OSMIUM

The Guide

Osmium - basic knowledge

Receive information on the international market of this exciting precious metal and risk a glimpse at its spectacular physics, breathtaking economy and superlatives in use!

Ingo Wolf
Osmium-Institut

Preface

My name is Ingo Wolf. All my life I have been engaged in business opportunities which are directed far into the future and which should not only give people a vision, but also good chances of success to gain a monetary advantage.

The Osmium market is an opportunity for the last "gold diggers and adventurers" of our time. An opportunity to be part of the beginning of a fast-growing market and to profit from the unusual advantages of Osmium.

In recent years, a structure of Osmium Institutes has been installed around the world, offering the end customer the security of buying only genuine Osmium and receiving only certified material.

In my job as director of the German Osmium-Institute, I have been assigned the task of accompanying the market introduction of crystalline Osmium. This exciting part of my life has led to the birth of the Osmium-Identification-Code and a number of interesting market changes around the world.

The sworn community of those who have come into contact with Osmium and who are now supporting the market launch has given me the courage to take on the daunting task of introducing the last of the precious metals simultaneously throughout the world.

I would like to take this opportunity to thank my phenomenal team of multi-lingual professionals who have worked tirelessly to plan, program, train and discuss to make the Osmium market as it is today possible.

From all the information gathered, this book has now been produced, which is dedicated to tipsters and retailers. They should have a profound knowledge not only about Osmium, but also about related fields of science, in order to be able to answer questions from customers, trade partners and the press with profound information.

Yours,

Ingo Wolf, Director of Osmium-Institute Germany

OSMIUM

Content

The fascination of the Osmium market

There is a reason why the number of people who invest in Osmium, sell it, design jewelry from it or trade in it is growing steadily and rapidly.

The absolute fascination is based on few influencing factors, which are increasingly rare, if not impossible to find in our new business world. That is why we dedicate the first few lines to the fact that Osmium is on the market and can be traded for real.

Osmium is the last of the eight precious metals to be introduced to the market. The reason for this is trivial. Before it could be crystallized, it was simply toxic. Or more precisely, when exposed to air it forms an oxide which is harmful to the lungs and eyes. With crystallization, this changed significantly, because in the crystallized state osmium tetroxide does not form under normal conditions and far beyond.

In addition to this, Osmium is unforgeable. Precisely in our times, when nothing is sacred to the deceiver and one must constantly keep an eye on one's property, it is especially important to have absolute clarity that the material assets one acquires are genuine and unadulterated.

Even more exciting is the incredible scarcity of Osmium in the earth's crust. You could load the entire extractable amount of Osmium into a small car.

As a final point, I would like to mention that Osmium simply looks so beautiful due to its crystalline surface structure that jewelry made of Osmium in sunlight will make even diamonds look boring.

Osmium is truly fascinating.

The history of the OSMIUM Institutes

The German "Osmium-Institut zur Inverkehrbringen und Zertifizierung von Osmium GmbH" today serves the purpose of ensuring a standardized approach in the trade and processing of crystalline Osmium and promoting it internationally.

However, the institute has a long tradition in the metal trade and has emerged from the Commodity-Trade GmbH, which in turn was founded a long time ago through a shell purchase. With the work in the metal trade, a team of people who lived and loved metal trade already existed when the company was later restructured into the Osmium-Institute.

The orientation at that time before becoming an institute focused more on strategic metals. These are metals which cannot be replaced in industry at defined points and which are therefore also regarded as critical by states. They are therefore hoarded by state institutions, industry and private individuals for safety reasons and for reasons of speculation.

These metals will be the very first to run out, because they are limited in resources, usually not easy to extract or separate and unfortunately, they are not found in every country in the world. Therefore, the countries that control such deposits have a real market advantage.

For this reason, the former company Commodity-Trade GmbH focused on metals such as indium, germanium, gallium, neodymium or praseodymium. Of course, metals such as lithium are also interesting, but value density and storability are factors that must be taken into account when selecting investment metals. Nobody wants to go on a truck trip with their lithium in case of a threat.

With the inclusion of crystalline Osmium in the range of offers, the myth of a new investor jewel suddenly arose, which held some superlatives for the company.

These included, for example, the enormous value density. Today, a single cubic centimeter can carry 30,000 euros around with it. That is a huge number.

The first talks in the market were positive throughout and in 2014 the company management decided to limit itself to Osmium.

Stocks of the metals mentioned, but also of hafnium, tungsten, platinum, silver or tantalum, were sold off. At the same time, all employees were trained and prepared for their new tasks at the institute.

A new market provides new tasks and challenges. This is also the case here. The scientific handling of the metal and the information to be disseminated had to be learned. At the same time, a trading network was to be thought of, for which future instruments and tools had to be created.

The tasks are carried out by the internal team of experts and a number of consultants and scientists.

Today, certification and marketing are carried out internationally on this basis. Traders are trained and informed, processing companies are instructed and new partners are educated.

Each customer shall have a contact person in each country who can provide valid information.

For private persons who own or have owned Osmium, the Osmium-Institute is the information center that can check for authenticity and answer questions about trade, export, import, transport, insurance and storage.

The Osmium-Institute in Germany has the main task of promoting the expansion of the network of Osmium institutes abroad.

Osmium institutes are only involved in trade within the framework of the first introduction to the market. All trading tasks are in the hands of traders and wholesalers and their networks in almost all countries of the world.

Osmium institutes support the distribution with relevant information, training and contacts. They maintain a large number of websites, set up information platforms, operate an FAQ list and video channels. They also support social media work by providing media material.

If you too see your new role in the national and international expansion of the Osmium trade, then please read this book, because it will give you the expertise to be successful in the Osmium market.

Inform yourself about the distribution of Osmium.

Picture: Osmium-Pearl

It is worth it.

About the handling of this book

I have tried to structure the book in a way that you can use it like a reference book to get quick and precise information. This information is mainly found in the FAQ towards the end of the book. Those are the questions that are constantly asked to me and my team. These questions are answered in as much detail as possible.

On the other hand, you can read it like a novel from front to back. In order to sweeten your learning, I have included a little story here and there, stories which we have experienced on the path we have taken so far.

Purely physical facts are presented in tables. You don't have to know these data by heart, but they make it easier to talk to customers if the question goes a bit further into detail.

At the end of the important chapters you will find a short summary of a few lines that you can use if you would like to read the book crosswise at first.

Also, you will come across exclamation marks here and there, these marks are used when a subject area is dealt with for our partners that is relevant for examination. To learn for the exam, learning along the exclamation marks is very practical. All other facts are marked blue.

Last but not least you will find a picture or illustration interspersed from time to time. These pictures of Osmium were taken internationally with a team of beautiful women whose faces stand for Osmium.

In addition to this book, there are also a number of brochures and reference works and many websites. The internet pages are marked red.

By the way: Nobody is immune to making mistakes. And, of course, as a writer, I am, too. Therefore, I ask all readers to look carefully for mistakes and inaccuracies, so that each edition of this book will be better than the previous one.

Yours, Ingo Wolf

How everything started...

I met my friend Rolf at a precious metal fair in Munich. He visited our booth and explained to me in his Swiss dialect that he was surprised that the precious metal dealers knew so little about Osmium. He told me that he was able to crystallize it.

We had offers of strategic metals at the fair and he had seen our exhibitors at our gold and antimony exploration fields in Bulgaria.

This man is one of the most impressive scientists I have met in my life. And that means something after almost two decades of science television at Science-TV GmbH. What he had achieved was a milestone in metallurgy.

He was disappointed because companies exhibiting at the fair were more likely to be recruited from the dry financial environment. Nowadays, it is well known that not every metal trading company has its own separating facility, and that they are more committed to trading. It is actually a pity that a lot of expertise is not directly available to the public in this way.

However, the employees of these companies are then rather bankers, salesmen or representatives of an existing trade.

Well, between us an interesting conversation unfolded, which culminated in a handshake in the evening and initiated a cooperation.

My question on that day was: " Well, is it still toxic when it crystallizes or is it no longer poisonous?"

The answer could not be more unequivocal: "It isn't anymore. It's non-toxic, beautiful and can be made into jewelry."

And that's the answer that started our collaboration.

The birth of the Osmium Institute.

Because Osmium was simply unknown at that time. You couldn't buy it, and you shouldn't have, because the black powdery sponge, which is really called Osmium sponge, is harmful to lungs and eyes.

Private persons are advised not to deal with it and should not come into contact with it. All processes in the laboratory are dangerous, complex and critical in their execution. They are performed under extreme pressure and at equally extreme temperatures as well as under really elaborate safety precautions and using particularly precise measuring methods.

That is why for years only the traditional materials silver, gold, platinum and palladium were traded. Among the precious metals, ruthenium is also interesting, but rhodium and iridium are certainly not. These two metals are traded by companies that simply buy precious metals without reflecting how these metals will be used in the future. So, the last remaining precious metal is Osmium.

And now in its crystalline state, more than 200 years after its discovery, it can finally be introduced to the market.

Now you can look forward to lots of short information and many small episodes:

Osmium facts: Technical, historical, scientific and economic facts of the international market launch of Osmium are marked in blue.

Addresses and presentation: Internet pages and classifications are marked red.

The bible of metal trade: An overview of the strategic investment metals with comparisons and parallels to Osmium.

FAQ: Frequently asked questions

Tables: Physical data and customs descriptions

Osmium facts

Picture: Rohstoffnacht (Commodity Night) with speaker Ingo Wolf

At first glance, Osmium seems to be a not very well-known element. Not even all precious metal traders know it and ultimately it is their profession to trade with precious metals.

Almost all other precious metals have been on the markets for a long time and are now well to very well known. Ever since palladium suddenly skyrocketed due to new applications, investors have been looking at precious metals again. Everyone already has gold and silver in their safe for bad times.

However, what was missing was an element with which to bring a little more fantasy into the investment business. Ruthenium was one such metal. It's not really rare, but it also made a significant price increase in a short time.

Since Osmium can now be sold in its non-toxic and beautiful crystalline form, the jewelry market and the investment market seem to have found a new wonder metal.

The Osmium-Institutes

Picture: Surface of crystalline osmium behind the logo of the Osmium Institute

The "Osmium-Institut zur Inverkehrbringen und Zertifizierung von Osmium GmbH" serves the purpose of ensuring the identification of crystalline Osmium.

The tasks are carried out by a team of experts who inform retailers, train processing companies and are available as contact persons.

For private individuals and companies, the Osmium institute provides experts who confirm the authenticity of Osmium and verify the Osmium-Identification-Code.

Osmium institutes are the contact point for press and television to obtain information about Osmium and its use.

They maintain a FAQ list, which is regularly translated into other languages, and answer questions from all scientific fields related to Osmium.

The German Osmium-Institute in particular also has the task of establishing an international network of regional institutes on all continents.

However, the primary task of the institutes is the introduction of Osmium on the world market. This market introduction concerns all processes from the import of crystalline Osmium to Germany to the first delivery to wholesale partners in the various countries of the world.

Internationally, Osmium is only imported into a country by the respective regional Osmium-Institute. The aim is maximum security for buyers and processors.

Picture: Osmium Round Bar in raw form and Osmium-Diamonds

Osmium crystals

Jewelers and processing companies are now increasingly using Osmium in the production of jewelry. This is mainly because of the unusually beautiful crystals.

The shapes can be very creative. There are only a few processing guidelines to be adhered to when incorporating Osmium.

The guidelines for the processing of Osmium by jewelers can be found at the end of this book in full form.

In jewelry making, Osmium is incorporated into the jewelry like a diamond or a precious stone. Every jeweler and manufacturer has the possibility to order almost any shape to be used in jewelry.

In fact, only the degree of crystallization, the thickness of the layer and the width of the ridges for further processing have to be considered. Here and there it is also necessary to give special consideration to the back of the Osmium pieces, the surface roughness of which does not really require special attention.

To get an idea in normal words: Normally these are smooth to mirror-smooth, depending on the crystallization process. In technology there are special terms for this surface texture, but I think you can imagine it rather well this way.

The roughness comes as a term from surface physics. In the production of technical devices, it is an important measure. For Osmium it is interesting in two different aspects.

Firstly, there is the structure of the crystals on the surface, which tells us how far the crystals grow out of the surface. This is important, for example, to indicate whether the hand of a watch can move over the dial. But quite trivially, it also determines whether an Osmium pearl can get caught on clothing.

The second aspect is the crystal structure on the back of the pieces. It consists of such small crystals in the nano millimeter range that you can see your own reflection in them.

Roughness is thus the term used to describe the unevenness of the surface height. For the quantitative characterization of the roughness there are different calculation methods, which take into account different characteristics of the surface.

With other metals and materials, the surface and thus their roughness is altered by processes such as grinding or etching and by corrosion.

For Osmium, these processes are not used because Osmium is not corroded and is not changed by etching. It can be grinded, which would be quite senseless, because the exact purpose of the crystals is to be preserved.

If the back of a flat Osmium structure can be seen in a piece of jewelry, it is important to check the quality of the back. However, this is not included in the pricing of Osmium.

At this point it might be a good idea to clear up a much-suspected rumor:

If you see a crystallized structure of Osmium and turn it around, the back is metallically shiny but not spectacular. For this reason, many people who encounter Osmium for the first time suspect that the Osmium crystals are deposited on another metal. This is not the case.

The reason is that the disc begins crystallization at many points on a surface in parallel, which then grow together as the crystallization progresses.

Therefore, these crystals are very small and break up as they continue to grow upwards. So, the bottom side is smooth and the top side is characterized by large crystals. The purity is always the same and does not depend on the size of the crystals.

Since the degree of crystallization depends on the thickness of the Osmium layer, which in turn depends on the crystallization time, it can happen that a piece of Osmium is grown with very small crystals that twinkle rather than show the strong sparkle. This growth may be desired, but is only successful in very few cases.

During the production of such pieces it can happen that the individual crystallization sprouts in the reaction vessel do not grow together completely to form a single layer. Small holes are formed.

These holes are irregular and let the light through. The Osmium therefore looks porous. Such pieces cannot be cultivated intentionally and normally they are not desired, but for some jewelry it might be interesting to achieve light transmission.

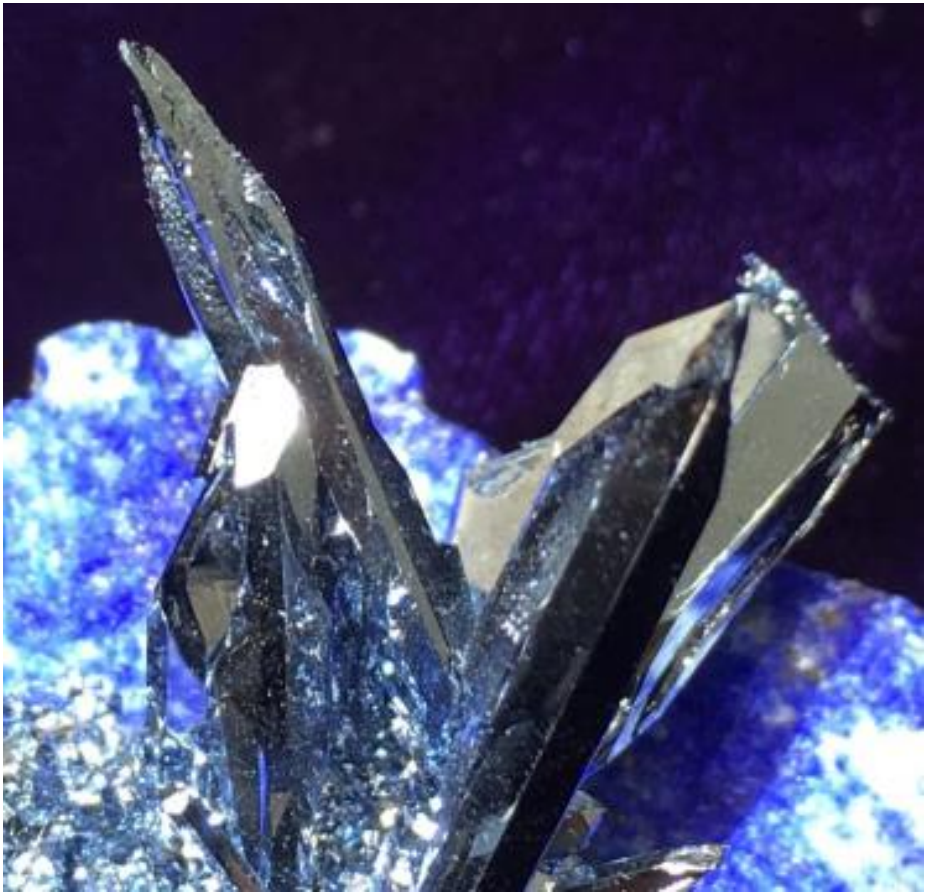
In such a case, exactly these pieces are then well applicable. For this reason, some pieces with high and uniform porosity are always kept and collected in the institutes for special applications.

Besides all flat pieces, three-dimensional Osmium crystals can also be grown. These structures are very different. There are generally three types of three-dimensional pieces.

- Structures that grow irregularly in several directions and form different crystals in the process.
- Structures that form around a tube to form a coiled area of crystals that looks like a tube.
- Structures around three-dimensional objects made of carbon, onto which the Osmium is crystallized with a layer thickness that is as constant as possible. The aim here is to achieve particularly uniform crystal growth.
- A special case of such a structure is the uniform sphere, which is also called Osmium Pearl. It is the most difficult product to produce from Osmium.

Summary:

Osmium cannot be crystallized in every planned form. There are also three-dimensional structures, but these structures are also grown in the laboratory, since Osmium crystals occur in nature only as very small crystals. These grow undirected and are usually not larger than 2 millimeters.



Picture: Osmium crystal

In this form, Osmium crystallizes under conditions that are not precisely controlled. Three-dimensional crystals are formed, as known from many minerals in nature.

However, this is a crystal grown in the laboratory. Osmium has also been found in nature in solid form, but only in very small quantities of less than a tenth of a gram per crystal.

Availability of Osmium

Crystalline Osmium is only available worldwide from selected specialist dealers who supply Osmium exclusively with a certificate of authenticity issued by the "Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH" in Germany, which is linked to each piece of Osmium with an eight-digit letter number code. This is the Osmium-Identificatio-Code. (OIC)

Raw Osmium, which occurs naturally in the environment together with platinum, is mainly extracted in Canada, Russia and Africa. All other recovery sites are rather small in comparison.

After crystallization it is sold and becomes internationally available. Unfortunately, it does not make sense for speculative investors to purchase raw Osmium, as the crystallization process works with only a few fixed suppliers and does not purchase raw Osmium from private sources. Above all, the internal guidelines for ethical sourcing should be observed. This means checking suppliers for the ethically justifiable handling of Osmium in extraction, separation and production.

In addition, speculation should be avoided at all costs, as the costs of crystallization and the high reject rates already cause prices to rise sharply. It is not necessary that another component in the raw materials trade leads to rising prices.

It should also not be forgotten that some substances are deliberately not to be traded by private persons, as the risk of injury with hazardous substances and reagents is high.

In addition, each batch would have to be homogenized and analyzed before use in production, which is expensive and time-consuming and can be avoided with a fixed pool of suppliers.

The decisive reason for not purchasing from private sources is, in addition to possible money laundering, the particularly important ethical sourcing, i.e. the adherence to strict ethical standards and guidelines during extraction and production, which in the case of Osmium go far beyond normal standards. These principles are adhered to by all current suppliers and are subject to constant review.

Whoever buys crystalline Osmium can be assured that no child labor was used or that other unethical aspects have been taken into account in its extraction. This is guaranteed by the short and clear links in the supply chain. It is only purchased from internationally known and reputable suppliers.

Therefore, the raw Osmium for crystallization is never purchased from private persons, uncertain sources or speculators. This is absolutely independent of the prices offered. In addition, a new source of raw Osmium must first go through an approval process with a purity and quality check. Especially when prices are particularly low, there is a suspicion that the product may have been stolen and is to be resold.

Raw Osmium does not yet have an OIC, so it cannot be clearly assigned to an owner or traced.

Osmium is therefore only used and distributed in the jewelry market in its crystalline form. The original form of Osmium is the harmful Osmium sponge, which is not used.

At this point we would also like to strongly advise against the purchase of Osmium melting beads, as there is no guarantee that they are harmless in terms of their toxicity. It is assumed that the amorphous surfaces are still clean after melting in a vacuum or under inert gas, but that they oxidize to Osmium tetroxide in air, albeit slowly.

Since 2014, however, Osmium is now available in its crystalline form. In this way, even collectors of elements can acquire Osmium safely and add it to their collections.

Osmium is available for these purposes in the form of jewelry and in small bars of various sizes as investment metal.

Osmium is the complement to gold and silver in the investment market:

… not replaceable and incredibly rare

… available in the form of divisible bars

… presumably even more valuable in times of crisis than it already is

… the new asset class

In the earth's crust, which is assumed to be 7 km thick, there is less than **9 m³** of Osmium compared to about **13,800 m³** of gold.

In terms of volume, gold is thus 1,500 times more abundant in the continental crust than Osmium.

Gold simply won't run out.

Osmium will!

And most likely soon....

Summary:

Osmium is particularly rare and is mined and traded according to strict ethical rules.

Compared to Osmium, gold is a really common and an easy to process element.

Raw Osmium is never purchased from private sources.

The purchase of Osmium melting beads is strongly discouraged.

Rarity

Osmium is not only the rarest precious metal, but also the rarest non-radioactive element of all. Osmium is mined together with platinum. Only about one ounce of Osmium is contained in 10,000 tons of platinum ore. Moreover, the separation of metals is complex and also expensive.

As soon as the production of platinum declines even slightly, Osmium will become even rarer, because clearly there will never be a mine that produces only Osmium for economic reasons. Osmium will therefore always remain a by-product. At the moment, Osmium production is just over one metric ton per year.

Part of that is available for crystallization. The rest is used in very small quantities for medical and university applications.

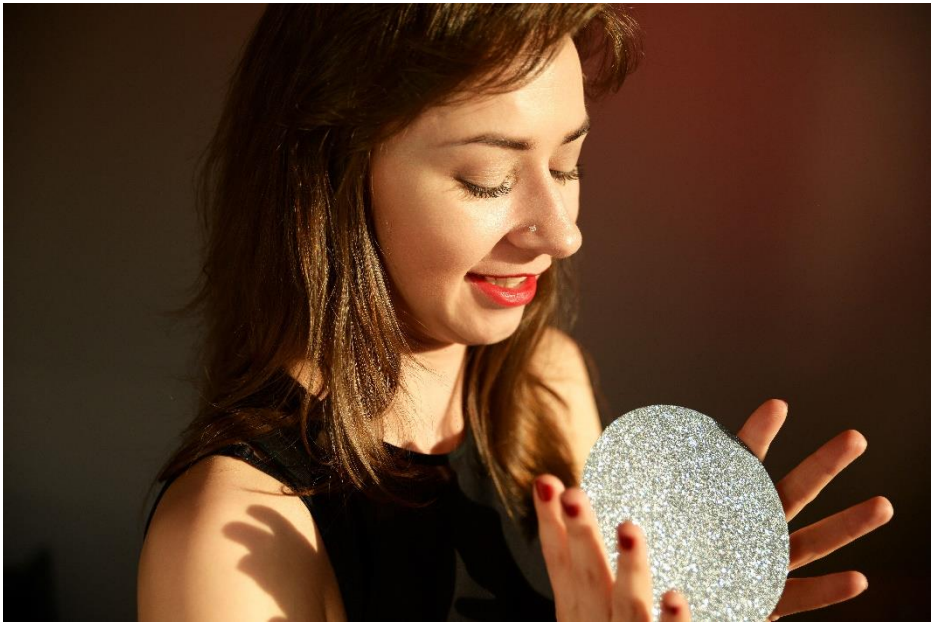
However, reliable and precise data on the production and rarity of Osmium is still not available.

Data is always collected when a market and its size make it seem reasonable to initiate more detailed research. One of the tasks of the Osmium institutes for the coming years will therefore be to collect valid figures on mining and availability. The results will certainly be very exciting.

An example to illustrate the rarity:

- To produce one ounce of Osmium, 250 forty-ton truckloads rim-full of platinum ore are needed.
- This ounce of Osmium fits into the volume of a single sugar cube. Approximately 9 m^3 of Osmium are available in the world.
- About 2 m^3 of this volume is mineable and transportable. This corresponds to approximately 44,000 kg of Osmium. This figure is an estimate, so it can vary considerably in both directions. However, scientific and reliable surveys are not yet available.

Osmium is in the fast lane!



Picture: Osmium Investors-Disk

Scarcity, use and rarity clearly speak for the element. The current success of Osmium is actually only due to the fact that it has been possible to manufacture products that can be used as semi-finished products for the jewelry market. Any shape can be cut from an Investors Disk.

For this reason, any kind of disk or bar shape can be seen as neutral. It does not depend on the taste of jewelry or the fashion of a certain year. It is processed when the jewelry is ready to be made and not before. The processing will certainly be further developed in the coming years.

Whereby a new trend has also become very visible. Some Investor Disks and some Osmium-Bars will probably just remain in a safe and may be sold from investor to investor. But with this many disks will never make their way into the jewelry market. Basically, this investor behavior is again an indication of further shortages.

Osmium is the generation metal

Perhaps one should own Osmium because there is a growing demand from jewelers and jewelry manufacturers. At the beginning of the Osmium market, Osmium was limited to well-informed designers and pioneers.

Now it is becoming more and more mainstream, although it has certainly not yet arrived at a real mass market and won't for some time.

Osmium, which is processed by jewelers and bought by customers, will then disappear from the market completely and find its final destination with private customers. It is worn as jewelry or is well kept at home.

In any case, it is usually not returned to the commodity market, as it cannot simply be melted down like gold or silver.

Osmium-Diamonds and stars can be removed from the jewelry without any problems and are unaltered even after being processing into jewelry. In other cases, Osmium cuttings, the so-called offcut, must be elaborately processed in the recycling process. Thus, the rarity inevitably continues to increase.

We are not talking about a shortage of Osmium or the search for new deposits, but about a probable unavailability that has never been experienced with any other element.

The Osmium market is supplied via a so-called natural monopoly, because there is internationally only one company that can crystallize Osmium and only one institute through which the marketing is guaranteed internationally.

The Osmium price is formed by a number of essential factors that include supply and demand. However, there are also factors such as electricity consumption of crystallization, stocks of raw Osmium, pre-order volumes, number of active furnaces or simply the current reject rate.

If unavailability is reached, this price development could trigger a special case on the market, the occurrence of which is really possible but difficult to estimate in terms of time. It is clear that anyone buying Osmium should not speculate, but should have a long horizon.

There is currently no Osmium stock exchange on which Osmium can be freely traded. Efforts to establish an exchange are already in progress, but the various initiators will certainly need time, as Osmium is not yet available as an exchange-traded commodity, but is sold in its physical form.

Perhaps it is also quite positive that a precious metal really only goes from hand to hand physically. Just think of the decoupling of the dollar from gold and the consequences that have long shaped our current financial world and its inflationary development and the turning away from tangible assets.

The now well-established term "generation metal" seems to have been wisely chosen. I like it quite well, because it indicates that Osmium is being purchased for the next generation, perhaps to be inherited. This is a way to detach oneself from all short-term trends.

The unavailability could then occur in a longer period with higher probability and bring real profit. Because it is certainly not so easy to predict such an effect. Even Osmium experts discussing this case can only guess at it because of the many influencing factors to be considered.

This phenomenon is often brought up and therefore already has its own name.

It is called Osmium Bigbang!

The Osmium Bigbang

According to experts, the comparison with the Big Bang should refer to a price development that could trigger a multiplication of the price of crystalline Osmium.

The following factors can support this development:

- Declining production in the platinum and nickel mines.
- Falling concentration of Osmium in mined platinum.
- Only small amounts of crystalline Osmium are still available.
- End of recycling due to the high effort and extreme prices in recycling

Once all these conditions have been met, scarcity will peak. It is difficult to predict how long this will take.

On the basis of the Osmium price in 2018, over 55 billion Euros would have to be invested or sold in Osmium on the world market in the future in order for all the Osmium that is suitable for mining to enter the market.

The effect can, driven by hype, occur in a few years, but it can just as well last a decade or more.

This is another reason why Osmium is called the generation metal in America. Because you buy Osmium for your children. One hopes for a future increase in value for the "next generation metal".

Some experts expect the Osmium Big Bang in a time frame of a manageable 10 years. Such assumptions are not based on a scientifically reliable calculation.

If large jewelry manufacturers step on board early, the Big Bang will come closer. If the market launch takes more time, then it will take longer.

In this case, continuous production in future jewelry manufacturing will decimate the available crystalline Osmium in a short period of time, since it is not possible to produce any amount of completely crystallized and cut Osmium at any speed.

The development of Osmium-Pearls is particularly exciting, as they generate higher reject rates in production with increasing quantities.

The result of the overall development probably leads to

- less and less Osmium for retail.
- investors being more likely to keep their Osmium than to sell it.

Summary:

The Osmium Big Bang is a theoretical concept in which a severe shortage or unavailability leads to a shift between supply and demand.

Availability is reduced by little extraction and almost no recycling. In this case an extreme price development may occur if the demand remains unbroken.

Osmium is the superlative with special properties

The reason why jewelers slowly but surely want to work more with Osmium and why investors have discovered Osmium as a new asset class is due to the special properties of the precious metal.

Besides the myth it is surrounded by, it is also physically considered to be absolutely special.

Osmium has the highest abrasion resistance of all substances. You could make the most durable nail file in the world out of it.

It also has the highest density of all elements and all compounds in chemistry. Therefore, it cannot be counterfeited by putting a similarly heavy core into a bar.

It has a unique blue-silver to blue-white luster, which unfolds especially in the reflection of sunlight and LED artificial light.

Its high reflectivity reflects light from the crystal structure in all directions. So, you can see the sparkling and overwhelming color spectrum in sunlight from every angle.

It shields especially well against gamma radiation and is a superconductor at low temperatures.

Osmium's compression modulus, i.e. its resistance to extreme pressures, is also higher than that of all other elements in the world. You could build the tallest houses or the sturdiest submarines, if there just was more of it.

Opportunities with Osmium

Osmium is the new silver or gold for investors. Since it is irreplaceable and incredibly rare, it will probably be even more valuable in times of crisis than it already is today.

In addition, Starrows, just like table bars, can be divided into small units if necessary.

The extreme shortage will probably quickly lead to unavailability. If Osmium has been introduced to the market as a jewelry metal by then, the shortage will become even more extreme, as described above.

This results in the following opportunities for Osmium owners:

- to sell into international markets after a longer holding period
- unlimited durability and no corrosion
- easy transportability
- consistent verification of authenticity via the OIC, see below.
- extreme value density, low storage volumes
- transfer to a new owner via OCC

Attention:

Before you buy Osmium privately, check www.osmium-institute.com or contact your local Osmium institute. You can enter the Osmium Identification Code "OIC" at www.osmium-identification-code.com and at www.osmium-jewelry.com to check the Osmium offered. Dealers can be found on the page www.osmium-partner.com.

In case of doubt please always call an Osmium institute for assistance.

Discoverer

In 1804 the British chemist Smithson Tennant discovered the element Osmium together with iridium.

He succeeded in doing so while investigating the insoluble residues of platinum ores that had previously been dissolved in aqua regia.

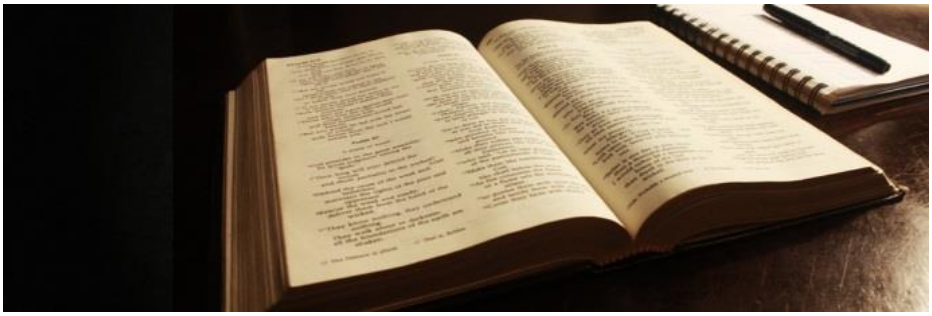
Picture: Smithson Tennant

1761 - 1815

Because the Osmium tetroxide smelled pungent and garlic-like, Tennant named it "osme" after the Greek word for smell. Osmium received its present symbol Os in 1814 from Jöns Jakob Berzelius.

The first important application of the metal was its use as a material for filaments in incandescent lamps by Carl Auer von Welsbach at the beginning of the 20th century.

Interesting facts about Osmium



- Osmium is about 1,000 times rarer than diamonds in the earth's crust and is used for the production of spectacular jewelry and exclusive wristwatches.
- It is available through many jewelers and every listed retailer and wholesaler affiliated with an Osmium institute.
- Most of the Osmium in private hands is concentrated in Europe. But markets like Australia and China are pushing into the market and threatening to change it forever.
- The enthusiasm for Osmium is growing steadily and internationally.

You surely know this brand: „OSRAM“?

The company name of the lamp manufacturer is based on Osmium. It is a combination of **Os**mium and tungsten (German word: Wolf**ram**)**.**

The first lamps for which the filaments were made of Osmium produced a wonderful soft light. A light bulb from that time can still be seen in the Deutsches Museum today.

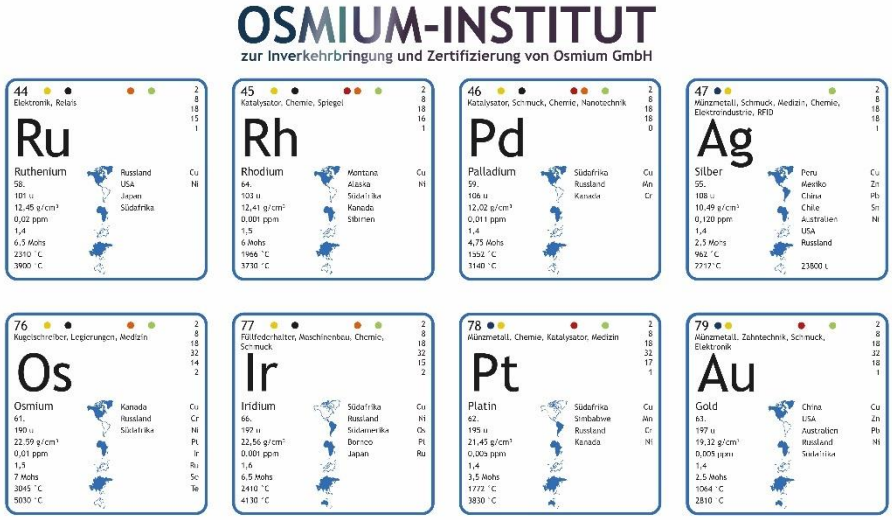
Unfortunately, Osmium was simply too rare and was replaced by tungsten completely!

The precious metals and their star

Precious metals are metals that are corrosion resistant, which means that they are chemically stable in a natural environment under the influence of air and water.

Because of this stability, gold and silver have been used since ancient times to make jewelry and coins. In the last four centuries platinum metals have been discovered, which are similarly corrosion-resistant as gold.

On the world markets, gold, silver, platinum and, since 2019, palladium have played a major role to date.



Picture: Section of the periodic table with Osmium among the eight precious metals.

Since 2014, Osmium has been available from Osmium institutes and their retailers, as it can now be safely used in crystalline form.

It can therefore be used as an asset or as a decorative metal in the market. Non-crystalline Osmium is harmful to health. For this reason, Osmium could not be placed on the market before the crystallization process was discovered.

- The precious metals became quickly presentable from right to left, one by one, at intervals of several years.

- Gold and silver have, of course, been known since ancient times and were for a long time the only reliable means of payment. Osmium is certainly not so at present, but its absolute unforgeability opens up perspectives.

- Palladium and platinum were already introduced to the financial market before 2000 and were also used for special pieces of jewelry, such as the open platinum rings, which can hold a diamond without a setting between the two ends.

- The last precious metals launch to date was ruthenium, which started with a furious rally in late 2017.

- Iridium and rhodium have had similar price movements on the commodity exchanges, but are not even rare or suitable for special applications.

Osmium, as the next and last of the eight precious metals, should therefore be at the beginning of a positive development.

The crystallization process and its price

The Osmium price depends on a number of parameters that are not only driven by the market, but also by the expenses, risks and imponderables involved in growing crystalline Osmium.

The crystallization process is of course subject to secrecy. Therefore, it is always difficult to explain something and to do this as openly as possible without telling exactly what is happening. Even the State Institute Partners only know a few details. These details, however, show us time and again how complex, difficult and ultimately how dangerous the process is.

In fact, the discovery of the process back then not only depended on the research work, but was supported by random chance in some neuralgic places.

The best way to start here is to start with a story that not many people know. Only once a large amount of Osmium was processed for a very special workpiece: The original meter in Paris. For a long time, the original meter defined the SI length unit meter in our western world!

Platinum and iridium were used to manufacture the original meter. The platinum contained Osmium, which had to be removed metallurgically. During the process a lot of Osmium was released in the laboratory.

Since the effects of Osmium were not yet known exactly, the work was carried out under low safety standards. The man who was in charge of processing the Osmium died by inhaling Osmium tetroxide.

In small doses and at room temperature, Osmium tetroxide is not dramatically hazardous in free air because it is volatile. Then again, even the smallest amounts immediately cause irritation of the respiratory tract, lungs and eyes.

For this reason, the normal work with Osmium is carried out under particularly high safety precautions, which takes place at low temperatures and pressures in the normal range.

If you want to change the crystal structure of a substance, suddenly everything is different. To get an impression, you can look at how carbon is turned into tiny crystals, which we call diamonds. The difference between the light and inconspicuous black carbon and a suddenly transparent diamond with special hardness is striking.

One gets an impression of how strongly the chemical and physical properties of a substance are changed by crystallization. This effect can be observed particularly well with Osmium.

The growing of diamonds is not expensive and also no longer particularly complex. In addition, the process is now well researched and can hardly fail or produce bad results. Moreover, it is absolutely harmless.

But if you work with a material that is processed with the most toxic chemicals under extreme pressure and unbelievably extreme temperatures, then you get an idea of what is required. Imagine, for example, how complex it is to have to precisely control an extremely high temperature under high pressure. These temperatures cannot even be measured exactly, let alone controlled.

All materials used are constantly at the limit of their resilience and it is simply to be hoped that no equipment will be destroyed from within, that the proportions are correct, that the material is perfectly placed and that many other factors that have to be observed will be adhered to.

More than 50 parameters play a role at the same time in ensuring crystallization. If only one parameter deviates slightly or moves in the wrong dynamics, everything was in vain.

If the apparatus is not accurate, the crystallization becomes uneven and you can start all over again. Everything that belongs to the apparatus has to be made anew for each new approach and cannot be used a second time.

Recovering the raw material afterwards or reusing an offcut requires an equally complex process and therefore the recycling of already crystallized Osmium becomes very expensive.

It must be distilled several times to get its purity. Of course, you have to keep in mind that these are not temperatures as in the distillation of alcohol. With some Osmium products, the process must be carried out up to 10 times in order to obtain a quality that allows a pearl or ring to be used as a piece of jewelry.

There is also a paradox at play. If you try to create several Pearls in a common reaction vessel, the processes influence each other. For example, suddenly one crystallization at one Pearl goes ahead and the one at another Pearl goes back in equilibrium. The result is that no Pearl can be used. It is not possible to intervene during the process.

So, if the number of objects you want to produce increases, the reproducibility of the process decreases. In other words, the more you want to achieve at once, the less quantity can be obtained and the worse its quality. In addition, the process cannot be automated. Crystallization is a sort of manual work. The person uses his experience to optimize the process.

There is no procedural approach to scale the process. And, to avoid the frequently asked question: It cannot be invented in the future either, because there are process variables that are simply already at their physical limits.

You never know what else will be invented, but nowadays you know quite well what will probably never be invented.

So, the sale of crystalline Osmium stands or falls with this process and the people who can perform it.

Summary

The new perspective of being able to obtain crystalline Osmium increases the demand for Osmium. When it was introduced to the market as crystalline Osmium, it was still largely unknown.

Osmium has no industrial applications because of its rarity and its appearance as toxic Osmium sponge. This changed with the possibility of crystallization at the beginning of 2014.

Crystallization made Osmium non-toxic by changing the atomic arrangement and opened up new markets and applications.

At that time Osmium was known to less than one percent of jewelers. Thanks to the products of Hublot, Ulysse Nardin and the growing jewelry market, this is currently changing. Even without the adoption of the Osmium Big Bang, Osmium is therefore a serious and very exciting precious metal.

Picture: Osmium Round Bar in laser light

Daily price

The price of Osmium is determined and published in Switzerland. It is not a price that is generated on an exchange solely by supply and demand. The data can be found on the Internet site www.osmium-preis.com.

The price essentially varies with the existing inventories in the crystallization operation and the lead times in crystallization as well as the current reject rates and harvest rates.

The storage of Osmium is only possible to a limited extent, as the quantities for crystallization are even lower than the occurrence of Osmium itself. Osmium is sold plus VAT or stored in a duty-free warehouse.

It must be possible to provide proof of purchase and authenticity at the time of sale. For this reason, the Osmium Institutes recommend that the electronic authenticity documents provided should always be handed over together with the Osmium in the form of the Osmium-Identification-Code as an eight-digit letter number code.

In the case of a private purchase, you enter the code on the Internet on the website www.osmium-identification-code.com or ask at an Osmium institute and you can compare the high-resolution scan of the corresponding piece with the real piece.

This comparison is sometimes even possible with the naked eye and is always clear. The best way to do this is to take a high-resolution photo of the surface of the piece offered and compare it with the scan on the Internet.

A new certificate can either be issued by an Osmium institute or simply printed out on the Internet.

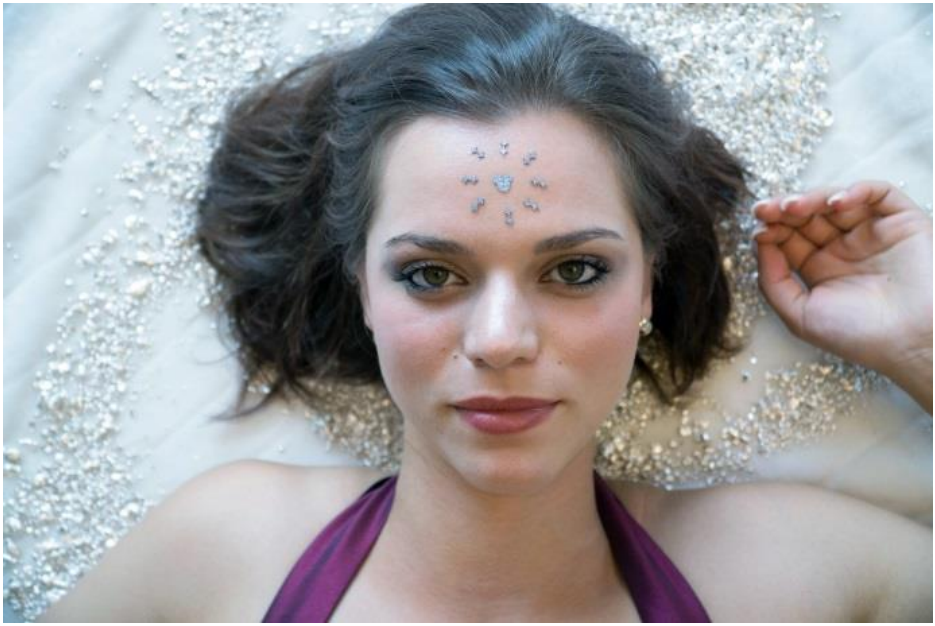
For the storage of particularly valuable pieces of Osmium, such as bars and discs, it should be considered whether it might make sense to store the code separately from the physical Osmium. This makes it difficult for thieves.

Especially the Owner-Change-Code (OCC) should not be kept with the piece, because it has a similar function as a vehicle registration document.

It can be used to register the new owner. Osmium can be stored, but most owners tend to keep Osmium within their home in order to have access to it at all times.

Osmium-Diamonds and Osmium-Stars are very popular with jewelers. Osmium institutes do not buy Osmium, nor do they trade in Osmium by buying and selling. They are exclusively responsible for the introduction into the market.

The most sensible way to sell is through jewelers who process Osmium.



Summary:

The price of Osmium depends on a number of parameters. It is formed daily. The price is a spot price and is not formed exclusively by supply and demand.

Demand drivers for Osmium

Key factors accelerating demand are:

- Osmium is crystallized in so-called semi-finished products, which still leaves the final application open.
- The political situation around the world is becoming increasingly explosive. Crisis hotspots are approaching and international problems in trade and among religions appear to be increasingly insoluble.
- Overpopulation and climate change are causing flows of people that are tantamount to mass migrations, making it necessary to keep assets transportable.
- The current problems in the diamond market are striking and devalue the stocks of diamonds acquired for investment. Due to the cheap production of artificial diamonds, which are at least equivalent to natural diamonds and also nature-identical, many traders run into problems and think about alternatives.
- The gold market has been subject to frequent frauds for years. With ever new business models, more and more broadly based companies are trying to score points on the gold market. They do this by making exaggerated promises of earnings and using ever smaller denominations in blister packs. Today you can already find bars with a tenth of a gram.
- There has been too much money in the market for many years. Real estate is becoming too expensive and people are looking for investment options that are within the limits of financial availability.
- In the Osmium market there are combinations of products suitable for every wallet or purse.
- Osmium is placed in the safe for the next generation and stays there for long periods of time.

- Increasingly, new players are entering the jewelry market, producing jewelry, watches and crystalline micro-sculptures made of Osmium.
- With the special microstructure of a spherical sphere, even the rarest pieces of jewelry, the so-called Osmium Pearls, can now be produced.
- The number of countries with their own affiliated Osmium institute is growing steadily. The aim is to ensure that Osmium is detected directly on site in each country.
- The belief in cash is fading. That's why investors turn to tangible assets.
- Some tangible assets change over time, as is the case with corroding metals, art, old cars or unmaintained real estate. The desire for stable products that outlast the times is growing.
- People who have earned their money in the last few decades want to leave their descendants a legacy consisting of suitable tangible assets.

Summary:

The demand for Osmium is growing in the face of increasing global uncertainty. Transportable values that cannot be falsified or are subject to ageing are in demand.

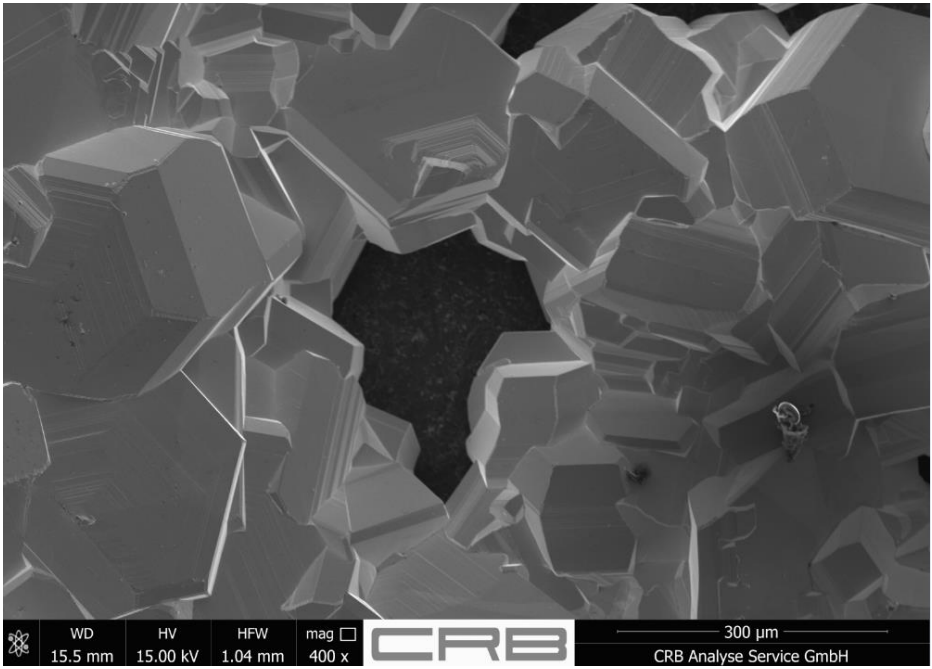
Cash will be used less and less over the years, as there are restrictions by governments that require proof of the origin of cash even for small amounts.

Thickness of Osmium semi-finished products in the delivery

Osmium is crystallized from an absolutely flat surface. For this reason, all Osmium pieces are absolutely flat on their back side. You can see the extremely small crystals, which are the first to settle, very well when you illuminate the back.

At first glance, one might think that the Osmium is applied to a carrier material. But it never is. All the pieces delivered are absolutely pure.

If Osmium is grown in a thin layer thickness, small holes can appear in the material.

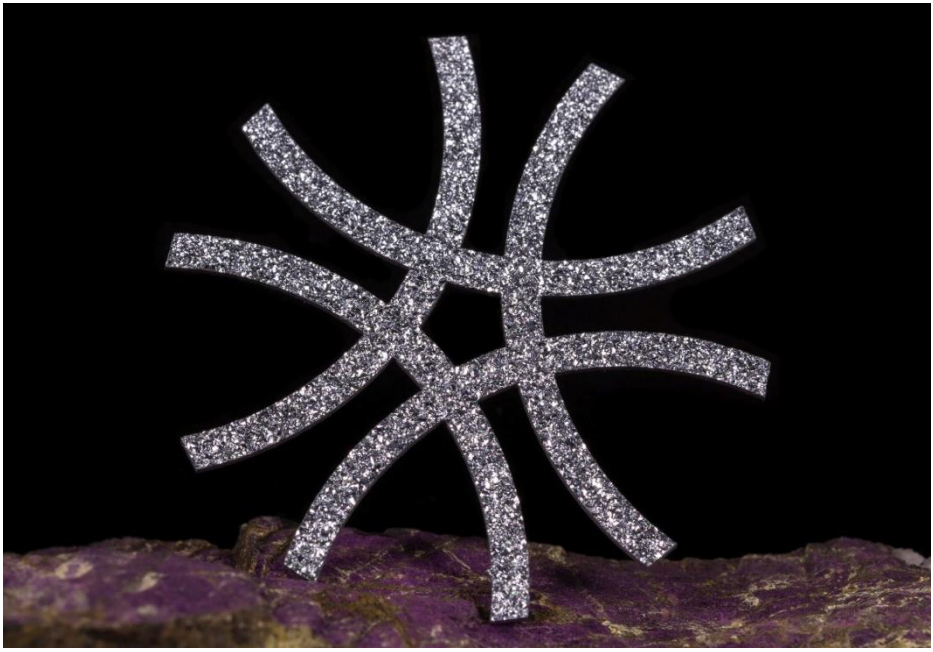


The holes can be in the microscopic as well as in the macroscopic range. In other words, in a size that you can see with the naked eye.

However, such pieces are only delivered to customers who want some kind of transparency or porosity. Otherwise, they go back into the process and are elaborately recycled.

As a rule, efforts are made to produce Osmium in very thin layers in order to keep the surfaces cheaper in price. This is especially important for shape cutting.

Here you can see an example of such a form for a watch face:



Picture: Osmium watch face as shape with cutout in the middle

If the layer thickness is low, then the growth time of the crystal is low and the individual crystals remain small. In addition, Osmium becomes bendable to a certain extent. However, if the thickness of the layer is increased because the Osmium has had a long growth time, then the crystals will also become larger.

This increases the Osmium-Sparkle, but on the other hand it also raises the price, because more mass of Osmium has to be used to grow thicker semi-finished products.

The cutting quality of wire EDM

For cutting Osmium, it is essential that the cutting accuracy is particularly high. Cutting to hundredths of a millimeter is still rather imprecise here. Cutting is done with a wafer-thin perfect wire of molybdenum or brass.

In general, it is also possible to cut with copper or silver. The choice of wire depends on the cutting speed, cutting accuracy and the deposition of wire residues on the Osmium.

Each workpiece must also be cleaned again after cutting. The deposits must be removed by multiple baths in acids. Depending on the wire, different baths are required.

When Osmium is cut, the wire runs under tension along the edge of the material and a rough-cut edge is produced.

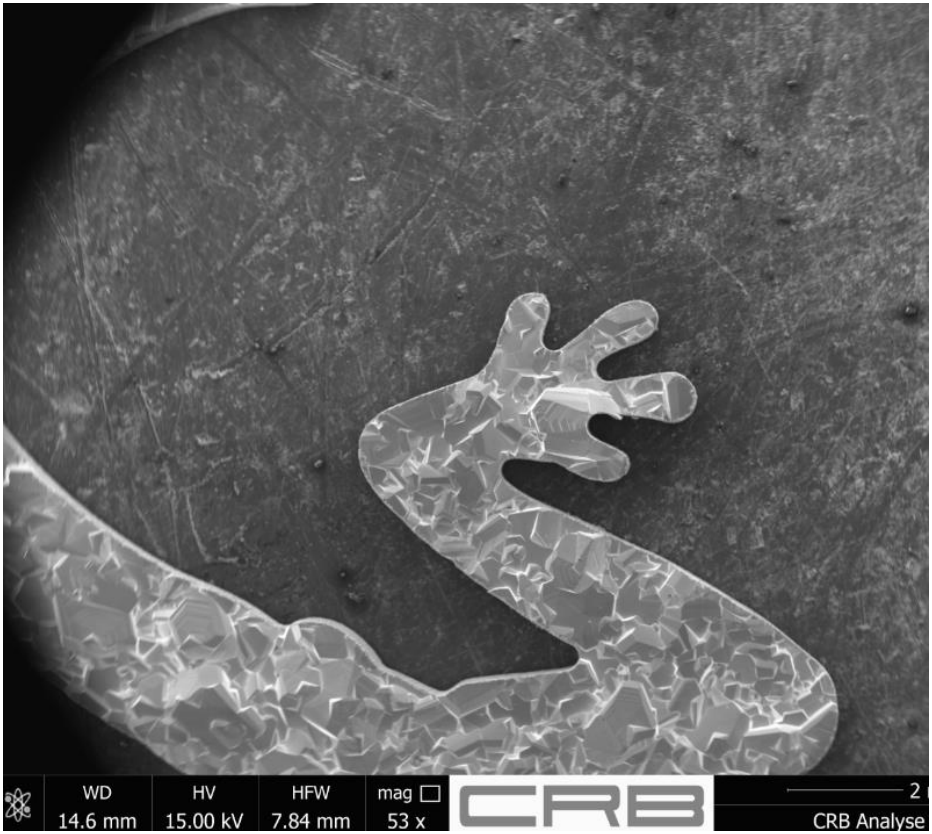
By repeating this process and by using finer wires, the quality can be increased to such an extent that the resulting surface of the cutting edge is reflective.

The cutting quality is therefore always related to the area of application. Semi-finished products are roughly cut, as they have to be cut into smaller pieces anyway if they are to be sold or processed.

But be careful with the term rough. Because even here we are already talking about an incredibly high quality of cut. There simply is an even better way.

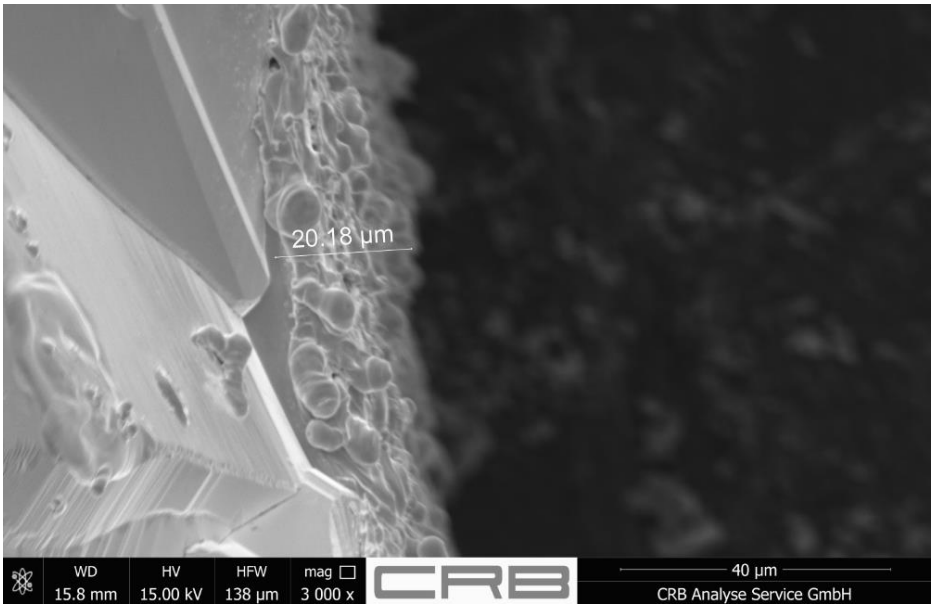
By the way, when cutting Osmium, the workpiece remains docked on a so-called nose until the piece is cut off.

You can see this on the index finger of the paw of the little salamander:



The individual crystal surfaces that form on the surface of the piece are also beautiful to see, as these surfaces are the identifying mark of Osmium. They are the basis of the recognition with the Osmium Identification Code.

On the next picture you can see the cutting edge in extreme resolution from above. The crystal surface can be seen on the left side of the picture. The cutting surface itself and its accuracy can be seen on the edge of the workpiece.

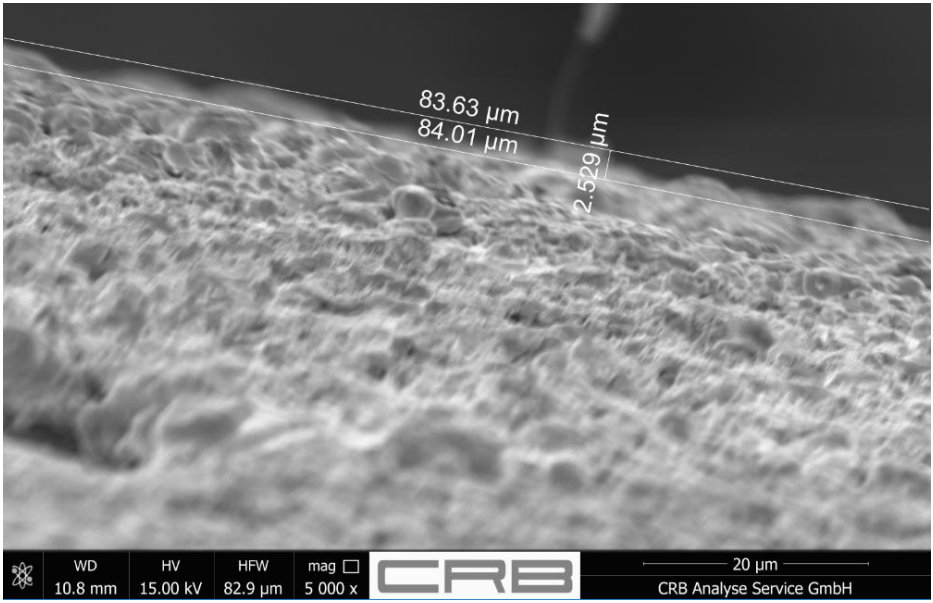


It is very easy to see where small melting areas have formed at those points where sparks have jumped over to the EDM wire and have detached from the workpiece.

The 3,000-fold magnification shows exactly that the deviations are on average only in the range of 20.18 micrometers.

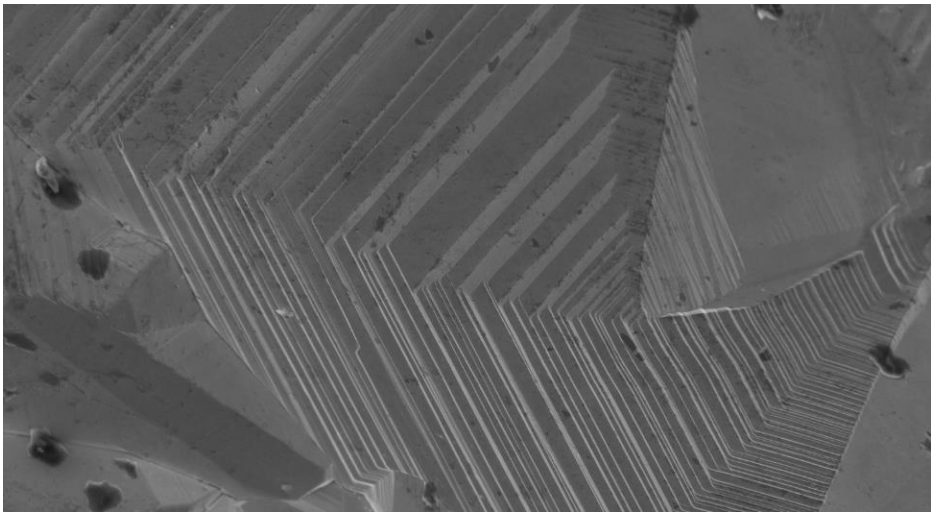
The small elevations on the crystal surfaces are impurities which are removed by acid during the processing.

On the next picture you can see very well how exact the guidance of the wire along the cut is.



Picture: View along an Osmium section in top view

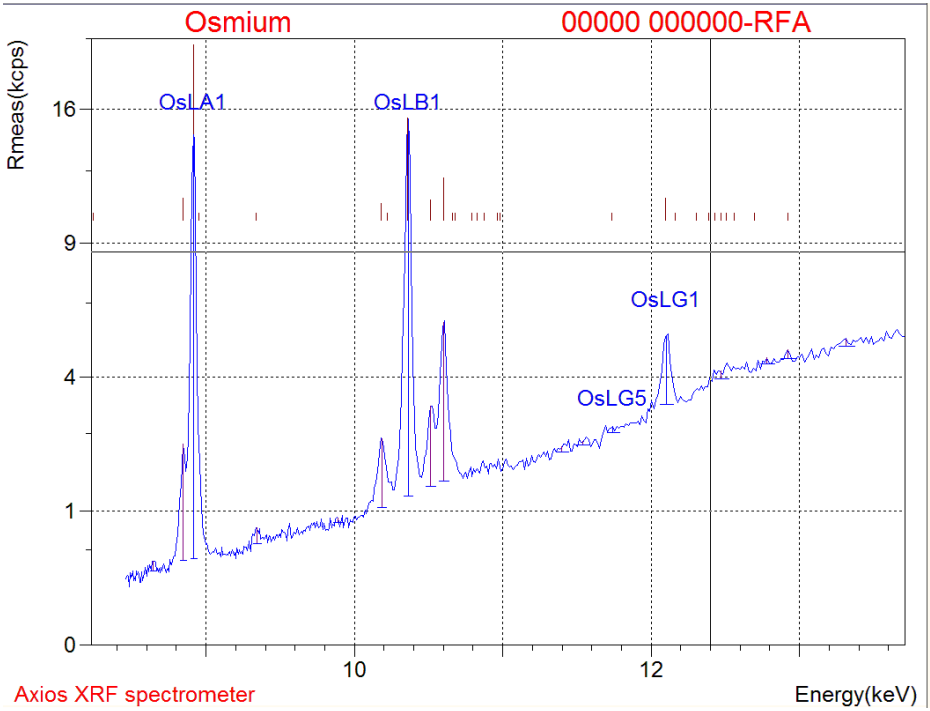
To see the accuracy of detection based on the crystal structure, it is revealing to examine the structure of the crystal edges in very high resolution:



In the past, the detection of Osmium was carried out using wet chemistry. For this purpose, the constituents of a sample were brought into liquid, which is a complex process in the case of precious metals, as the metals are very difficult to dissolve. Then the inorganic analysis procedure was used to identify the substances.

In modern times, methods are used which bombard the surface of the object under investigation with radiation. The atoms of the material are excited by the bombardment and also emit radiation when they return to their normal state.

Based on this radiation, not only can the irradiated metal be determined, but conclusions can also be drawn about its proportion in the sample. The procedures that only provide information about the presence of a metal are called "qualitative" and those that also provide information about the proportions are called "quantitative". At the same time, a high-resolution image of the surface can be calculated from the generated radiation. This is virtually no optical image, but an image with very high accuracy.



How can the cutting costs be optimized?

If you as a customer resell your Osmium, there are generally several ways to do so. It should be noted that you can simply offer the acquired form again as it is.

Alternatively, you can have a disk cut into hundreds of diamonds and stars, for example, which you can sell for more than the disk itself. With cutting costs of 1,500 to 3,000 Euro, this is an interesting business model. But then you have to have the new pieces certified again and you have to sell them individually.

The other variant is the cut for an own piece of jewelry or the cut for jewelry series and single pieces.

In this area it is important to know some facts and to be able to make distinctions. Therefore, I would like to give some information about the cut here.

First and foremost, the wire EDM company that is to cut Osmium must always be certified to handle the toxic Osmium tetroxide. A cut without knowledge of the processing guidelines is to be avoided.

During processing, several steps must be followed, which are carried out one after the other.

The first step is planning. There is a huge difference whether Osmium is cut into a single piece or a small series.

There is also a huge difference between using ready-made patterns or whether the shapes are already optimized for cutting from a disk.

After all, every disk is different. So, you look at the crystal height of the growth, the crystallization of the surface and the size of the single reflection surfaces. The nature of the edge of a disk also plays a role.

In fact, each disk is slightly higher in the middle than at the edges and may have a slight bulge in the middle.

Any piece can be used, but care must be taken where a mold is inserted into the disk.

The easiest positioning is with investor disks, conventional disks, Thinline-Disks and large bars. Thinline-Disks are slightly thinner than normal disks and usually weigh between 8 and 15 grams. The structure of their crystallization is somewhat finer. This makes it necessary to use a slightly higher ridge width.

It is therefore also important to pay attention to the width of the web in the design. This is the minimum width that remains in the Osmium surfaces when cutting. For example, if you make the tail of a cat or the trunk of an elephant too thin, the Osmium becomes much more sensitive to breaking. Of course, Osmium is made up of crystals, and if the width of the bar becomes small and gets into the size of the individual crystals, the bar at the transition between two crystals can be very thin. But with decreasing layer thickness the risk of breakage also increases.

The fineness of the structure and the length of its circumferential edge also has another effect. Namely, the cut may simply become very long. With wire erosion, every millimeter of the cut is traced with a continuous wire.

A lot of wire is led through the machine for this purpose. Wires cost up to 3,000 Euros per roll and are therefore a serious factor in the calculation. Especially in view of the fact that a particularly perfect cut requires running along the workpiece up to seven times.

The wire is usually drawn from molybdenum or brass. Which material is used is decided when the quality and color of the edge of the cut is important. The cut edge must also be cleaned of the wire material after the cut is complete. The cleaning alone takes a whole day.

Nevertheless, the highest costs in the process are incurred during programming. This block is divided into three parts.

- Programming the shape to be cut.
- Positioning on the disk or in the bar to be cut from.
- Finding a path through the material that does not let individual pieces fall off while still cutting in one piece.

When cutting, the wire must always be guided in such a way that the workpiece can still be clamped and held. In the case of complex pieces, it may be necessary to re-

tension several times. This work must be carried out extremely accurately, as all cutting edges must engage with each other to keep the entire cut homogeneous.

To cut Osmium, a lot of preparation is necessary, which some companies on the market offer. It does not necessarily make sense to do this work yourself. The goods should be handed over to experienced and certified companies with a clear design idea.

By the way, these companies also bear the risk of a cutting error or injury to the Osmium surface or breakage of small bars. So, if a cut goes wrong, the company provides Osmium at its own expense to create a new workpiece. This service should be a priority. Because only companies that are sure of the quality of their work offer this type of insurance.

To have an Osmium piece cut, a cutting file is programmed which defines the outer shape, the path of the wire through the workpiece, the number of holes drilled through the piece and its holding points. If this file is used only once, the workpiece will quickly become disproportionately expensive.

Therefore, it is important to pay attention to the fact that small series should be produced instead of single pieces. Only then does the cut make sense in terms of costs. Single pieces can cause up to several hundred percent higher costs than the production of a series of ten or hundred pieces, for example.

One should also pay attention to whether a company cuts a lot of Osmium, because if it doesn't, there are setup costs on the machine for each cut. The time pressure should also not be too high. Naturally, the companies would make it worth their while if they had to insert a defined piece between other jobs. This may require overtime or holiday hours and the machine has to be refitted twice.

With Osmium, it is not only the conversion, but also the cleaning of the collecting tanks. Last but not least, finding all pieces of Osmium from the offcut.

This also includes partial modifications of the machines, which make it possible to catch the offcut again. The offcut is the part of the Osmium that remains around a cut.

However, the offcut is not usable for the client. It must be re-granulated and distilled several times to be recrystallized. For this reason, it has no higher value than normal raw Osmium.

It is recommended to leave the offcut at the wire EDM company, which can return the offcut to the process. It certainly does not make money with it, but the Osmium is not lost.

Please also keep in mind that the trips to a wire EDM company must also be insured, as high values are transported after all. There are companies that can insure the transports for you and also carry them out.

Summary:

Cutting costs are optimized by perfectly planning the cutting line through a disk or bar. The shapes to be cut must lie close together. The thickness of the disk at the different distances from its edge can be used to give defined pieces more sparkle or make them more resistant to bending.

The main cutting costs are in wire material, machine set-up costs, programming of shapes and cutting sequences.

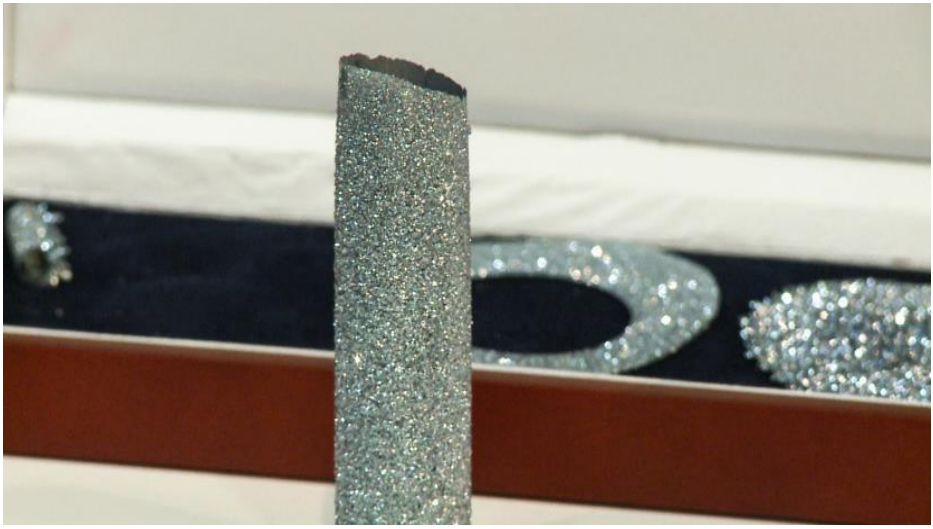
Osmium semi-finished products

In order to bring Osmium into shape, one first needs the so-called semi-finished products, i.e. goods that are no longer raw materials but are not yet ready for use.

In the case of Osmium, these semi-finished products are the so-called tubes, which are cut into Osmium round bars, as well as disks, which are cut into flat structures. Osmium round bars look like rings, but should not be worn without a coating, as they are quite brittle and can crack if dropped.

The flat structures can also be purchased as semi-finished products, as they can be used completely and over the entire surface. This is different with tubes, because tubes are thicker and their crystalline structure is too rough in the middle and too thin at the end and therefore not sufficiently stable.

For this reason, only the areas just before the ends of tubes can be used to cut Osmium round bars. And since only some parts are usable and the rest of the material is recycled, tubes are not sold to investors.



Picture: Osmium tube and in the background a cut-out Osmium-Disk

Osmium products

At the end of the manufacturing process is always the product. This is also the case with Osmium. However, the understanding of the term "product" differs depending on the clientele. For the investor who simply wants to keep Osmium at home to sell it again in a few years, Osmium as a semi-finished product is already the product. The investor does not want to have it modified or cut, but simply keeps it as a disk or bar. He usually sells it to another investor who wants to buy Osmium as a semi-finished product in the future.

Thus, buying Osmium is comparable to buying ingots of Gold. Only in very few cases is a gold bar melted down again to produce jewelry. However, with many metals this is exactly the intention. The intention is to pick up the metals and make them available to the industry. This is certainly the case with the metals described in the following chapters. However, the situation is different for Osmium.

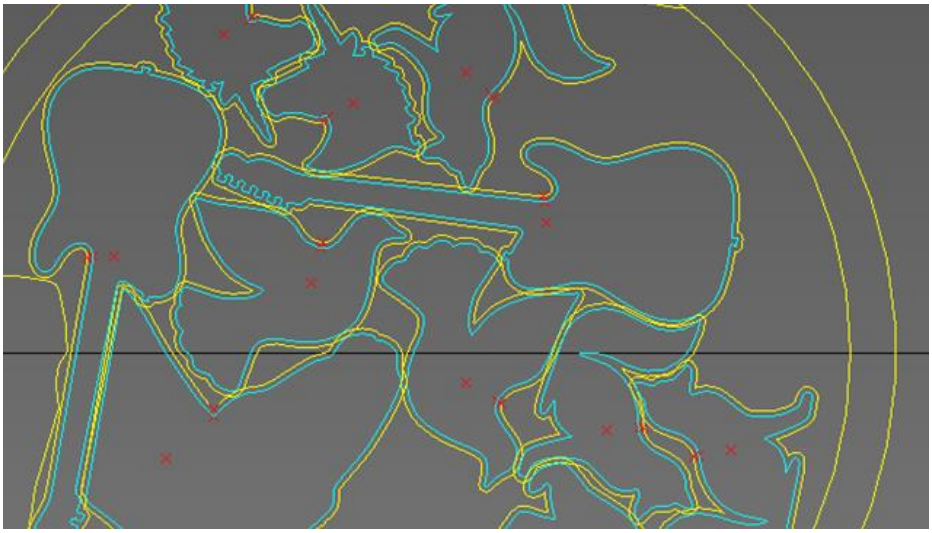
It is foreseeable that only a small part of the Osmium will reach the jewelry market. The two driving forces are either the sale of semi-finished products to a jewelry manufacturing company or the desire to have a piece of jewelry made from one's own Osmium.

The path from semi-finished product to Osmium jewelry is very easy. Osmium can only be cut by wire erosion. So, a design is agreed with a jeweler. Those parts of the jewelry that are to be made of Osmium are then planned as a cutting file or are brought in as a drawn pattern. Based on the drawing, a cutting file is created. This file is then cut by a wire EDM machine.

Please note that it is essential that the company is certified to cut Osmium. Any Osmium institute can provide you with the names of suitable companies.

With the document, the semi-finished product Osmium, i.e. the disk or bar, is delivered to the wire EDM company. You can choose to receive the cut Osmium and the offcut back or only the cut piece. The wire eroder can deliver the offcut back to an institute from where the Osmium is sent for recycling.

However, the wire EDM does not earn anything from this service. Therefore, it makes no sense to ask him to buy the Offcut. There is no secondary market for the Offcut, as the price is close to the price of raw Osmium.

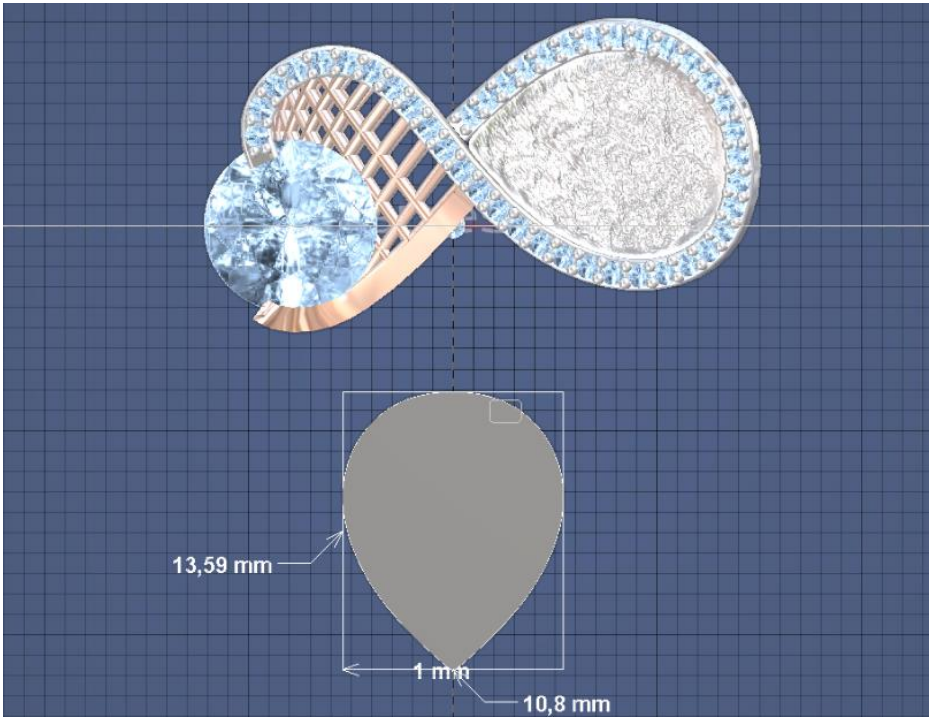


Picture: Optimal arrangement of cuts on an Osmium-Disk

However, when creating the cutting file, you can use every square millimeter of your bar or disk to get a high return and have some other pieces cut. Obviously, this makes sense. If the company is good, then it can be placed in the best way and you will get some more interesting pieces in addition.

In the picture you can see how well the large objects can be placed. All free spaces can now be filled with small objects. Squares, small bars or simply diamonds and stars are suitable for this. One difficulty lies in the arrangement of the cutting sequences on a disk. Because if a piece is cut off completely, its shape cannot be further processed. It has to be re-clamped and a new program has to be written. In other words: cutting is an art and not simply a service.

Please do not expect the cut and preparation for the cut to be very cheap. Unfortunately, this is the curse of the single piece production. Because each step has to be done individually for each piece. This also applies to the set-up costs of the machines. A roll of molybdenum wire can also easily cost 3,000 Euro.



Screenshot: Planning file for a special ring with an inlay of Osmium

The recommendation is therefore to have a small series produced. This saves you a lot of money and you also have several jewelry inlays in your hand.

On the other hand, there is now the advantage of manufacturing inlays made of Osmium. These special unique pieces are of course usually sold more expensively than would be the case in a large series.

The finished pieces of jewelry, however, usually look really spectacular, as you can see here on the designer ring created by Myriam Soseilos.

Picture: The finalized ring "Aqua Wave" with Osmium inlay (Designer: Myriam Soseilos)

This special ring was produced in cooperation with the Osmium-Institute in Cyprus.

Myriam Soseilos belongs to the elite of international designers and has received several awards.

A selection: "International Jewellery Designer of the Year", International Trade and Export Awards 2017, "Designer of the Year", Madame Figaro International Award 2015, Finalist "New Designer of the Year" U.K. Watch and Jewellery Awards 2014 and "Designer of the Year" London Jewellery Week 2013.

Myriam Soseilos is the holder of a number of important memberships, including:

United Kingdom GB: Honorary member of NAJ with benefits of a British based member and Member of the London Assay Office

Cyprus: Member of the Cyprus Jewelers' Association and Member of the Cyprus Assay Office

Summary:

On the one hand, products made of Osmium are jewelry. On the other hand, Osmium is also sold from investor to investor. The bar or disk, which are actually semi-finished products, then also become products at the same time.

The cutting and use of Osmium in jewelry enhances the value of Osmium. However, the costs for processing are not low either. It makes sense to use every square millimeter of a disk when cutting it. The offcut is worthless after processing.

The bible of metal trade for private investors

An old testamentary introduction, not meant to be entirely serious…

In the beginning, it is written that god created heaven and earth and thereby about ninety useful elements such as Osmium. He divided the elements into metals, metalloids and non-metals.

Equipped with the gift of omniscience, he subsumed the probably most important industrial metals, rare earths and refractory metals directly beneath the ground during the legendary creation of “heaven and earth”.

When creating in such euphoric manner, it is probably easy to become stressed and when stressed, one makes mistakes and, sadly, cannot afford to spend time on details. As a result, the elements have incredibly different characteristics. Some are liquid at room temperature or are magnetic and can even conduct electricity, which didn't even exist yet.

But the plan of the world ruler continued…

Iron and copper, lead and tin were surely a little boring for such a being. As a connoisseur of the periodic table, there were so much more important things to create, things which humanity would first discover only much later.

Surely, god felt a thieving joy knowing how much time it would take exploring humans to find all the ores and analyse them. This is easy when you are an eternal being. And then he teases us with elements like Osmium, which probably won't be used by any single industry, because there just aren't enough large amounts of it around….

By the way, I presume god is married, otherwise he wouldn't have made the effort of creating so many precious metals. Gold and Osmium would have easily been adequate.

But no, palladium, platinum, rhenium and a few others had to be added. This had to have happened under the influence of a woman…

He probably foresaw the two-tier society and created the pretty and industrially well-applicable metal silver as an investment metal for smaller wallets.

Because he already envisioned flat screens, nuclear power plants, processors and turbines for the start of the week on day eight, he additionally created indium, hafnium, uranium and the lanthanoids without hesitation. Sadly, on the seventh day, god ended the creation halfway through….

Because he wasn't finished by a long shot…A real shortcoming of the creation of humans and animals e.g. was their limited shelf life.

How can you do research and make discoveries when life is so short? Thank god, god created tantalum, so humans could extend their time of roaming on earth with artificial hips.

There's nothing like having a good plan.

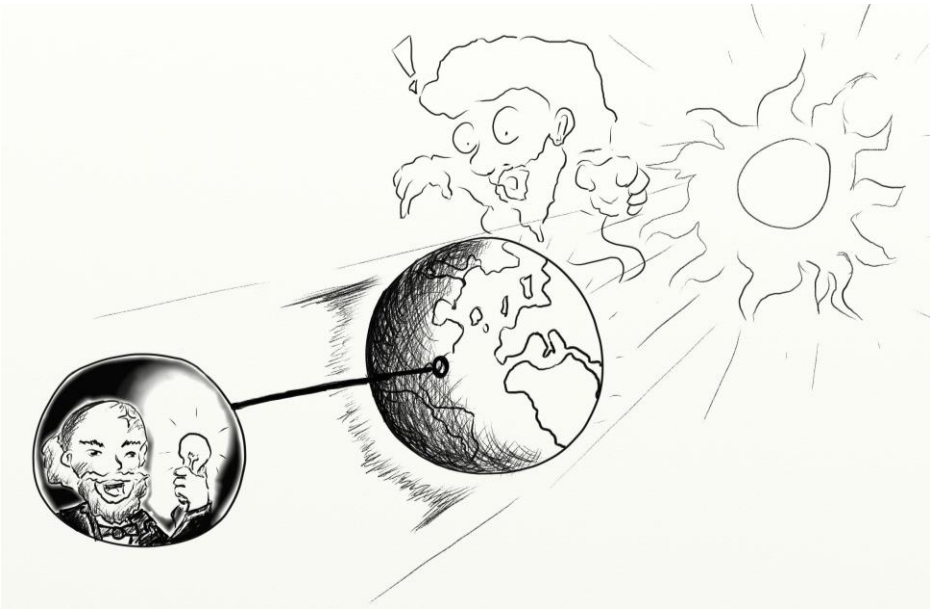
He said let there be light, but that didn't work at night. Clearly, the earth's side opposite the new sun always lay in darkness. Surely this must have robbed some of his motivation from him.

Thanks to Edison, who enhanced god's creation with electricity and Smithson Tennant, who discovered Osmium, humanity was able to quickly remedy this situation after a few thousand years by inventing the light bulb.

And yet another problem: Too little Osmium. When god was briefly asked whether there would be more available, he answered: Creation time is over.

Of course and as always, humans reacted quickly and used tungsten instead. This process is called substitution. Important to know and a rule in metals investing: A metal is only valuable as long as it can't be substituted by another metal or is no longer required in a changed process. When new batteries become available, lithium

will lose its value. One should therefore always be aware for what technologies and markets a metal is used and needed.



Here you can see the discovery process of Osmium and the invention of the lightbulb in only one illustration.

So now we leave god's work and turn towards humanity. From here on, it was the Homosapien's turn to carry out the remaining work on the newly attained ores with his innate urge to discover.

Most probably, the first two humans Adam and Eve initially searched for gold and silver, after their apple misery and expulsion from the practical shopping centre and first Big Brother house, also referred to as paradise. Because ultimately, people have to trade with one another and create a currency that persists.

This was technically a good idea, had they passed it on to later generations. But no, humanity had to create paper money. How fatal!

The decoupling of the dollar from gold maybe should have never been allowed to happen. Because with paper money, the in-house decisions of banks, religious leaders and state leaders quickly lead to inflation and finally into chaos. But god's revenge soon followed. With the great flood, he thoroughly reshuffled the metals on earth. Initially, he probably wanted to leave the earth with carefully stacked piles of commodities.

Humans were still relatively well-behaved. But dealing with the evil Gomorrhans required a great flood. A good idea in principle – had he not overdone it quite so much. A bad awakening for humanity was to follow.

All the important metals were spread across earth's entire crust by the great flood. Now it would be even harder to find them and mine them with great expense at daytime. Silver mines, gold mines, copper mines…everything separately.

And yet metals are so massively important. The Chinese, for example, needed colors for their fireworks after mixing together the first explosive substances.

This works especially well with substances like strontium or barium as admixture.

Fantastic appliances such as lead inside the bullet of a gun, plutonium in the atomic bomb or uranium as armour-piercing ammunition were found. So, god turned away from humans, but left us the metals behind….

We will have to come to terms with this fiasco by ourselves. But we humans have unforeseen possibilities for the utilization of all the 68 tradeable metals.

One of them being the wonderful and legendary Osmium!

So, get started with your own metals investment!

Manufacturing of metals?

Let's begin with the self-evident information that metals cannot be manufactured. They are elements of the periodic table and therefore have a fixed number of protons in their nucleus. This so-called atomic number shows us which element we are confronted with. At the same time, we can easily find it in the periodic table and can roughly identify its properties according to its position.

In several theories of particle physics, theoretical physics predicts the hypothetical decay of a proton into other elementary particles. However, it can generally be seen as stable. Safe to say, no free proton decay has been recorded so far.

Protons are thought to have an almost infinitely long half-life of an incredible 100.000.000.000.000.000.000.000.000.000.000.000 years. I presume that your investment decisions will take place within a shorter time period. When it comes to decay, Osmium is also once more a special case. If you calculate the lifetime of the universe and form averages, then it will last quite a long time already. But compared with the average life expectancies of most elements in the universe, Osmium would outlive them by a factor of 140.000. Now that's more like an eternal metal.

Now we know almost for certain that the metals will not just decay, as long as they are not radioactive. But can they be manufactured nevertheless? Gold, for example, was supposed to be manufactured in the middle ages, or at least the ruling classes tried everything to achieve this.

Because gold not only occurred in solid form, but also in fine distribution and in an inconspicuous ore, from which it could be obtained. But it soon became apparent that the synthesis of gold would not work.

The simple reason lies in the fact that gold is an element and no compound. The few elements have such versatile properties that, as building blocks, they can form millions of compounds.

In chemical reactions, elements merge to compounds, whose smallest unit is called a molecule and which can fully display the properties of a substance. These molecules can be constructed and dissolved again in an almost arbitrary way.

Sometimes such a chemical reaction occurs through a change in temperature, sometimes via an aggressive acid attack, through oxidation or by electrochemistry. Energy is added or produced, but the number of acting elements and atoms before and after the reaction always stays identical. The according laws are the conservation of mass and the law of preservation of proportions.

The reason for the impossibility of synthesis of elements, aside from radioactive decay and fusion, lies in the incredible longevity of protons and neutrons. They don't decay in the nucleus of an atom.

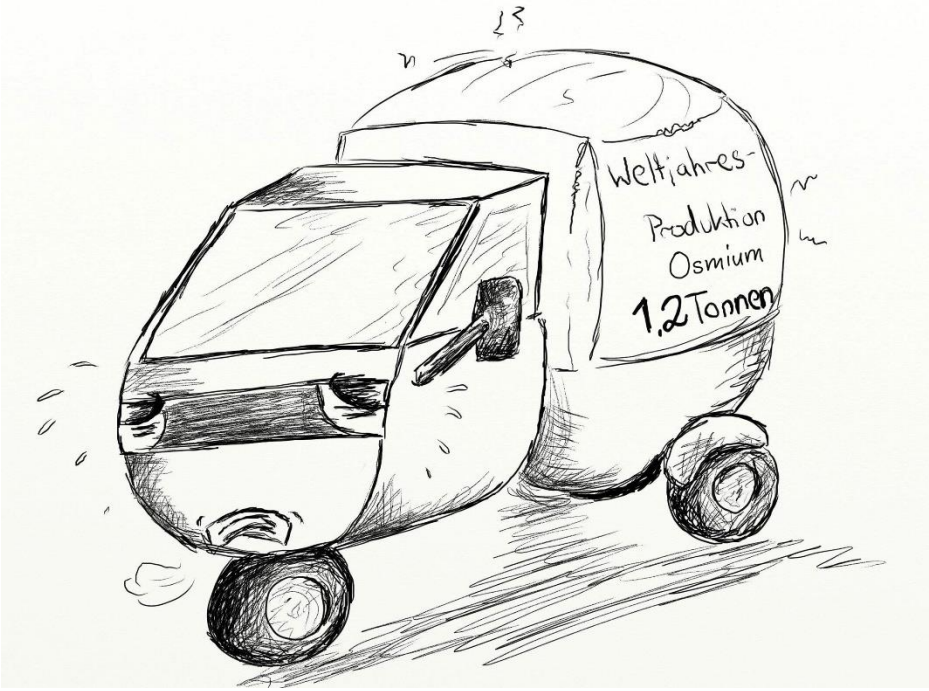
And the nucleus doesn't change during chemical reactions, as it doesn't take part in them. The function of bonding lies with the electrons, which, according to old world views, circle the nucleus and exist in a number that makes the atom electrically neutral.

Even if the irregular electrons migrate from the electron shell during an ionisation or bonding, which by the way is part of the definition of metals, this only changes the charge of the atom, not the number of protons in the nucleus. In conclusion, the element always stays the same. With Osmium, the number of so-called valence electrons, which are responsible for the chemical bonding, is at the upper limit. They are eight electrons.

Why is it so important to know that the elements can't be manufactured?

Very simple: There is a certain amount of them available to us in the earth's crust. And not a gram more! End even here, they are often very hard to find and at times even harder to isolate in pure form.

We always have to keep in mind that the amounts available to us are extremely limited in some cases! As an example, the annual world production of Osmium is just under 1,2 tons. With Osmium's high density, it is possible to load this entire amount into a small car on the basis of volume – if it weren't a slight overload.



You probably also know of isotopes from school days. Isotopes of a metal have the same atomic number, but a different number of neutrons in the nucleus. This changes the atomic weight of the element, but not its chemical properties. The reason being that the number of the negatively charged, chemically relevant electrons depends on the number of positively charged protons.

The atom always strives for the state of neutrality. For example, caesium 137 is radioactive and decays, whereas caesium 133 is not and is stable. If you throw it in water, both explode, as it is incredibly reactive as an alkali metal. The chemistry doesn't change. And of course, it also looks identical.

Processes which take place on the basis of changes in the electron shell between elements are described as chemistry. The chemical behaviour is dependent on the number of electrons in the atom and mostly on its outer electron shell.

In the case of an uncharged atom, in order to create an electric balance between nucleus and electrons, this number is identical to the atomic number.

For the sake of completeness, it is noted that during the radioactive decay of atoms, neutrons decay and leave protons behind in the nucleus. Hereby, a new element is actually created which then contains more core particles than the original element. However, you shouldn't try to create elements in this way.

You need a nuclear reactor and the result is often just lead at the end of the decay series. And to be honest, you can simply buy lead much more easily and a lot cheaper, because the reactor only creates a few atoms at a time! ☺

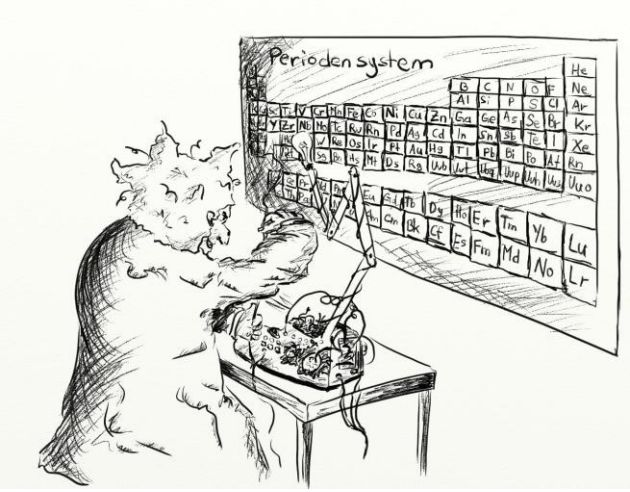
Summary:

Metals can't be manufactured, but only searched for, found and isolated. The respective available amounts on the globe are limited for each metal. Once it can't be extracted anymore, it hast to be obtained through recycling. When it can no longer be used in recycling, because it is too finely spread, then it will inevitable run out.

If there is no substitute to replace the process or product for which the metal was needed, then the product can no longer be manufactured and the process can no longer be performed.

Metals rule the world

There is no area of our modern life left which isn't significantly shaped by metals. During the industrialization, iron and its associates made a real name for themselves. Nowadays, the areas of application for the metals have been so meticulously studied that inventors around the world are free to invent whatever comes to their mind. No matter what the requirements of the new machine are, one of the metals is sure to fulfil them.



You want a filament that won't melt even at 3.000 degrees Celsius? No problem, Osmium and tungsten can do that. The switch that you want to construct must be able to react quickly to a positional change? For this, the metal should conduct electricity and be liquid at room temperature. How about mercury or a low melting alloy?

A conducting thread should be thin and transparent and provide every light cell on your screen with electricity? Then use indium compounds. You would like a material that, as a catalyst, doesn't take part in a reaction but accelerates it? The goal is the improved burning of exhaust fumes? Platinum stands ready for you. How about an

almost unmistakable metal that hardly reacts with other substances, perfect for being used as means of payment? Gold and silver can do that.

You have to manufacture reaction vessels in the chemical industry that don't react with sulfuric acid? Please apply tantalum as the inner coating. Your hard metal is falling apart and needs a binding agent to achieve a similar hardness to diamonds again? Simply sinter with cobalt. In principle, it's a colourful world in which almost everything is possible – provided one has the right metal at hand. This is where the resource allocation battle commences.

Batteries require lithium in order to create a high charge density. No problem, let's go. Or maybe not, because you don't have any lithium at the ready right now. Well, then you must buy it from one of the world's many metals dealers. Hopefully your dealer can acquire the lithium at a cheap price and hopefully the purity will be sufficient. Or are political entanglements currently hindering the delivery across a state border?

Should you not be able to obtain a metal quite so easily, pay the higher price at first and change your source. If it gets too expensive or if you are not even able to acquire the metal any longer, then what? Normally you would have a team of engineers sit down with the instruction to find a substitute. Meaning a metal, alloy or a compound which has the same or maybe even better properties than the originally applied metal.

For 100 years the thermometer was filled with mercury. Sadly, mercury is very toxic and deposits itself in the liver. Especially the fumes of the metal are incredibly dangerous. In order to replace it, a combination of the metals indium, gallium and bismuth was found, which stayed liquid below zero degrees Celsius. Thereby, the metal's area of application was substituted.

But sometimes it is not that easy. As an example, when you need hafnium in a reactor to capture neutrons, you won't find any other metal which performs this so effectively. Replacing hafnium means inventing completely new types of atomic reactors.

So better stick with hafnium, even if it's expensive and the price is only going up…

Access to commodities is a necessity in the current world situation. Among all commodities apart from water, food and fuel, the most important commodities are the metals. Strictly speaking, they are also necessary to obtain the other three. In summary one can therefore state: „Metals rule the world!" And the regents of the world are aware of this and are assuring themselves access to the strategic metals.

During my presentations and in private conversations I am often told to be careful with general statements like "metals are changing the world" or "metals are the building blocks of a modern world" and that I shouldn't dramatize.

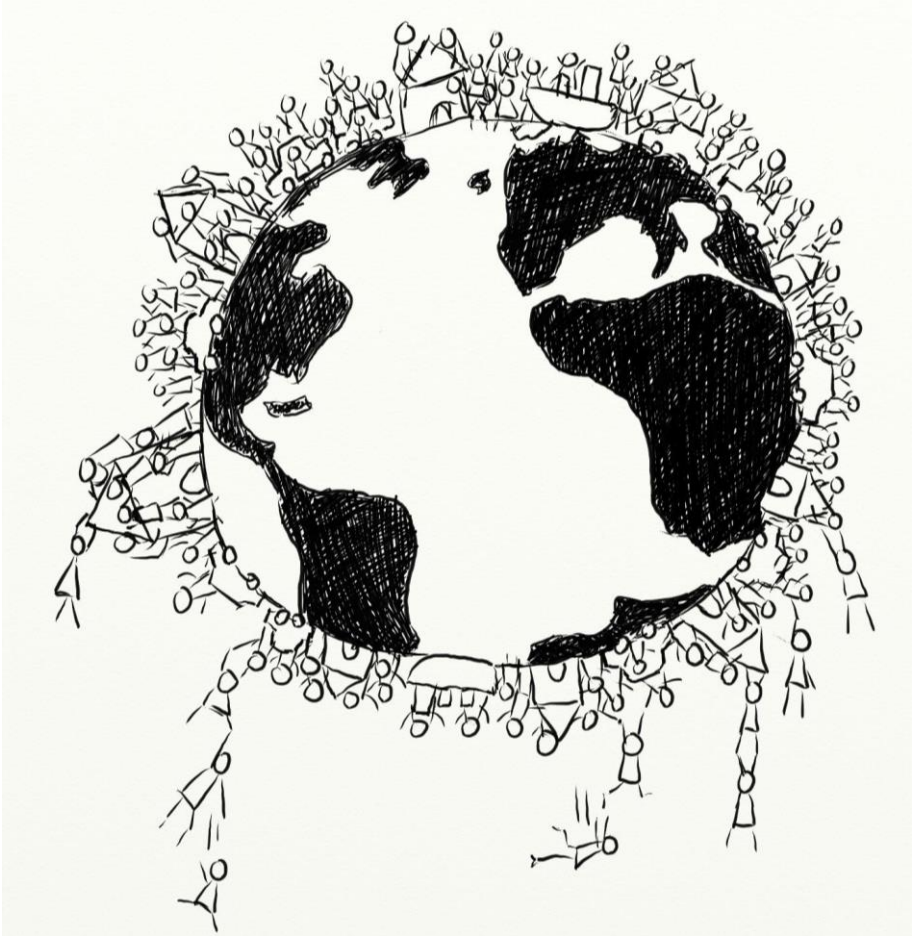
In such moments I realize time and again, that the implications of a strategic metals shortage have yet to occur to peoples' minds as being a serious problem, which no doubt they are.

Right now, all the fancy technical appliances can still be bought. It is clear as day that we will never solve the current problems of environmental pollution, climate chance or water and food scarcity without getting control of strategic metals.

From solar to wind energy, from navigation to communication. Everything requires clearly defined metals.

However, I choose the term „rule" advisedly. Because when an actual shortage of a resource takes place in a country, the governments intervene in its procurement. Then the allocations battle usually starts to get political until there is no easy way out and wars are started.

The necessity to own commodities is growing for all economies on earth day by day. The governments of the next decades will depend on this. And it is no longer only about oil, woods or copper. It is about rare deposits of almost unknown metals.



It is wise to have a metals depot. The most powerful economic player on earth, the catholic church, started hoarding land and property very early on. Now, the metals have come into focus.

I am of the opinion that the possession of metals and especially strategic metals must be in the hands of secular states, industrial corporations or private persons. The fewer

monopolies are created, the more trade will remain and the more manageable prices will be. At this point, I come into conflict with my own politics of storing value.

Of course, I also invest my money in metals. And naturally, I would like to build up trade monopolies with many partners and friends which would enable profit maximization and improved control.

This statement stands in contradiction to the necessity for states and industries to have access to metals with strategic value. But there is a difference between hoarding commodities for speculative reasons or also hoarding them to ideally pass them on to the right client at the point of resale.

So, what is Osmium's role in this battle of the giants?

In the following chapters you will read about the extraordinary properties of Osmium and about the unusual rareness that we are dealing with here.

Osmium is sold in a monopolistic market. Internationally, there is only one single market introduction channel, namely the Osmium-Institutes. The reason being that Osmium is only non-toxic in its crystalline form.

It belongs to the metals which have many properties and could therefore be applied everywhere, but it is simply too rare. Which is why it is seen in the market more as a special investment metal, which is later rather sold to the jewelry market.

The Osmium price has been trending upward for years, because the production of crystalline Osmium is toxic and dangerous. But the two main reasons why people buy Osmium are its high value density and its absolute unforgeability.

Of course, the investment in Osmium is also speculative. Especially considering the fact that a publicly accessible and liquid market does not exist yet. However, one buys Osmium for the future and not for short-term speculation.

Because when pure speculation is part of the game, risks also emerge, sometimes followed by the intervention of lawmakers. In the past, a thrilling incident occurred along these lines, which is a very present story on the internet. I suggest you read about the attempt to control the silver market.

In the USA, the billion-dollar fortune of the Hunt brothers was wiped out by the commodity futures exchange COMEX through a simple rule change. When you get too greedy, life takes its toll. Silver is an investment metal, even if it is needed by the industry.

A price is sound when it is not caused by speculation. It is realistic when there are clients in the market who actually buy a metal at a price because they want to process it. The main focus when investing in metals must therefore be the investment horizon and an eye must always be kept on the usage and the consumers. If this is the case, no speculative bubbles will form, even when prices are going up strongly.

When choosing your metals and your trading partner, keep an eye on these two important aspects:

- **Buy metals that increase in value.**
- **Hold metals ready for the industry, without hindering the subsequent sale by creating shortages.**

These aspects do not stand in conflict to each other if they are carried out by responsible organizations. This is why you choose a company as your metals trading partner that allows metals investing under both aspects.

Choose a metal or a mix of metals that includes elements which can be traded liquidly, such as gold or silver. And maybe also add to the mix an element like Osmium, which may be new to you but shows hight increases in price.

Is money worth its money?

It always makes me grin when the DAX shoots up to new highs and the news departments and investors surpass each other in their joy because the "value" of their "paper shares" is increasing unbelievably fast. When such an index goes up by 10% or more in one year, that does look fantastic. As a result, everyone buys shares and tries to get a piece of the big cake.

However, it was not the absolute value or holdings of the companies that multiplied so dramatically, but merely the phantasy of good business continuing. The manpower you can measure is declared to you at a month's end on a payroll in abstract numbers. Now you take this "money" and buy a share of a company or store the cash at home in order to buy yourself safety for the future.

In general, the secret of successful investing is to generate as much "increase in money" as possible in order to outpace the rate of inflation and to let the money "work" for you by itself. Some forms of investment go further and solely concentrate on "financial transactions", thereby no longer creating any real values at all.

The result of all forms of money creation is always inflation, which means the currency loses value. The amount of money increases and the purchasing power decreases. In most cases, the total amount of all goods does not increase to the same extent. This means you own more on paper, but less in the real world. The super-rich buy real estate, art and metals and thus protect themselves against the decreasing value of money. The small investor cannot do this to the same extent.

A fatal cycle commences. To make matters worse, many of these „financial transactions" take place with borrowed money or with leverage. When such loans default because of speculation, the money of the transacting bank or well-paid managers has already been spent. The debts are written off and the investor loses his assets. But the money that was there a minute ago must have been used for something….

Indeed, it was, as banks invest their money in real estate, government bonds or simply in metals. To summarize, they invest in the safest assets we can imagine.

Have you ever thought about what a currency note is? No? – Well, it is a debt obligation to receive something for it. If the promise is broken, the money is gone.

It was a different situation with pence coins of past days. These coins had a higher metal value than the minted value that was stated in the currency DM (Deutsche Mark). Sadly, simply melting down money privately was not allowed.

Many other forms of investment we chase because they sound so fantastic and wonderful are arbitrage activity, meaning the trade with currency disparities or derivatives or cybercurrencies such as Bitcoin, Ethereum and others.

The purchase of loans or the purchase of options on the rise or fall of stock prices is a similar type of bet. But seriously, it might be better to go to a casino, because the chances of winning money are significantly higher there. Considering you know the rules that enable the casino to take your money from you, to me, that seems almost fair.

The least fair form of inflation is actually the creation of a cyber currency that is meant to be used as money. Because this is the promise: Transport and use your money

around the entire globe, avoiding the treasury, taxes and always have total access to it.

But the same applies here: You are buying a “currency note” for the value written on it. But it doesn’t have this value. So here too, the old principle applies:

A cybercurrency may be used as a speculative object if you know what you are doing. And if you are not betting your entire net worth. However, even in this case, one should only purchase coins or tokens which promise a direct and real return on investment and deliver it, too.

But now back to the banks:

The next time you sign a financial investment contract at a bank, read the small print. Depending on the product you will find different securities or rather insecurities that the bank expects you to take on. These days, legal obligation forces the banks to express themselves more clearly. If a total loss is possible, then it is mentioned in the product description. And more and more products from the “serious” banking world now carry this flaw. In relation to this, I find the so-called “negative interest rates” especially outrageous. We are all losing our money simply due to the circumstance that it is lying around in a bank account. – what an upside-down world it is.

Only sadly, a total loss of investment with seemingly safe assets such as government bonds or retirement bonds is not only possible, but becoming increasingly more likely, because the whole system is nearing collapse. Time and again, there have always been new currencies throughout history. Principally this is like having a large debt-write-off. Carried out on the backs of investors.

But who is spared from this write-off? – Well, the owners of values that stay unchanged. For certain these are: Owners of real estate and metals.

If you like, you can also add companies to the safe values. However, in this case you are in the possession of documents and so-called goodwill, not objects that you can transport away. When the economy is doing badly, companies are no longer worth the future expectations laid out in their business plans.

And how about the other values? Unfortunately, states can make you mortgage your real estate against your will to secure their own financial health. The debts then stay with all of us…

When it comes to gold, the state also has the option of making ownership of gold illegal. This is surely the simplest form of legal expropriation. This will certainly never be the case with Osmium.

Right now, the situation is becoming more and more dangerous and even states have long stopped backing their minimal reserves with their golden treasures, which some would fittingly call metal nest eggs. Uneasy world politics, the convoluted trade relations, the changes in the economy of states, the inherent mass migrations and many other reasons should warn us a little of the future.

Having a safeguard is probably not a bad idea. And ideally, the safeguard should be mobile. It makes sense to check how much percent of your wealth you could actually take with you, should you be forced to change your place of residence.

The amount of gold that would be necessary at the moment to hedge our money is not even available anymore in the entire earth's crust. So somehow, window dressing or government daydreaming must play a role, because we would never accuse our well-intentioned politicians, banks and captains of the economy, who all just want what's best for us, of fraud.

Metals are the first choice of investing options

So how can you protect yourself from the future, secure purchasing power advantages and escape massive state intervention possibilities all at the same time? Maybee even gain some say through economic influence?

My personal answer to this question is crystal clear:

Obtain assets on the basis of metals that offer the best possible price outlook for the future.

For this, there are several criteria that a sensible investment needs to meet.

- There must be demand for the chosen metal in the future.
- The metal should be hard to substitute in its area of use.
- It should be required by several sectors.
- A natural scarcity should be foreseeable.
- Easy saleability directly to the industry now or in the future.
- Safe storage in a well secured building.
- Direct access to the physical property if needed.

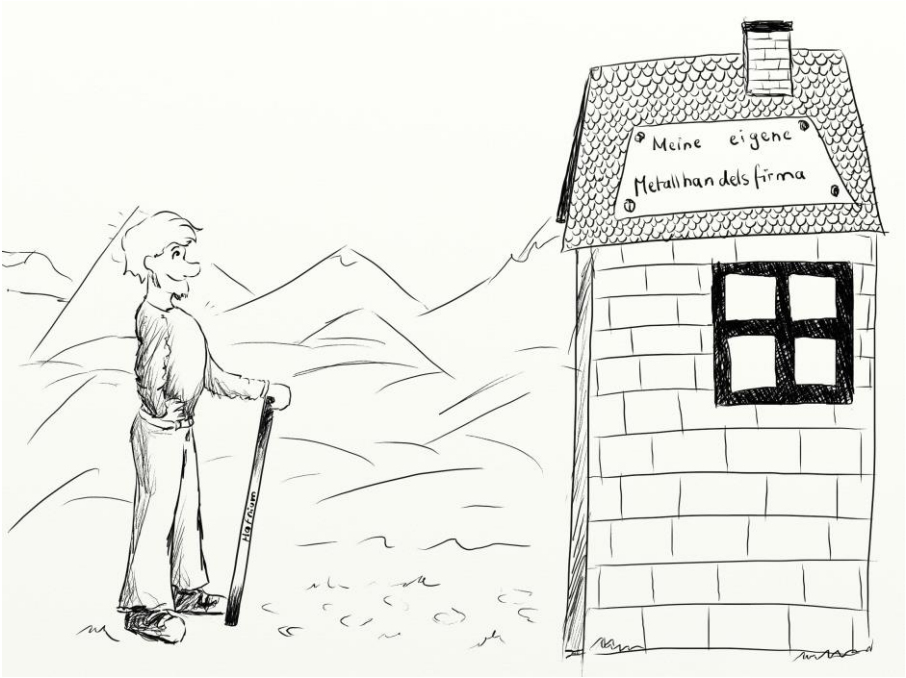
As you can tell from the title of this book, I have a clear vision of this. And to honor the truth, I too have spread my hard-earned money. Because, as the saying goes: Don't cry, diversify.☺

I do not want to tempt you into any action that you are not one hundred percent sure of yourself. But I would like to always keep newly informing you. Because our world is on the move. Maybe some of you will feel the desire to use metals as an investment option. And maybe Osmium will be a part of it.

From my past days as a student of chemical process technology and physics at the Technical University of Munich, I retained a decent piece of understanding about the deployment of metals in the industry. As part of building up over 30 companies and through the so-called M&A business, the trade with shareholdings, many things about the real economy became a lot clearer to me.

Especially the development of small companies is eye-opening in respect to state regulations, peculiarities of legislation and tax law as well as the difficulties of preserving value.

The running of channels such as Science-TV, Invention-TV, Finanz-TV and Commodity-TV as well as several channels in the area of new technologies finally led me to the realization: The real values lie especially within the metals that no one knows of, yet are these metals so incredibly important to all of us.



And now finally the time has come where we “small folk” have an advantage. Because in the area of metals trading, industry, craftsmen and research have better and more sound information on occurring events than banks and finance media do.

Did you know that there are no actual rates for strategic metals and that they can’t exist? Many transactions are carried out as so-called spot-transactions, which means just one single deal between a seller, e.g. a mine, and a purchaser from industry or trade, sets the price. Here, bankers have no access to valid information.

The issued prices are mostly made by corporations and collected by finance journalists.

Finance media call the companies on the phone and inquire about the daily prices. They form the average and issue the rate. In reality, though, a rate gives no guarantee for the sale or purchase at the stated price. It is only possible by trade, through matured relationships to clients from the industry and research.

The spreads, meaning the difference between buying rate and selling rate, are also higher than with other products of the investment market. The reasons for this are safe custody, separate storage in single charges or the analysis of repurchased material. However, these effects disappear in longer investment periods due to the massive opportunities in value increases.

In particular, the few providers of commodity investments for private persons have created an own world of investment options, which are respectively suited for a special type of investor. Please make sure that the portfolio on offer matches your own ideas.

An example would be the sale of metals in the form of commodity baskets. Such a commodity basket is mostly matched to a certain industry and combines metals that will be used by this industry in the future.

The commodity basket is subject to a current price, which is defined by the provider. Hereby, the demand of investors is taken into account to generate the price. However, the price doesn't represent a market rate in the actual sense, as it is generated by the offering company.

It doesn't succumb to conventional market fluctuations. However, should the demand for such a commodity basket collapse, then this will inevitably also happen to the daily repurchasing price. More importantly, the value decrease of one single metal is always averaged out in commodity baskets. The principle of investor capital diversification also applies here, just on a smaller scale.

Should a commodity basket of rare earths contain neodymium and should neodymium be substituted as a magnetic metal in wind generators in the future, then it will probably fall in price, because it is not really rare, but just elaborate and costly to separate from other lanthanoids. In conclusion, you can no longer get rid of a single metal from a commodity basket so easily.

So, commodity baskets have the advantage of dividing the risk onto several metals within an investment. You can choose the sector and participate in a commodity basket which always contains the same amount of metals that only change in value.

This means that the indicator for your asset is not the market rate, but simply the mass of the respective metal in kg. Because when you trade with metals, the kilogram becomes your new currency.

It is also possible to put together commodity baskets by yourself. For there are more and more companies that decouple the price of a commodity basket from the sum price of the individual metals and in doing so make immense profits, which are later paid for by the investor at the point of sale.

The own commodity basket can be compiled in no time, especially when you want to work with precious metals. A little gold, a little silver, platinum and Osmium. There you go, the basket is complete.

Anyway, you should only invest in metals if you accept the transience of currency as the truth and start thinking in long time periods. Just like you would buy a property as a generational project.

For this reason, Osmium is also called the “next generational metal” in the USA.

And if you have the staying power, possibilities arise that you would never have as a speculator.

It has basically become natural law that the prices of all types of metals can only rise across the board. The reasons are obvious:

- More metals won’t come into existence just because we need them.
- The world’s population is unstoppably increasing.
- Peoples’ demands are rising beyond the measurable.
- Technology is constantly creating new products and demands.

Summary:

Shortages will push prices up in the long run. Not every metal is fully understood by us. Monetary systems are becoming more unsafe. Values must remain transportable.

Stay well-informed on a regular basis. Then you can put together your commodity basket yourself and store your metals in a safe environment at your home.

Possession or ownership?

Wikipedia writes (original German, translated)

"In legal jargon, the term possession (lat. Possessio) denotes an object over which someone has actual, but not necessarily legal control. "Possession" therefore means that someone has an object (in his / her control) regardless of whether the object is his or her property or not, for example, if the object is rented or stolen. In the legal terminology, the term possession often also means the will to "keep this thing to yourself" (will to possess something, Latin animus rem sibi habendi).

In legal terms, it can be expressed in such a way that the term possession refers to an actual state, a "wanted factual rule" over a thing. On the one hand, the possessor must have a close relationship to a thing, i.e. must have it in his power or custody, which means having "actual power over the thing (corpus)". On the other hand, the possessor must also have a will to own, that is, the will to keep the thing as his own (animus possidendi, animus rem sibi habendi). There is no legal basis. According to this definition, the thief of a thing is also its possessor. Possession is not a subjective right.

This definition is necessary in order to differentiate between possession and ownership, since ownership is abstract, by means of a social claim to rule (i.e. by a monopoly on the use of force by means of a right, e.g. by means of a contract). Ownership gives the owner the power of disposal to his/her object, even without direct connection between person and thing and excludes others from free disposal. "

In our case of metals trading, this differentiation suddenly becomes very important when the metals no longer lie in own hands, but are kept in an external storage facility or in a duty-free warehouse.

So, when an investor from Germany buys a metal and it's located in a deposit in Switzerland, then the metal is not in his possession, but only in his ownership (and only for as long and as far as the Swiss society enforces this legally).

In conclusion, being both owner and possessor can be a sensible thing, were it not for European tax legislation. If I buy a metal and demand home delivery, I am obliged to pay import duties and especially value added tax.

Companies which handle the “possession of the metal” for me while I remain the owner can often offer the advantage of a duty-free warehouse. Here, the metal originating from abroad is stored until it is resold abroad or the customs duty is payed domestically. The VAT is also not „erased“, as long as the metal is part of the company’s inventory.

Therewith, one enjoys an undeniable advantage. An advantage which is actually used as a promotional and factual argument by companies that operate in this investment area.

The other option is evident, even if it is relatively time-intensive. The method is becoming the possessor yourself, paying the tax and just waiting longer.

Maybe waiting for a long time. But the rising price will likely soon compensate for the cut that was taken by the tax authorities.

In any case, you are now free to store your own metals in your cellar and have direct access to them, holding them in your possession.

However, when it comes to large volumes of investment, we advise our partners take another path: The founding of a small company with the corporate purpose of storing metals for the economic reason of value increase.

This way, the metals can be stored over the years without the loss of VAT in order to be sold directly to the industry one day.

The stumbling block lies in the absolutely necessary analysis of the metal when being sold to a processing plant. No one buys the pig in the poke unless he has sold the poke himself. Osmium enjoys a special status here. Through the Osmium-Identification-Code, the authenticity of a piece can always be directly proven.

Sadly, packaging and sealing have been regularly falsified in the recent past. For this reason, it can sometimes be of interest, if not important, to store the metal directly with the seller. This way, the seller is also responsible for insurance. If direct access to your metal was promised to you, then you should actually have this access. No harm can be done by testing this and visiting the storage facility of your supplier.

It is a different case for crystalline Osmium. The crystal structure is absolutely unforgeable, because no crystal can be re-cultivated in the same way. Apart from Osmium, it is also possible to crystallize other metals, which would then also have a unique and unforgeable surface structure. However, there is one key difference.

All other metals can be melted down and resold. In doing so, the identity of every single piece would be lost. This is where a small but significant difference to Osmium comes into play.

When melted down, Osmium regains its toxicity and can no longer be traded. It thereby completely loses its value, which wouldn't be the case with other metals.

A further significant difference is the value that is created by the process itself. The crystallization of almost all other metals is substantially cheaper, because a lot less protection is necessary in the laboratory and the processes are less difficult to perform at very low temperatures.

Therefore, Osmium remains the only truly unforgeable metal.

But let's come back to the smaller batches, the resale of small amounts and the consequently emerging costs in trade.

There is no way you will get around paying the mark-up of the gold-or silver dealer, who requires it to pay for the costs of storage, packaging in batches and further handling fees. These unavoidable costs just shouldn't be too high.

10 to 20 percent are considered typical in this sector. This is not enough for the company to make a large profit, but it enables it to do business with private investors.

But take caution, because there are metals where these costs can amount to 100 percent or more in total. An example would be the lanthanoids, also called rare earths. Here, the trading profits of almost all firms are at 100 percent or more. This is a level that makes resale almost impossible.

Even more so for small batches, because rare earths are especially easy to falsify and stretch. They mostly appear simple, like normal flour, when they are sold as oxide. For this reason, every incoming batch must be homogenised, then analysed and then reduced to the metal when a sale occurs to industry.

Of course, one could simply just store the metal and not the oxide. Sadly, even when packaged, the materials oxidise very easily and thus lose value. We know this from cars of the 70s. When rusty, meaning oxidised, they were worth less.

Please also keep in mind the so-called costs of storage. Naturally, fees are charged by all providers. But they should be adequate. A fixed amount is preferable, with monthly or yearly payment for storage and insurance.

And be prepared for the eventuality that the storing facility could close at some point. Then you have to relocate or withdraw your goods, which would mean paying VAT and customs duties.

Storage fees that are charged in the form of a percentage-based reduction of your commodity-holdings, instead of a price based on the commodities' current value, should be renegotiated for two reasons. Firstly, when the current value of the commodities increases, so does the storage fee, which doesn't resemble the actual cost, because the amount of commodities has not gone up.

Secondly, a percentage-based reduction of the commodities is a constant decimation of your investment volume and therefore your wealth. And most of the time, it is not the volume or amount of the stored commodities that make up the cost of storage, but their value, because this value has to be insured. The actual storage is not expensive. Here, the term value density comes into play once more.

Annual fees which you pay as money are fair and sensible. If you want to circumvent these fees, you can always move the commodities to your own place.

Summary:

Owners like to store their metals at home in order to have access to them. Commodity baskets have the advantage of risk-spreading, but also have the disadvantage that items in the basket may be valued higher than the sum of their single batches.

Small amounts of commodities and oxides are hard to analyse at the point of sale, because they have to be homogenized first. However, commodities can also age over time and form unwanted oxides.

Metals with high value density, such as Osmium, are simpler to store.

I'm going to be a metal investor!

There is only one important principle which you definitely have to adhere to: Make your investment decision on you own! Because in any case, you alone are responsible for what happens to your money. In order to make this decision, one thing is especially important: Expertise!

An old truism of vacuum-cleaner salesmen states that it is easier to sell a product if you have less knowledge about it, because the facts are just a burden. Sadly, this is true. But just like I endeavor to train my salesmen well every day, I imagine a little more knowledge will also make you as a customer feel more assured. By the way, should you have questions as a customer, you are welcome to visit our seminars at www.osmium-training.com

In conclusion, there is no way around acquiring a certain basic education which helps you make investment decisions on your own accord. This is not about being able to recite every element in the order of its electron negativity or knowing all chemical symbols. But you should definitely know in which industries a metal is used.

Go ahead and receive information from the industry itself. Don't hesitate to call companies. They may find this a little strange, but in return you will receive first-hand information.

This book compares the investment in Osmium with the investment in strategic metals and precious metals. For this reason, I especially want to create a profound understanding of the other metals, because how else could we compare them. So until we get to Osmium, we all have to be patient for a little longer.

But either way:

You are also welcome to visit our basic introduction seminars. Ideally from different hosts in order to compare what is said and form an own opinion.

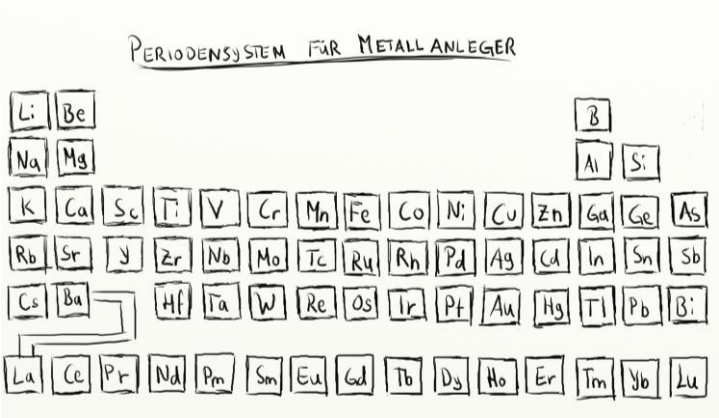
Also, why not confront the lecturer with a different opinion, one which you have already heard or read about. It is clear that you won't encounter the general truth. No one has the crystal ball. Also, the opinions and information about this market, which is in part very volatile and in part very sluggish, but in any case, heavily fought over, diverge strongly.

Odd really, since there should always be only one truth…

The spread of opinions has always something to do with the interests of the person opposite you or his/her access to information. So always be aware of what advantage the dealer might have.

Our task is the market introduction of Osmium. Accordingly, we will always grant Osmium an advantage. But as this book hopefully shows, the aim is to make this comparison as open and honest as possible.

Endeavor to gain understanding of scientific information and about the tools for forming an own opinion in the commodity trade.



In any case, we can suggest studying the periodic table for metals investors as a helping hand. When changes on the market occur, you can quickly identify connections and

sharpen your own opinion. The periodic table for metals investors is available at the Osmium-Institute. And Osmium right in the centre.

As a freshly minted metals investor you have to make some decisions quite early.

The investment decisions continuously revolve around the same topics. This is why we shortly list these FAQs of metals investing for you. You will then be able to position yourself better as a metals dealer.

At the end of this book you will also find the FAQs which only focus on questions around Osmium.

For this, you need to ask yourself the following question:

- Which investment volume do you want to invest in metals?

Principally, you can invest almost any amount in the form of metals. When acquiring smaller amounts, most people instinctively turn to gold. It can be bought tax-free and also anonymously at many places. However, when purchasing gold, the price difference between small amounts compared to the price in kilograms is immense.

With Osmium, there is also a difference between the pricing of small pieces, such as Osmium-Diamonds and large pieces, such as Osmium Big Round Bars (also called Disks). However, there is a significant difference.

In the case of gold, the price difference is mainly due to the blister packaging, meaning the complex packaging which is supposed to imply a high value. With Osmium, the reason lies in the actual cutting costs that arise when a Disk is processed into smaller pieces of Osmium. In procurement, this makes no difference.

But it becomes important for the sale. Reselling gold into the market in spite of the elaborate and expensive packaging is only possible within a spread and at prices at which a refinery, which melts everything down again, can make a profit.

With Osmium however, cutting costs for jewelry either arise when one is already cutting the desired end-shape or, at the latest, when a jeweler buys a disk and performs

the cutting himself. For this reason, the cutting costs should be the same whether the cutting takes place before the purchase or after the sale.

At volumes of 5.000 to 10.000 Euros, mixing for the purpose of higher security through a diversified purchase is not wise. Because you then buy in smaller amounts and suffer a disadvantage with every metal that you obtain.

In this case it is better for you to decide upon one metal and then only purchase this metal.

Some companies also offer metals-baskets for precious metals that have already been bought in large amounts and are attractively priced due to the purchasing group consisting of many clients, making them a good alternative. These baskets contain a small diversification and therefore basic security.

Between 10.000 and 50.000 Euros is the ideal range where you can start acquiring one or the other single metal according to your own desire or market behaviour. Here, a first small speculative position can also be added. If you believe in a rising Osmium price, then by all means buy gold and silver, but round off the investment with a fraction of Osmium.

Above 100.000 Euros you should definitely seek advice, as you have now reached an area of large investment volume where larger mistakes can be made as a result. Notably, you now have the chance to found your own company that has the function of acquiring, trading and storing metals and belongs solely to you. In regard to VAT, this is definitely an interesting option. It's also a great pleasure to enter the metals trading business.

From One Million Euros upward, the fun begins. Now you can fill larger trading positions and your portfolio becomes interesting to the industry for direct trade. It now definitely makes sense to found your own company and have the VAT refunded in-house. The company will also be managed by several partners on the market for you, so your work effort can be limited to selecting trade- and investment positions.

What share of my investment volume should consist of metals?

Of course, this is most likely a question of belief, but no one can make this decision for you. It has emerged that many investors allocate between a third and half of their wealth to metals, depending on the necessary direct access options.

He who has informed himself about the metals market usually also wants to enter after acquiring the first information. Surely you will have a similar experience like us. As we gained more and more knowledge, we couldn't let go.

Once you have made your choice, you should not touch your portfolio for a while, unless you are offered an especially interesting takeover bid for your goods. Then it is all about taking the chance and selling at a profit in order to newly orientate yourself and stock up again.

The market also offers savings contracts for metal portfolios which give you the possibility of saving monthly through so-called giro collective safekeeping. Positions are respectively added at the daily price by the provider or withdrawn from the total portfolio.

Of course, it always makes sense to also own real estate or other assets, such as art or old-timers. After all, these kinds of assets can be delightful in other ways, too.

We find ourselves in times of fast moving, volatile markets. These markets can be described as critical in their entirety. This is why we suggest to no longer hold any financial assets which entail the risk of total loss, no matter how low this risk may be. A total loss still remains a total loss.

Also, recommendations such as paying into a life-insurance plan, thereby burning your hard-earned money, cannot be taken seriously. Shares of interesting companies can always be part of a portfolio, especially when they are big industrial corporations of your country and you have a good understanding of the industry.

If you are interested in commodities anyhow, then maybe they should be mining companies. However, as a conservative investor you should be sure that the mines you invest in actually exist.

Should you also be invested in cash or have money in a savings account, then you could think about reducing your cash amount in favor of other options. For at least the rate of inflation should be fully earned.

Would you like to familiarize yourself further?

It always helps to know what you are doing. Especially when a decision turned out to be not the best. Of course, you can always follow the larger trends. However, specifically these trends are mostly controlled or influenced. You will only be faster and better within the market if you have an information advantage. And you must develop this advantage.

If you dread this work or simply don't have the time, it makes sense to collaborate with a serios provider on the market and participate in a metal portfolio. Make sure that the acquired assets are within your access and you can demand withdrawal at any time, because this is the only way you can rule out a total loss.

In this market the products can be easily stored separately in giro collective safekeeping. Meaning silver granules, tungsten in powder form or oxides or simply Osmium in crystalline form.

There are hundreds of such products with different product shapes. Your provider will surely offer you the most sensible variant, because it is also in his interest to work under eased conditions.

Either way, you should take part in one of the cheap seminars the market has to offer. The participation is even free sometimes. Of course, every organiser has an objective, but if you keep the necessary distance to the statements and form your own opinion, then the concentrated information will always help. Especially because you can openly ask any type of question here.

What type of risk is right for you?

The question of risk is naturally less prevalent with metals than it is with financial assets. However, here you can also invest in volatile assets or stable assets. Mercury, rhodium or palladium have proven in the last decades and years that values can move by several hundred percentage points, but in both ways.

On the one hand this is risky, but on the other hand it opens up opportunities to real, presentable profits. With metals, it's very often simply about the investment time horizon. If you have financial security and are able to leave your assets untouched for a decade, then you can easily wait out the small fluctuations. Because, as is said time and again about metals, they are simply still there, no matter what happens.

The risk only ever emerges when it becomes possible to substitute the metal or when the technology in which it is used could disappear.

And naturally, there are the five eternal metals that stand out from the precious metals as those that can be used for jewelry and investment. These are gold, silver, palladium, platinum and since recent times also Osmium.

Apart from their characteristic as a value investment, these metals captivate with their beauty and special properties for jewelry manufacturing. Of course, their prices and rates also move up and down. Predictions are hard to make, but it also applies here that a total loss can be ruled out, because the metal is ideally located at your home and can't go missing.

The risk falls when a metal is hard to recycle and there are markets and industries that will presumably always need it, plus when it mined and sold in politically difficult markets. At the first moment, this sounds illogical.

However, you logically buy the material at a time when it is still available. Otherwise you wouldn't have been able to buy it…. When a politically changed situation later leads to an artificial shortage, then you can liquidate your positions.

But in any case, the motto is: Invest long-term to minimize risk, because, as a metals investor, you will always find a metal where the traffic light is set to green.

Do you require direct access to cash?

The crucial question of any investor is generally the availability of cash. Cash and cash equivalents are often necessary when the car breaks down or one is blessed with triplets when expecting just one child. For exactly this reason, savings accounts, against all reason, are still relatively popular. When examined more thoroughly, this investment form is the worst of all.

Except of course for any finance certificates, which are not even fully understood by banks anymore, but only by finance mathematicians.

Please keep in mind that, especially in the metals trade, the situation can occur where a position cannot be instantly sold or only with a loss at the current daily rate. This is why it is important that you should never need to make an emergency sale, no matter what your risk type is.

If this situation is not to be expected in your case, then you can wait out almost any price developments, because as already often mentioned, the commodities won't magically multiply themselves.

Markets such as the Osmium market may be illiquid, but in turn they promise nice gains in the price of the semi-finished products and the end products in the jewelry market. Here, the growing scarcity to the point of unavailability is especially interesting.

How do metal trading companies create the prices for their products?

First of all, the base price of a metal depends on its market rate or spot rate on the metals market. This means that the dealer always has to pay the asking price, which in general is formed daily or even more frequently.

Then he either buys the product because it has already been sold by him, or he deposits the product in his depot and sells it once he has found a customer. In doing so, he exposes himself to a rate- or price risk. To generally absorb this risk, he increases the price of his products a little to withstand small losses, should they result from storage or purchases that took place at unfavorable price points.

You see, metals dealers don't have access to information that gives them real indications to where the prices are heading, either.

In conclusion, you invest a small amount of money at the start of every trade of a metal, which is used by the selling company for such safeguards or for customs duties, for paying a commission to an intermediary or for storage, analysis, batching, insurance and transport.

Thus, you lose a little money with your first purchase in the metals trade. On the other hand, the metals dealer is performing a service, which you basically pay for with this mark-up.

But actually, this can also be done a different way. You can, as is customary e.g. in the Osmium market, also buy certified semi-finished products, bars and disks easily on the internet and store them at home. Analyses are not required. You determine batching yourself and you can also pick up the products yourself, saving transport and insurance costs.

Please divide the costs like customs duties and VAT over your entire planned investment period. Think of them as a land transfer tax or notarial fee. After these calculations, you will gain a realistic picture of your opportunities and risks.

So generally speaking: When money is quickly needed, a loss is unavoidable. So only invest sums that you can do without for a while, because that's the nature of metals investing: long-term orientation.

With which investment time-horizon do you approach the subject?

If, like the church, you are shopping over the next centuries of your dynasty, then it is almost irrelevant which metal you acquire. Everything will result in a positive return. However, very few investors have such a long time-horizon. This is why the choice of metal also depends on the period of investment. The right metals exist for all strategies.

Gold, if time is short and liquidity is important. Silver, if it must be separable in batches without losing too much value. Osmium, if the price outlook should be more speculative and greater forgery protection is demanded.

Long-term planning can make sense not only for large corporations and family-offices. It is certainly also a great option for private investors to back the study of the next generation with capital, which is bound in metals for one to two decades. Because even if the capital is used, it will not be consumed in one instant. The time of sale can therefore be chosen after careful consideration. But there are also strategies for short-term investment.

If your short term aim is to safeguard monetary assets, have them available or be able to transform monetary investments into liquid funds, so that the money flows back and forth and creates profits, which you can withdraw or re-invest at your choosing, then you should build up a metals trading company.

There is an especially interesting opportunity with Osmium that is readily used. In order to use the further processing as an opportunity, you can buy discs or bars and have them cut by a wire EDM process specialist. The resulting shapes can then be certified at reduced costs by an Osmium-Institute and sold to the market by yourself. This way, the amount of money used remains manageable. The processing creates a profit at the point of sale and after the sale you have money for a second round. Withdraw your profit and repeat the procedure again.

Do you believe in the total collapse of the monetary systems?

If you do, then metals and real estate are your thing anyway. The more assured you want to be, the more the rudder of your investment preferences will point towards metals. You then belong to the people who don't believe in cash and its store of value.

You should either own precious metals or choose metals that, after a necessary delay, will again be needed in large amounts when a crisis has passed.

By the way, historically, production increases stronger after a crisis than before the crisis. This quickly becomes logical when you bear in mind that consumption stagnates within a crisis and that demand strongly increases after the crisis, often hitting new highs.

When the crisis is over, everyone wants to live in prosperity again and buys consumer goods made by industry. For every product, the manufacturing process or even the product itself requires metal.

When a currency system dies, the risk that governments will expropriate real estate assets or a ban the ownership of gold becomes a real possibility. It is exactly in moments like this that you should own metals that cannot be confiscated or are simply easy to hide.

And of course, they should always be metals with a very high value density, so that they are easy to transport. The truck filled with silver will then likely draw attention on the road.

Do you believe in conflicts of allocation and wars over commodities?

Should the almost inevitable battle for commodities commence on some not so sunny day in the future, then you can count yourself lucky for owning them. Nobody wishes for war or civil war-like circumstances. But we all know how quickly a conflict can be evoked.

Especially in our politically very unstable times of trade wars and new militaristic threats, the uncertainty is growing and we feel this happening in Europe. But please for a second imagine what it feels like living in an unsafe region yourself, unable to protect your possessions.

Particularly the people in these regions of the earth flee to currencies such as precious metals. And therefore, this form of investment also becomes more attractive for investors in safe regions, because demand is growing.

By the way, it is important to keep an eye on the pure amount of money in circulation here as well. Because the reserves of the critical, strategic and precious metals can easily be bought up by the money on accounts and cash. Increasing money supply

strengthens this effect and around the entire world, money is being printed continuously.

On a side note, the world's richest individuals could very easily buy up a market like that of crystalline Osmium all by themselves.

Let's assume a minable amount of about 2 cubic meters. This was worth about 60 Billion Euros in the year 2019. There are several people in the world that come to mind who could completely buy up such a market.

We look forward to the moment when yet again someone tries to completely control the market of a metal with his/her money.

However, when it's about commodities that are vital for the survival of countries, trade quickly gets bitterly serios. We would surely all be glad if the most important commodities were in private and responsible hands in such a case.

Within such a – hopefully unlikely – scenario, it is actually vital that your metals portfolio has several significant properties. These are:

High value density. The more value exists within a volume, the easier it is to hide or transport the commodity.

Unspectacular packaging. If your metal, e.g. tantalum, already looks like normal metal scrap from iron, then you have an advantage. No one will take it from you, because the thief simply won't recognize the value.

In contrast to this statement, you will have to prove authenticity to a potential buyer, which could be a problem. For this reason, metals like Osmium will be sought after, because they can always be proven as genuine via the Osmium-Identification-Code.

No granularity. Should you still have to sell your metal, then it doesn't make sense to trade a gold bar for a piece of bread. Silver is probably the better alternative in this case. It occurs as a granulate in small grains that are easy to trade.

You will then receive bred for a few grains of silver. Coins, which are well-known throughout the world, are especially good objects for bartering.

On the other hand, there are gold split-bars and Osmium-Starrows, which you receive as a whole bar but that can be broken into smaller pieces thanks to their predetermined breaking points.

This type of Starrow bar or split-bar also makes sense to use for a second reason. You are not paying the price of a blistered single package, but the lower, relative price for an entire bar, yet still have the option of dividing it into smaller bars or Stars. Osmium even gives you the option to recertify every single piece with the OIC.

With gold, these small bars are all imprinted. With Osmium, they are a part of the entirely scanned surface of the Starrow.

Are you an entrepreneur?

If you innately enjoy running companies, then you should also do it in the area of metals trading. There are only a few types of trade where you can earn money in a fairly relaxing way by simply waiting.

But moreover, as a business man you are already familiar with taxes, customs duties and their minimization. You can use this knowledge by founding a small metals trading business or have someone else found it for you, maybe initially as a UG.

In Germany, the UG is a type of a small GmbH, which offers all the forms of protection, is cheap to found and can be transformed into a GmbH at any point. Other countries outside of Germany offer similar corporate forms.

This company can also be passed on fairly easily in later stages or sold via the stock exchange, should other ways be unwise at the given moment. In any case, you will surely have pleasure in handling and actually working with the metals. Maybe you even have contacts in the industry in order to trade positions that aren't available to other dealers in the market.

Are you the haptic type?

There are people who can only experience property as their actual property when they are also at the same time in possession of said property, holding it in their own hands. And per definition, this is how it should be. You can and may store almost any metal at home. However, it also makes sense here to keep in mind the value density, because you probably don't want several cubic meters of silicon lying around in your basement.

Yet the precious metals and many other metals like e.g. bismuth and also Osmium once more have a quite pleasant side effect due to their beauty. I know that you have to be either a metals trader or a woman to describe metals as beautiful. But take a closer look, how bismuth crystallizes or how magnificently the surface of a hafnium bar twinkles or how indescribably Osmium sparkles under the sun.

So then, the course has been set.

Now get to work! Become a metals investor!

Comparing the classic investment metals with Osmium

In the Olympics, the first three places are awarded with gold, silver and bronze medals. It is about time that the overall winner receives Osmium. We know bronze from history class, because the bronze age was named after it and it was used for creating weapons, jewelry and objects of utility.

It is easy to presume that bronze or also messing are precious metals. But in reality, they are alloys with special physical and chemical properties.

Bronze for example is an alloy that contains a minimum share of 60% copper. The oldest alloy on earth is especially famous when alloyed with tin, the resulting metal is also known as tin bronze.

Having said this, the group of classic precious metals consists of only four metals. The list is led by the omnipresent gold and silver. Platinum and palladium follow. All four investment metals belong to the heavy metals. Up-to-date prices are generated for them on the stock exchanges.

Osmium is not or at least not yet traded on a stock exchange. However, there is a spot price that is released daily.

The prices for gold and silver are published on the LBMA (London Bullion Market Association) and the prices for platinum and palladium are published on the LPPM (London Platinum & Palladium Market), both located in London. Originally, these metals were used to back currencies. But as a result of the new debt reduction policy of countries under continued usage of the printing press, this is no longer possible.

It is vital for the private investor to also have investment metals in his/her portfolio. Principally, they can be sold at any time and place on earth. Sure, doing this is easier with gold and silver than it is with platinum, palladium or Osmium. The reason is simply the different degree of prominence.

With the myths surrounding Osmium and the incredible story of its market introduction, Osmium's degree of prominence is also increasing, often rapidly so. Therewith, the liquidity of the total market also increases.

Liquidity and minting output not only depend on marketing and market penetration, but also on the circumstances of production and usage. There were times where so much gold and silver were minted that the mints simply moved the production of platinum to the side lines.

Both metals have been in circulation for a much longer time and have thereby become well-studied investment metals. An interesting fact: A long time ago, platinum was thought to be a kind of waste product that occurred when mining silver.

Its name also arises from the circumstance that it was first thought of as "little silver" and later as a type of unfinished gold. It was discarded in the 18. century and used by forgers to produce fake gold.

Large problems arose, because platinum could not be melted down in those times and could only be complexly compounded with gold through alloys in the forge of black-smiths.

The triumphant march of precious metals as investment metals throughout the millennia has a simple reason. The metals are chemically resistant. A gold coin will endure a century on the bottom of the ocean.

The rate formation process and price determination of investment metals follows two fundamentally different ties. They are of course firstly influenced by the demand from the industry. The platinum price rose with the invention of the catalytic converter. Also, the gold and silver prices rose at times of large international festivals due to higher demand for jewelry. These developments can be logically explained.

Secondly however, the prices of the metals are also partly linked to each other. Investors who like to diversify investment metals in their portfolio also buy other metals, without taking into account their use in the industry. For example, the price of silver has, even though it is substantially lower than the price of gold, followed the gold price most of the time in the past and has been more volatile.

The ratio between the silver price and the gold price has seen levels very near 1:100. Meaning gold was almost one hundred times more expensive per gram. Technically, this price difference should not be possible if you look at mining output.

As a second example, one can mention the 1:20 ratio in value difference between gold and Osmium. Here, the ratio is more likely to drift further apart due to the high production costs of crystalline Osmium.

In order to derive such developments and connections, the investor is provided with charts that form the ratio of two investment metals. This observation contains important information for the strategists among us who believe in charts.

The investment metals have densities between 10,49 g/cm³ for silver and 22,61 g/cm³ for the heaviest precious metal Osmium. They are either easy to shape and therefore suited for producing bars and coins of special shapes or they are directly handed over in crystalline form.

But even more interesting is their value density, meaning the supposed value for a specific volume.

The value density is so great that you can buy an entire house from a mere one-liter gold bar. This volume easily fits into every milk carton. To put it simply, you can easily carry a whole fortune around with you.

Osmium marks the tip of the iceberg. With a volume of only three to four cubic centimetres you can purchase a brand-new Lamborghini. A family house fits into your trouser pocket.

Viewed fundamentally, investment metals, strategic metals and precious metals are actually a little undervalued considering their rare deposits. Because they will definitely run out one day. Today, a metal may still have a relatively low value within a liquid market. But in reality and when observed more closely, these metals will physically run out and will no longer be available to buy or to mine and in some cases, not even to recycle. Then, prices will and must leap to the upside.

At the moment, the precious metals move more in line with the financial markets, which is especially unrealistic and they sometimes even act like currencies. This can also make their prices fall from time to time. In other words, almost no other prices are as hard to predict as those of precious metals. When the price is comparatively low and you have a good gut-feeling, it is surely never wrong to purchase investment metals.

The perfect entry point can never be timed anyway, unless you are unlucky in love, so lucky in the game. You can assume that the stories that one reads about people, states an corporations who supposedly influence precious metals prices are more “fear mongering” and “greed creation” than anything else, because influencing or even controlling the price of a precious metal in the long-run is certainly impossible.

Typical variants of overreaching and fraud with gold

Please pay attention to the possibility of forgeries when buying investment metals. There is actually more forged gold in circulation than one would think. There was a case in Germany where gold, which was originally bought in blistered packaging, changed owner a few times before someone had the idea of melting it down and examining it.

It was a forgery. And nobody had noticed. Neither the banks nor the precious metals dealers in the chain. It is therefore almost impossible for a private person to identify the counterfeiter just through a mere visual inspection.

At first, one would assume that it is impossible to forge an element. In a physical sense this is correct, but you are actually buying a product that was manufactured from gold. Be it a jewelry piece, a coin or a bar. And these products can by all means be counterfeited.

It is a proven method amongst counterfeiters to coat a bar of tungsten, which has a similar specific weight, with a layer of gold, thereby committing forgery.

In order to reveal the forgery, you would principally have to at least drill a hole into the bar, if not cut it open or even melt it down. The procedure is only completely certain through total homogenisation in the melt and the certificate of a renowned refinery.

Because the price of the gold would dramatically increase when performing this procedure, only very few buyers choose this path. They simply trust their supplier, which is perfectly reasonable when buying from a metals bank or a refinery in a constitutional state.

To prevent forgery, certificates are attached for minimum security and you can check the engraved stamp or the mintage of a coin. Simple tests like observing the surface, examining the ductility or measuring the density or conductivity are possible without damaging the metal. However, in many countries it can also still be commonplace to check a gold or silver coin with the teeth.

It is especially easy to commit forgery with shrink-wrapped products, because of course the dealers give you the advice to leave the product wrapped along with the certificate.

The most common form of forgery is to change the amount of an investment metal in a product. If you buy 666 gold, then you can identify the gold concentration based on the engraved stamp. But the stamp can sometimes very easily be stamped into a jewlery piece with 333 gold by an inclined “train station” jeweler. Here, carefulness is top priority, because otherwise you may get a great shock from the drop in value at the point of sale.

Sadly, the truly worst form of overreaching is legal. You see, when a product like gold is changed in its shape or processed to jewelry, then a processing surcharge may of course be added. In principle, there is nothing wrong to this approach. Obviously a jeweler should be able to make money from his artistic work.

But if you watch the home-order channels on TV, then with the help of a little basic mathematics it will soon become clear to you that these people are making disproportionate profits with virtually worthless products.

I would like to make this clearer for you by giving an example. Imagine you buy a kg of gold as one single bar. Serious dealers will sell near to the material value, which is displayed to you by the markets. In this case, you have done everything right so far.

If you are not able to raise this amount of money all at once, then you buy more often and smaller amounts instead, until 1 kg is reached. You always do this when money is available or when the pay check is due.

Naturally, the single pieces that you acquire cost a few percent more than had you bought the kg as one whole gold bar. This is also logical. You lose a few percent, but you can live with that, because you are also receiving a more easily sellable batching.

If you have even less money available, then you are likely to fall into the trap of an absolutely unpleasant business idea created by TV stations and their precious metals suppliers. A channel needs a sales profit of at least 50 percent to cover the costs for the studio, team, moderation, light, electricity and the technical department. This is comprehensible and initially nothing bad.

But in order to reach this percentage, the money makers had the idea of introducing coins with special embossment features to the market. The production of these coins is hardly any costlier than that of normal coins and they can be sold for significantly more money due to the "enhancement". Imprinted colors or especially elaborate "collector's packaging" are also part of this „enhancement".

Money was made for years with this method. But in the times we live in, increased greed means this margin is no longer enough. So, coins that weighed an ounce became coins that weighed a gram, then half a gram. Only the asking price didn't go down along with the decreasing weight. To the contrary, when the amount of gold was halved to e.g. half a gram, in some cases the price was even held above the fair price of one gram.

Please also keep in mind that the "enhancement" with colors can be disadvantageous, because the imprinted color must be separated from the melt during recovery. The worst form of this business models has now taken the shape of gold bills. Gold can be rolled and stretched especially thinly thanks to its phenomenally high ductility. This is why gold leaf is so cheap.

It is just unbelievably thin. Imagine a bar of gold which you roll thinner again and again until you finally roll it through a form which reproduces a bank note.

Then it is somehow still a bar. It may only be a few molecule diameters thick, but it is still "three-dimensional" in space. These peculiar bars are of course only paper-thin layers of gold, which are imprinted with the surface image of a bank note. Because these super-thin layers can tear very easily, they are packed in plexiglass. Even more-fold. This is done so absolutely nobody is inclined to extract the tiny amount of gold, which is sold at unbelievable prices, from the packaging and therefore becoming aware of the scam.

To the viewer, it appears as though even more gold is being sold now, because you can see the large surfaces of gold with bank note images. In conclusion, everyone thinks about how valuable these flat bars must be. And this notion is also strengthened by the presenters' white gloves. But in reality, it is only the next step toward even less mass and an even higher price than it was from one gram of gold to half a gram of gold. The profit was still not enough for these provider companies. If you melt this gold down, there is literally almost nothing left over. Please do not fall for this scam.

In principle, there is a simple rule of thumb. If the sales and marketing department of a company is the single greatest producer of costs, then the time has come to work on the product margin. Any expensive selling structure or any sale through expensive media is definitely too much to allow a fair sale of metals at fair prices.

Taxes or no taxes

The metal gold is also especially interesting against the backdrop of VAT-free transactions, because you don't lose out on the entire tax with each purchase or sale. Fast buying and selling, meaning speculation, would be quite senseless with VAT.

For Osmium, the rules are fairly simple. In Germany, the VAT must be paid on top and this tax is lost at the point of purchase. On the other hand, the price increases are partially so great that VAT plays no meaningful role. In some countries, Osmium enjoys a similar status to gold.

With silver, the current status is a little confusing. Silver bars succumb to the full rate of VAT, whereas silver coins can or could long be bought at a reduced VAT rate. Please make sure to inform yourself about the current legislation. Please also keep in mind that the VAT rate differs widely across the various European countries.

Metals are an interesting investment

Now we finally reach the chapter that everything written before has worked towards: The investment in truly interesting metals.

Here, we classify the metals in an unconventional way by investment criteria and allocate them to sectors where they are used. In every section, we look at what advantages and disadvantages they have compared to an investment in Osmium.

Some metals are also of especial interest singularly. In this section, we only limitedly cover the properties of the metals and focus more on the future outlooks and opportunities that are associated with the metal.

For if a comparison to Osmium is to be made, it is of course essential to also be well informed about the other metals.

Metals and their application in the industry

Information technology:
Germanium, hafnium, gallium, europium, silver

Mechanical engineering:
Tungsten, molybdian, vanadium, cobalt, tellurium

Metals of which the value density is simply too low are excluded. Metals such as iron, aluminium, copper and silicon are an example for this. The storage volume of these metals would be already quite high with just medium capital expenditure. Also, you become competition for scrap dealers, who devote themselves to the collection, separation and processing of these metals. However, there are companies that offer this class of investment in the form of instalment purchase agreements as granulates.

Medical technology:
Bismuth, tantalum, silver, titanium, niobium

Magnet technology:
Neodymium, bismuth, praseodymium, dysprosium, terbium

Key industries:
Indium, antimony, bismuth, tantalum, zirconium

Key industries are branches of industry that are paving the path to the future, like solar technology, medicine technology and mobile communications. Principally, one could say that without these sectors, nothing will work in the future. Its proponents argue that the alternative to using these key industries equates to falling back to the stone age.

Solar, LED, laser and lighting technology:
Europium, indium, germanium, gallium

Aerospace technology:
Molybdian, tantalum, gold

Chemical engineering:
Platinum, tantalum, tungsten, nickel

Critical storage, but interesting from an investment perspective:
Mercury, rubidium, caesium, arsenic

Jewelry metals:
Silver, gold, platinum, palladium and Osmium

For those who don't want to invest in a commodity basket, a series of internet sites offer the chance of single investments in individual metals. Especially for Osmium, a large number of sites exists. They are listed at the end of this book.

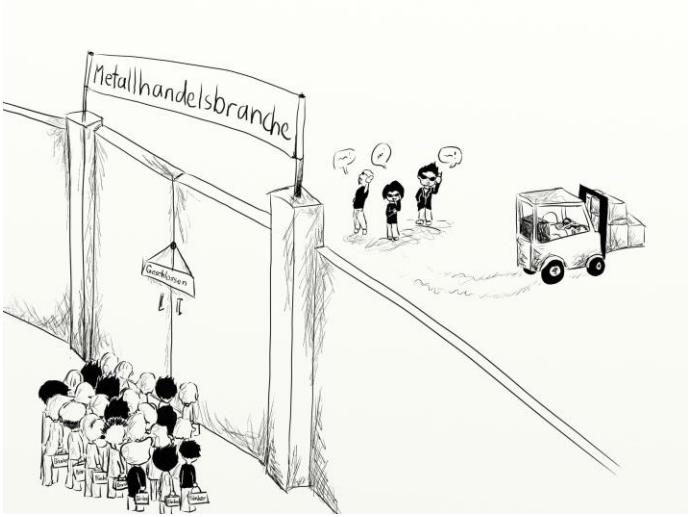
Safety and value retention

Many pages can be written about safety and value stability when it comes to investing in strategic metals, but I prefer to summarize the few facts and will lay them down logically for you.

What do our states do? They hand out debt securities to the public and spend the money on measures that can boost the economy directly or indirectly, if this principle works out. The good intention that follows is to someday recompensate the public with the money that is taken from their tax payments. Somehow, this also sounds a little absurd.

Because we all pay a different amount of taxes and own different amounts of bonds, a simple debt write-off seems impossible here.

But it is exactly this process that increases the social wealth gap. Companies and people with wealth lend money to the state. The state guarantees for it and increases its amount, earning it back mostly from the declining wealth of the middle class through taxation. A healthy interest is payed to the already wealthy classes.



If now even more money is printed and brought into circulation and the monetary base increases, every Euro is less valuable on the whole. This is called inflation.

It is kind of obvious that the amount of economic goods just can't keep up with the money printing machine. This process is particularly dangerous when real goods are purchased with printed money, because these goods are actually the values and assets of a society. If these assets are not quickly secured, one will not have access to them in the future.

And therefore, commodities now enter the game, because they are the only real everlasting values. Even property will lose value over time without maintenance. It is necessary to keep on investing in property wealth to secure its value. An art piece rots with time, no matter how well you protect it.

The risk of an investor who invests in commodities is the supposed fluctuation in value. Yes, correct, different prices are paid for commodities every day. This is exactly what you want, because you make money from price increases due to shortages. But the following, incredibly important effect is much more decisive: 1 kg of a commodity stays 1 kg of a commodity, and therein lies its value. Measure the value in kg and not in a currency.

A friend told me a really nice story: Many years ago, he bought a property and was asked by the bank in what way he wanted to guarantee for the mortgage and how much of his own capital he could contribute to reduce the risk.

Of course, the bank wanted to be entered into the land register in first place. This is so normal for all of us, that we simply go along with it. It also follows the principles of fairness to collateralize the party that is lending us money.

Several years later he earned lots of money and payed off his property. The surpluses now lay in his bank account. He again visited his bank adviser and told him about the money that he would now like to offer the bank in return for a good interest rate.

The bank adviser offered him a rate that lay below that of his mortgage, but then banks also have to pay for their administration. My friend understood this. Half-jokingly, he asked the bank adviser for collateral for his loan. He asked whether he could be entered into the land register of the bank. He received an utterly uncomprehending look in return…

Allow me a second small story, this time from my own experience. I visited a group of salesmen from the financial services sector. I wanted to learn where the challenges of this clientele lay for selling their service packages and, to be honest, I wanted to win some of them over for my own commodity business.

So, I held a flaming presentation. The auditorium much liked the fact that the commodity space revolves only around pure trading activities, which aren't further complicated by a dangerous level of government regulations. Above all, the risk of the seller and that of the investor falls at the same time. With this sentence, I had broken the ice.

However, a different presentation was already held before me, which I was also able to attend. This presentation was about arbitrage activity. Meaning the trading with currencies to compensate for extremely small fluctuations.

Because these differences between the currencies are so incredibly small, you have to deploy a lot of money in order to make money this way. A second topic was trading with CFDs. In the short term, it may be possible to earn more money this way than with the investment in commodities.

I asked the presenter if a total loss was possible at these relatively high interest payments. The answer was: Yes, of course. You can lose all your money in any financial operation.

My second question then was: So why do investors invest their money in such products? The answer followed quickly and consisted of only one word: Greed!

What do I want to make clear here? We all want to secure values. We do this by investing money. Initially however, this is no increase in value, but an attempt to compensate for inflation. So why not just purchase the values themselves and therefore secure yourself for real. Yes, of course it can happen that the markets change and that the values change in response, but even then, they are still there.

There is no total loss. Rather, no matter what scenario you choose, there is no loss in value at all, because the value is always there in the form of a metal. And measured in kg. Because strictly speaking, the value of a currency changes in relation to the metal and not the metal in relation to a volatile currency.

Especially for investors with long time horizons, metals are almost the only way to secure values in the long term. And honestly, who actually has the crystal ball that can predict the next currency system crash or market crash at an exact point in time? Although – I somehow have the feeling that the next crisis will be easier to predict and is closer than we all think.

For me, unhealthy price increases in the stock markets are an indicator that not the economy is growing, but that only the numbers in the valuations are growing. In such moments, the normal investor cannot restrain himself and buys in at any price, just to be part of the party, because he doesn't want to be left empty-handed.

These are the times when the augurs cry out the incredible hights to which the DAX will climb up to in the coming months. Sometimes I have the feeling that the press hype serves the one and only purpose of driving small, private investors into positions that the inclined banker is already waiting to sell so he can realize his profits. There is truly only one way to step off this bandwagon. And this is the purchase of values. In principle, it makes no big difference if you invest in metals and property or in jewelry and old-timers.

The question is always the same: Who needs what and when does he need how much of it? Art may be a volatile market. With property, you follow cycles and development plans. The thought process with metals is also very straight forward.

If you believe that the large DAX companies will continue on their path anyway, then don't buy the companies, but buy the things that the companies need. These things are the defined commodities for each respective sector. Your diversification thereby increases and you can always also sell to other companies. As you know: Don't cry, diversify!

The value density

I want to take into account an important aspect of metals investing, which is the so-called value density. You know density as the ratio between mass and volume. It is a measurement for how much mass of a substance one can accommodate within a defined volume.

You can apply the same principle to money or a value per volume unit. This ratio is called value density. But why is the value density so significant?

If you use a warehouse and keep your values there, then it is interesting for you to know how much value you can store at this location. This is also an important basis for the calculation of your insurance.

A similar ratio can also be formed with money and mass. We use this ratio every day, it's called price. Meaning the price that someone is prepared to pay for a defined mass of a substance.

Let's now leave the industrial scale and move to the genuinely high value densities. As we are in the environment of metals trading, it makes sense to start with a substance like gold.

As an example, we will determine a 1 kg price of 42.000 Euro. Gold has a density of 19,32 g/cm³. If we expand by 1000, we get 19,32 kg/l. Multiplied with the price of gold for 1 kg we receive 811.440 Euro/l.

That is a fairly high number. You can carry around almost one million euros in just two jacket pockets. This is also the reason why I like to also refer to value density as escape density.

And don't forget: Osmium's value density exceeds this by a two-digit factor.

A small lexicon of the metal trade

Mass

Firstly, I would like to explain the difference between mass and weight, which only as a limited relevance for the metals trade, because you surely won't be working on the moon or generally in conditions of altered gravity. Nevertheless, this knowledge is simply elementary for an aspiring metals investor or metals dealer.

The mass, which is stated in kg, is a basic unit of seven basic units of the SI unit system, which all of physics and chemistry refer too. Only the inhabitants of the Anglo-Saxon sphere have not understood this yet.

A certain mass is found within a homogenous gravity field through comparison with a mass of reference. In our case, this is the original kilogram in Paris, which is compared to a different mass simply by weighing.

This comparison with weighing is possible because two equal masses within the same gravity are affected by an identical force, independently of their material. We call this force weight and we can directly compare it.

Not entirely decisive for buying gold, but still true, is the fact that the force of the earth's gravity on masses decreases in line with the distance to the earth's surface in both directions. So, it makes sense to buy gold in a mine deep underground or high up on a mountain and to resell it at sea level. If you could somehow make it to the centre of the earth, then your metal would become very cheap, because earth's gravity neutralizes itself to zero in all directions there.

Because the weight, meaning the force that acts upon the scale, is measured, you are also not cheating. However, you shouldn't use a beam scale, because this scale simply compares this mass with a different mass, which also loses weight under said conditions.

You should then identify the mass with the help of an interesting characteristic, the physical inertia. When a mass is accelerated by an accelerating force, it opposes an inertia force in proportion to its mass. This inertia force must be overcome in order to accelerate the mass.

A mass that is being accelerated, meaning is changing its speed, can simply be determined according to Newton, because force and acceleration are proportional. The constant of proportionality is simply the mass.

If you weren't applying a force to a piece of gold in your hand, which you can feel in your hand is directed upward, then the gold would start moving on its own and fall to the ground in earth's gravitational field.

This force results from the property of mass being heavy. Actually, the gravitation of earth on the gold acts in the same way as the gravitation of the gold does on the earth. However, it is sufficient to perceive the effect from the point of earth due to the striking difference in the mass of both bodies. The gravitational field is proportional to the mass of a body. We can therefore neglect the gold's field compared to that of earth.

If you now accelerate the piece of gold horizontally so it glides over the table to the buyer during a sale, then the gravitational field of earth is counterbalanced by the table from underneath, because this force acts in the direction of the earth's centre.

Even so, you again feel a force in your hand when you accelerate the gold. This force is called inertia. The observation that mass is not willing to be accelerated and opposes a force has led to the introduction of the term inert mass.

Either way, both effects have a single cause. Mass. Measured in kg.

Weight

Now we come to weight or, more specifically speaking, weight force. On the surface of the earth there is a gravitational acceleration of 9.81 m/s^2 toward the centre of the earth, which acts upon every piece of mass.

The weight force is specified in newtons. The newton consists of SI basic units. The newton is then written as kg m/s^2. So, the gravitational acceleration is multiplied with the kg.

Strictly speaking, every weight should be stated in newtons. However, some factions still say that an object weighs 1 kg when 9.81 N are acting upon it.

Because we find ourselves within a very constant gravity range on the surface of our almost round earth, the proportionality between mass and weight is simply equated by the proportionality constant of our gravitational acceleration in daily use.

So, if 1 kg weighs 9.81 N and this applies throughout the entire planet, then it makes sense to just calibrate all scales to this and call it 1 kg. Because this is the mass that a scale shows when it is calibrated to a weight force of 9.81 N.

Units, weights and concentrations

The masses, or as mentioned above referred to in some factions as weights, are displayed in units that diverge frequently from the SI unit system. For this reason, one is constantly occupied with conversion.

Because a different unit also means a different price. Here, proportionality also plays a part. Thankfully, it is therefore possible to convert every unit into another one by using the simple rule of three.

I would prefer to calculate everything in the kilogram-meter-second system, but it seems the world is not yet ready for this.

So, let's unnecessarily occupy ourselves with fine ounces, ounces, carat and the like.

You assuredly buy antimony in kg. However, for historic reasons, precious metals are indicated in fine ounces. A fine ounce, or troy ounce (oz.tr.) equates to 31.1034768664 grams when rounded to ten decimal places. The unit derives from a twelfth of the troy pound (lb.tr). This equates to 373.2417223967 grams. In reverse, one gram equates to 0.0321507466 fine ounces.

The typical ounce equates to 28.35 grams. By the way, one pound equals 16 ounces, to make things a little less complicated. But you can forget about this unit straight away, because the metals trading business uses the fine ounce that originated from old times as the pharmacist ounce.

Theoretically, ounces shouldn't even be allowed to be used, but because many bars are labelled with 0.5 ounces, 1 ounce, 100 ounces, 400 ounces and 1,000 ounces, it makes sense to keep this unit alive for a while longer.

When buying gold and silver, please especially watch out for a significant difference which has to do with the concentration. You will always find the grade of purity stamped into a bar – typically in per mil, meaning per thousand.

If a 1 kg silver bar is contaminated by one gram of different metals, then it is a 999/1000 bar. It therefore contains 999 thousandth of silver. The bar's mass in indicated in fine ounces, which equate to the total mass of the bar. You buy 1,000 ounces at a defined silver price, but only receive 999 ounces of silver.

Caution! This is different with gold. Here, the imprinted number of ounces indicates the actual amount of gold. A gold bar of 1,000 ounces also contains 1,000 ounces of gold. However, due to the contaminations, the bar actually weighs a little more. In conclusion, a 995/1000 bar has an increased mass of about 5 ounces.

Old gold coins also have this effect. They always contained one ounce of gold. This was also engraved into the coin. So, the mass of gold was in any case correct, but in order to increase stability, other metals were added as impurity. Therefore, it would be in no case valid to speak of a high purity.

It would be better do just write 1000/1005. Calculated inside and out, there is also a difference in the determination of the parts per thousand. Just like the figure of the VAT included in 1,000 Euros and the figure of the added VAT to the net price of 1,000 Euros are not the same.

By the way, in the technical terminology of metals traders the concentrations are very simply and pleasantly shortened. A bar with a 99,99 percent purity of a metal is simply called "four nines" because of the number of applicable digits. Correspondingly, a 99 percent low grade would be called “two nines”.

The highest purity that investors and jewelry manufacturers can come across in the metals trade is the purity of Osmium. This purity measures 99.9995 percent and is due to the process of crystallization. It is impossible for this procedure to embed other metals, or be it only extremely small traces of them, in the Osmium crystal.

Meanwhile, crystalline pieces of Osmium are being used to calibrate measuring devices, because the stated purity could even be two nines higher, meaning 99.999995 percent. And this is truly impressive.

Carat

Now things get a little confusing, because carat is used both as a weight unit and as a proportionality. The proportionality or purity is also referred to as fineness.

With diamonds, a metrical carat is a mass of 0.2 grams. This is simple and uncomplicated, but unnecessary, because a 5-carat gemstone weighs exactly one gram. Maybe this just sounds like too little for the customer.

In this case, the 1:5 higher numerical value, i.e. the scalar in front of the unit and therefore a different unit, naturally makes sense again. Unit and scalar just have to counterbalance each other. If one rises, then the other must fall by the same ratio.

In our case, meaning the fineness of gold and silver, the separation in 24 carats is akin to the separation of the day into 24 hours. 24 carats are equivalent to a purity degree of hypothetically 100%, which of course cannot be reached in reality.

They carry a stamp, which in technical terms is called hallmark, of 999. In the past, a twelfth carat was called “Grän” in Germany. In our example, this would correspond to five minutes of the 24-hour day.

24 carats equate to 1000 per mil or 100%. 12 carats equate to 500 per mil or 50%. The other carat figures can also be calculated using the rule of three. However, in our calculating system they form uneven numbers, which have to be rounded and stated in twelfths of a carat. In conclusion, 8-carat gold has a mass fraction of one third, because 24 divided by 8 is exactly 3. Nevertheless, the rounded twelfth of 333 is applied in this case. Common are 24, 22, 21, 18, 14, 9 and 8 carats.

It is typical to use 21,6 carats for gold coins, as this equates to a gold share of 90 percent.

This means that higher contaminated gold can also be used as a coin. In most cases, the adding of other metals is done to increase stability, so the coins don’t deform too easily in daily use.

Maybe a last word on the mass fractions of gold: As you already know, gold has a high density and a high atomic weight. This is mostly not true for the admixtures. Most of them are lighter.

This results in a drastic effect, because the fraction of purchased gold atoms decreases with higher impurity. Gold has a relative atomic mass of 196.97. The relative atomic mass of copper is 63.55. So when you buy gold that is contaminated with copper, every copper atom weighs only about a third of a gold atom.

So, in conclusion, if an alloy contains an equal mass of copper and gold, meaning the same mass fractions, then it also contains substantially fewer gold atoms than copper atoms.

Put into proportion, the left side of the scale always has three copper atoms, whereas the right side of the scale only has one single gold atom. To put it bluntly, you are buying copper which is contaminated with gold.

Therefore, the golden rule is: Never by gold and silver without a calculator.

The other side of the coin, however, is the specification of numerical values for very low masses.

If the value density of a metal is tremendously high, such as that of Osmium, then it makes sense to make use of the metric carat and actually measure the Osmium-Diamonds, Osmium-Stars and the other small cut shapes in carats, which will probably also be done in the Osmium market within the next years.

Thankfully, you now already know how to convert the units.

Determination, naming and classification of metals

Because there is a muddle with many publications and internet sites when it comes to the allocation of metals and naming of group affiliations and classifications, it is my strive here to provide clarity with several listings and explanations.

The distinction of several groups is defined more arbitrary, like e.g. the distinction between precious metals and semi-precious metals. I hereby follow in line with the typical breakdowns. Most classifications are however very explicit. Unclear or not defined affiliations are identified separately.

Metals

A metal is an element or an alloy with the following four important properties, which can be easily measured or perceived.

- High electric conductivity
- High thermal conductivity
- High reflectivity
- High ductility

Within a metal, the cohesion of atoms is formed on the basis of the so-called metallic bond. The valence electrons are free-moving in this binding form.

For this reason, there can never be just a single metal atom, because the properties of metals can only be developed in a group of atoms, the so-called clusters.

This property is not bound to a solid physical sate, which is also shown by the liquid mercury.

Being a metal is quasi more a physical sate that is defined by the fact that the number of electrons in the outer atomic shell is smaller than the coordination number. A further definition is that the ionisation energy, which is needed to split off the outer electrons, is smaller than 10 eV (electron volts).

This so-called ionization energy is therewith very small and encourages the capacity to form positive ions.

You may still recall the simple Bohr atomic model, in which electrons circle the nucleus in shells. This model is sufficient for us to simply understand several things about metals.

Elements that are situated further left in the periodic table have less electrons in the outer shell. This means that they are more likely to release a valence electron than to fill up their outer shell. As a result, with metals, positive ions generally occur in noble gas configuration.

Hereby, the outer shell of the valence electrons is completely full and the element loses the capacity to easily form chemical bonds.

Once again, Osmium is super exciting in this regard, because the number of electrons that are involved in the bonding of Osmium tetroxide is exactly eight. This is a further indication of how “noble” Osmium is amongst the precious metals.

Metals also have the unique feature where the atomic cores within the metal are grouped in a lattice structure.

Within this lattice structure, the valence electrons can move freely. The belonging of the electrons to an atomic core is dispersed.

You can imagine the electrons and their way of moving akin to a gas. The free electrons ensure good electric conductivity, because as a charge carrier, they are the electricity that we are familiar with from the socket.

In this case too, Osmium is in a unique position. At especially low temperatures just over absolute zero, Osmium becomes superconductive and conducts electrons through the metal without resistance.

For the explanation of the metallic properties I cite Wikipedia (translated from German):

Shine (mirror shine): *The freely moving electrons can re-emit almost the entire incoming electromagnetic radiation, even up to the wavelengths of x-rays. This is how shine and reflexion emerge; for his reason, mirrors are manufactured from smooth metal surfaces.*

Opacity: *The previously described reflexion on the metal surface and the absorption of the not reflected portion ensure that e.g. light can hardly penetrate into metal. This means that metals only seem a little transparent when processed to the thinnest layers and appear grey or blue under observation.*

Good electric conductivity: *The migration of the freely moving electrons in one direction is the electric current.*

Good thermal conductivity: *The easily displaceable electrons take part in the heat movement. They also transfer thermal inherent motion of the atomic cores (oscillations) and thereby contribute to the heat transport, cf. heat conduction.*

Good ductility: *There are grain boundaries and dislocations in the metal, which can already move at an elongation below the tensile stretch, that is, without the bond being lost; so, depending on the grid type, a metal will deform before it breaks.*

Relatively high melting point: *It results from the binding forces, which are directed from all sides between the positive ions and the freely moving electrons. However, this effect is weaker than the electrostatic attraction forces between ions and salt crystals.*

About 80% of all elements are metals. This means that overall, metals are not exactly rare, but there are great differences in their deposits. Metals also exhibit several properties that are not directly obvious but still important:

The metallic character of elements increases in the periodic table from top to bottom. In conclusion, the heavier elements are quasi the better metals. The metallic character also decreases from left to right, until we reach the metalloids and then the non-metals and noble gases.

Osmium is located with the precious metals on the bottom left…

All metals except mercury are solid at room temperature. With increasing atomic number come several maxima in the melting points. With the metals, these melting point maxima are located in the 5th and 6th group.

Between the atomic number 19 and 30, the maximum lies with vanadium. Between 37 and 50, molybdian is located at the peak of the melting point curve. The third and highest maximum is formed by tungsten, which also leads the list of melting points. Osmium is ranked not far from this peak.

The 66 stable metals are ordered here in accordance to their atomic number. In brackets you will find the symbol and the atomic number.

Lithium, (Li, 3), **beryllium** (Be, 4), **boron** (B, 5), **sodium** (Na, 11), **magnesium** (Mg, 12), **aluminum** (Al, 13), **silicon** (Si, 14), **potassium** (K, 15), **calcium** (Ca, 20), **scandium** (Sc, 21), **titanium** (Ti, 22), **vanadium** (V, 23), **chrome** (Cr, 24), **manganese** (Mn, 25), **iron** (Fe, 26), **cobalt** (Co, 27), **nickel** (Ni, 28), **copper** (Cu, 29), **zinc** (Zn, 30), **gallium** (Ga, 31), **germanium** (Ge, 32), **arsenic** (As, 33), **selenium** (Se, 34), **rubidium** (Rb, 37), **strontium** (Sr, 38), **yttrium** (Y, 39), **zirconium** (Zr, 40), **niobium** (Nb, 41), **molybdian** (Mo, 42), **ruthenium** (Ru, 44), **rhodium** (Rh, 45), **palladium** (Pd, 46), **silver** (Ag, 47), **cadmium** (Cd, 48), **indium** (In, 49), **tin** (Sn, 50), **antimony** (Sb, 51), **tellurium** (Te, 52), **cesium** (Cs, 55), **barium** (Ba, 56), **lanthanum** (La, 57), **cerium** (Ce, 58), **praseodymium** (Pr, 59), **neodymium** (Nd, 60), **samarium** (Sm, 62), **europium** (Eu, 63), **gadolinium** (Gd, 64), **terbium** (Tb, 65), **dysprosium** (Dy, 66), **holmium** (Ho, 67), **erbium** (Er, 68), **thulium** (Tm, 69), **ytterbium** (Yb, 70), **lutetium** (Lu, 71), **hafnium** (Hf, 72), **tantalum** (Ta, 73), **tungsten** (W, 74), **rhenium** (Re, 75), **osmium** (Os, 76), **iridium** (Ir, 77), **platinum** (Pt, 78), **gold** (Au, 79), **mercury**(Hg, 80), **thallium** (Tl, 81), **lead** (Pb, 82), **bismuth** (Bi, 83).

I am deliberately not listing the metals of which all isotopes are radioactive. It can surely be of interest to own uranium or thorium, but definitely not for private investors.

In addition, radioactive metals are only available in very small amounts and extremely difficult do extract. Technetium, polonium and promethium may be positioned in the middle of the periodic table, but they are not available in the free economy and of course no option for the investor.

Artificially created in the reactor, these radioactive elements with half-life periods of sometimes only nano seconds and drastic radioactivity wouldn't cause you too much fun anyway.

The importance of the metals is evaluated differently according to industry. In chemistry, for example, the following rare elements are considered vitally important:

Gold (Au, 79), **platinum** (Pt, 78), **selenium** (Se, 34), **silver** (Ag, 47), **mercury** (Hg, 80), **tungsten** (W, 74), **tin** (Sn 50), **lead** (Pb, 82).

By the way, metals conduct electricity to a varying degree, which makes some appear more suitable as an electricity conductor than others. Of course, price also play a role for this application, because the most suitable metal would actually be silver, closely followed by copper and only then by gold and aluminium, which was also used as wiring material for a long time.

Metalloids

Metalloids are located between the metals and the non-metals in the periodic table. It is hard to allocate them to a group per definition, which also lead to the term metalloids or semi-metals.

They partially show metallic traits and partially don't. But in particular, their properties often change with the temperature. For our definition, we will use room temperature.

The conductivity, the dissociation energy, the frequency of occurrence of a crystal modification in nature and, especially in accordance with the newest definition, the allocation by means of the so-called bandgap are used for subdivision.

From the following list, one should therefore regard germanium and antimony more as metals than as metalloids, whereby selenium is actually more a non-metal.

Boron (B, 5), **silicon** (Si, 14), **germanium** (Ge, 32), **arsenic** (As, 33), **selenium** (Se, 34), **antimony** (Sb, 51), **tellurium** (Te, 52)

The main difference between metals and metalloids is important for technical applications, as the electrical conductivity of metals decreases with rising temperature, whereas it increases with metalloids.

Non-metals

Opposite the metals stand the so-called non-metals. Most non-metals occur in gaseous state at room temperature. Only bromine is liquid.

The hard non-metals are carbon, nitrogen, phosphorus, sulfur and iodine. By means of this relatively short list, it is easy to see that actually most elements available to us on earth are metals.

The rest consists of the gases. Six of these are the noble gases, which can barely be made to react. Still, the list of abundance is led by a non-metal that is gaseous at room temperature and called oxygen.

Oxygen makes up 45.50 % of the mass in the earth's crust. It is mostly found in Si-O compounds as silicate of the metals aluminum, iron, calcium, sodium and magnesium. Together, these silicates form 91.5 % of the earth's crust.

The rough number of minerals lies at 3,500. The second important oxide is that of hydrogen, which we call water in daily use. Among the ten most common elements in the earth's crust, eight are metals and two are gases. Hydrogen stands at position 10 with 0.15%.

Investment metals of the „Old Economy“

Gold (Au, 79), **silver** (Ag, 47), **platinum** (Pt 78), **palladium** (Pd, 46)

The investment metals are a subgroup of the precious metals, because they have been used as a store of value for a long time.

Palladium and platinum belong to the 10th group of the periodic table. The group is actually called nickel group in chemistry, but often referred to as platinum group in the world of finance, although it begins with the element 28, which is nickel.

Please don't mistake the term platinum group with the definition platinum metals, because these are totally defined metals of the 5. and 6. period of group 8, 9 and 10 in the periodic table.

These are **ruthenium** (Ru, 44), **rhodium** (Rh, 45), **palladium** (Pd, 46) in the 5th period and **Osmium** (Os,76), **iridium** (Ir, 77), **platinum** (Pt, 78) in the 6th period.

As mentioned, these elements are together also referred to as the platinum group, but more in an economic context.

They all have similar chemical properties and are usually mined together with copper and nickel.

Precious metals

Gold (Au, 79), **silver** (Ag, 47), **platinum** (Pt 78), **palladium** (Pd, 46) **ruthenium** (Ru, 44), **rhodium** (Rh, 45), **Osmium** (Os, 76), **iridium** (Ir, 77), **mercury** (Hg, 80)

The precious metals are characterized by their low reactivity and are extremely corrosion resistant. They are separated into gold, silver and the platinum metals.

Mercury is also a precious metal in the actual sense, although it forms compounds more easily.

Also, it was not suitable for coins and jewelry due to its liquid aggregate state at room temperature. Additionally, its fumes are highly toxic.

Osmium is in a unique position, because although all other precious metals were introduced to the market very early on and almost all of them can already be traded on exchanges, Osmium couldn't be sold yet until only recently. It forms, as we know, the harmful Osmium tetroxide. For this reason, it is also not sensible to trade with raw Osmium.

In our new world of the "New Economy", it is becoming a star as a latecomer for exactly this reason, because it can be crystallized since 2013 and now shines bright in the heaven of precious metals as the most noble and most beautiful precious metal of all, thanks to its surface full of sparkle effects.

Semi-precious metals

Copper (Cu, 29), **antimony** (Sb, 51), **rhenium** (Re, 75), **bismuth** (Bi, 83)

The definition of semi-precious metals comes from electrochemistry. The standard potential of these metals is higher than that of hydrogen.

This is of course also true for the precious metals, but they aren't subsumed under the semi-precious metals.

Scientifically, a semi-precious metal is a metal which reacts under the influence of a non-oxidizing acid in watery solution, like diluted HCl, the hydrochloric acid, without forming hydrogen.

The semi-precious metals can be easily dissolved in acids, such as sulphuric acid or nitric acid.

Their half noble character is also reflected in their price. They are cheaper to purchase. These metals don't necessarily make sense for the private investor.

Being related to arsenic, antimony is quite similar and harmful to health. Rhenium has no widespread areas of application and bismuth can hardly be used as an investment metal due to its low value density.

Buying large amounts of copper is also not really worthwhile because of the low value density.

Strategic metals or special metals

Beryllium (Be, 4), **magnesium** (Mg, 12), **silicon** (Si, 14), **titanium** (Ti, 22), **vanadium** (V, 23), **chrome** (Cr, 24), **manganese** (Mn, 25), **cobalt** (Co, 27), **gallium** (Ga, 31), **germanium** (Ge, 32), **selenium** (Se, 34), **zirconium** (Zr, 40), **niobium** (Nb, 41), **molybdenum** (Mo, 42), **ruthenium** (Ru, 44), **rhodium** (Rh, 45), **cadmium** (Cd, 48), **indium** (In, 49), **antimony** (Sb, 51), **tellurium** (Te, 52), **hafnium** (Hf, 72), **tantalum** (Ta, 73), **tungsten** (W, 74), **rhenium** (Re, 75), **Osmium** (Os, 76), **iridium** (Ir, 77), **mercury** (Hg, 80), **bismuth** (Bi, 83), **uranium** (U, 92).

These metals are chosen according to their form of application and availability. This is how they become – depending on the states in which they occur - a strategic project of governments, which is especially often the case with uranium.

Many strategic metals are very good for storing value, but less so for speculation. I gladly point out that the value fluctuations of some metals, such as mercury, have seen incredible price jumps of several hundred percentage points. Rhodium has also enjoyed an eventful value history over the last decades.

Still, you don't want to trade with mercury, because, if things take an inconvenient turn, you buy an investment metal and end up paying for the disposal of the toxic mercury. That cannot be the aim of a value investment.

With the manufacture of bullion coins from more and more metals with high value density, the physical form is also making more and more sense for the investor.

Easy transportability and identifiability of metal and mass speak for themselves. Of course, not all special metals are interesting for storing value or to speculate with, especially not in physical form.

Critical metals

The term „critical metals" was coined by politics in regard to the availability of commodities. It's supposed to make clear at one glance that a lack of these substances can actually cause a crisis.

Disconcerting hereby is the fact that the political situation of the producing countries is often the reason for rating a mineral as critical.

Therewith, the commodity itself is still available in the mines, but political streams in the exporting country are not allowing the export to happen. The reasons for this are multiple, they stretch from disputes between countries where political aims are trying to be followed, to the simple need to use of the commodities in the own country.

Because, if we are honest, it is understandable when a country takes precautions for itself and primarily consumes its own natural resources.

When leaving out the non-relevant substances for the metals market, we are left with the following list for the EU:

Antimony (Sb, 51), **beryllium** (Be, 4), **cobalt** (Co, 27), **gallium** (Ga, 31), **germanium** (Ge, 32), **indium** (In, 49), **magnesium** (Mg, 12), **tungsten** (W, 74), **tantalum** (Ta, 73), **niobium** (Nb, 41), **platinum** (Pt, 78), **palladium** (Pd, 46) and some rear earths, like e.g. **neodymium** (Nd, 60).

I am personally of the opinion that **copper** (Cu, 29), **rhodium** (Rh, 45), **bismuth** (Bi, 83), **gold** (Au, 79) and several other metals will be given the status „critical“ quite rapidly.

Osmium will never become a critical metal, because its form of application is „only“ in the jewelry market. In return, it will probably be the first to run out from all the stated metals in this group. And we already talked about what is most likely to happen to the price of a metal when it is no longer available.

Refractory metals

Metals are categorized as metals with high melting points or refractory metals when their melting point is higher than that of platinum, which, measured in °C, lies at 1,772. When measured from absolute zero, this equates to a temperature in Kelvin of 2,045 K. As a rule, one can keep in mind that refractory metals have a melting point of over 2,000 K.

Chrome (Cr, 24), **hafnium** (Hf, 72), **iridium** (Ir, 77), **molybdenum** (Mo, 42), **niobium** (Nb, 41), **Osmium** (Os, 76), **rhenium** (Re, 75), **rhodium** (Rh, 45), **ruthenium** (Ru, 44), **tantalum** (Ta, 73), **vanadium** (V, 23), **tungsten** (W, 74), **zirconium** (Zr, 40).

Alkali metals

The alkali metals are located in the first main group of the periodic table, directly under hydrogen. They only have one single electron in their valence shell.

Lithium (Li, 3), **sodium** (Na, 11), **potassium** (K, 19), **rubidium** (Rb, 37), **cesium** (Cs, 55)

You surely know the alkali metals from chemistry class. They react with water, float around on it and free the hydrogen that is bound in the water. Because reactions of alkali metals with water are strongly exothermic, meaning they free a large amount of heat, the hydrogen spontaneously ignites itself when heavier metals are used.

Lithium and sodium are only moderately dangerous here, whereas potassium, rubidium and cesium are extremely critical. By the way, this also applies for their storage, because outright bombs can be formed through improper warehousing.

In no way are the alkali metals suitable for private storage. They have a silvery-white color, with exception of cesium, which presents itself in a wonderful golden tone at room temperature and solid state.

Sodium is especially common and is our daily cooking salt in form of a chloride. Lithium is more seldomly found and is used in lithium-ion accumulators. Potassium is needed in the chemical industry.

The possible applications are a lot less for rubidium and cesium. E.g., cesium is used for creating an ultrapure vacuum.

Alkaline earth metals

The alkaline earth metals form the second main group of the periodic table. They are the elements:

Beryllium (Be, 4), **magnesium** (Mg, 12), **calcium** (Ca, 20), **strontium** (Sr, 38), **barium** (Ba, 56)

Particularly housewives will be familiar with the term water hardness from trying to remove the calcium carbonate from the pots and pans.

With a 4.16% share of the earth's crust they are very prominently represented and definitely not rare. Compared to the alkali metals, alkaline earth metals are moderately reactive, even though they too can react with water. Furthermore, the first three in the row are good conductors of electricity.

The heavier elements of the group have been added to the mixtures of fireworks for centuries, because they display very pretty colors for pyrotechnics.

Rare earth metals

I would like to clear up two common possibilities of misinterpretation right from the start. For the most part, the rare earths are not rare, but only well spread in the earth's crust and hard to separate from each other. Moreover, they are not earths. However, oxides were named this way in the past. So, the rare earths had the misfortune of being isolated as oxides.

The group of rare earths consists of 17 elements which include the scandium group, made up of scandium, yttrium and lanthanum, as well as the 14 lanthanoids. The lanthanoids follow after lanthanum in the periodic table.

Precisely this lanthanum does not occur in nature in own lanthanum minerals, but always in combination with the lanthanoids, most frequently with cerium, which is also the most common lanthanoid. By the way, according to the chemical definition, lanthanum is ranked as a lanthanoid. So, there are actually 15 of them.

Please note that promethium may be part of the row but is of no real significance. Above all, it is also radioactive. It's a fission product of uranium and especially interesting due to its historical meaning, because of all the elements in the periodic table, it was the last element to finally be found.

Scandium (Sc, 21), **yttrium** (Y, 39), **lanthanum** (La, 57), **cerium** (Ce, 58), **praesidium** (Pr, 59), **neodymium** (Nd, 60), **promethium** (Pm 61), **samarium** (Sm, 62), **europium** (Eu, 63), **gadolinium** (Gd, 64), **terbium** (Tb, 65), **dysprosium** (Dy, 66), **holmium** (Ho, 67), **erbium** (Er, 68), **thulium** (Tm, 69), **ytterbium** (Yb, 70), **lutetium** (Lu, 71)

The display of the scandium group elements is based uniformly on the reduction of their fluorides with calcium or magnesium.

The heavier and lighter rare earth metals are distinguished from one another. If you study the density and melting point curves, you will quickly understand the lines that are drawn between the heavier and lighter rare earths. With increasing atomic number, the density also increases significantly, along with the likewise rapidly increasing melting point.

Both curves feature two striking dips. Europium and ytterbium generally swing out to the downside. The element that follows europium, gadolinium, therefore marks the dividing line.

The light and rare earths are:

Scandium (Sc, 21), **lanthanum** (La, 57), **cerium** (Ce, 58), **praseodymium** (Pr, 59), **neodymium** (Nd, 60), **promethium** (Pm 61), **samarium** (Sm, 62), **europium** (Eu, 63)

And the heavy earths are:

Yttrium (Y, 39), **gadolinium** (Gd, 64), **terbium** (Tb, 65), **dysprosium** (Dy, 66), **holmium** (Ho, 67), **erbium** (Er, 68), **thulium** (Tm, 69), **ytterbium** (Yb, 70), **lutetium** (Lu, 71)

The number one driver of prices was the complex separation through crystallization and fractional decomposition of the nitrates. The processes had to be repeated many times in order to increase the concentration of the single elements. Today, small amounts of lanthanoids are effectively separated through ion exchange and very high purities can be reached.

Transition metals

Following a simple definition, the transitional metals are those metals, or rather elements, which have an incomplete d-shell or which form ions with an incomplete d-shell. They would hereby normally cover all subgroup elements. However, with the elements zinc, cadmium and mercury, these shells are already completely filled with electrons. This means that they don't meet the definition. The transition metals are all metals, which is why the term transitional metals has prevailed for them.

They are the following elements from atomic number 21 to 30 of the periodic table:

Scandium (Sc, 21), **titanium** (Ti, 22), **vanadium** (V, 23), **chrome** (Cr, 24), **manganese** (Mn, 25), **iron** (Fe, 26), **cobalt** (Co, 27), **nickel** (Ni, 28), **copper** (Cu, 29), **zinc** (Zn, 30)

From 39 to 48 the elements:

Yttrium (Y, 39), **zirconium** (Zr, 40), **niobium** (Nb, 41), **molybdenum** (Mo, 42), **ruthenium** (Ru, 44), **rhodium** (Rh, 45), **palladium** (Pd, 46), **silver** (Ag, 47), **cadmium** (Cd, 48)

And from 57 to 79 including the lanthanoids:

Lanthanum (La, 57), **cerium** (Ce, 58), **praseodymium** (Pr, 59), **neodymium** (Nd, 60), **samarium** (Sm, 62), **europium** (Eu, 63), **gadolinium** (Gd, 64), **terbium** (Tb, 65), **dysprosium** (Dy, 66), **holmium** (Ho, 67), **erbium** (Er, 68), **thulium** (Tm, 69), **ytterbium** (Yb, 70), **lutetium** (Lu, 71), **hafnium** (Hf, 72), **tantalum** (Ta, 73), **tungsten** (W, 74), **rhenium** (Re, 75), **Osmium** (Os, 76), **iridium** (Ir, 77), **platinum** (Pt, 78), **gold** (Au, 79), **mercury** (Hg, 80)

In the area of radioactive elements, the atomic numbers are 61 and 89 to 112, but because they are of no relevance, I am not listing them individually.

The transition metals commonly boast formidable properties for mechanical engineering. These are the especially high tensile strength and the high melting points. Physically important are the high densities, a necessary evil in mechanical engineering, and the high boiling points.

In addition, some transition metals show excellent magnetic properties, which can be explained by their orbital structure. Paramagnetic and ferromagnetic behavior is an economically important factor for the value of several transition metals. The structure of the elements is also responsible for the richness of colors of the transition metals' compounds.

Minor metals

Minor metals are not a group of metals, but a term for the metals which also occur within the ore of the primarily mined metal as a byproduct.

In some instances, the minor metals make up an interesting additional income for mining companies. As an example, many copper mines extract molybdenum or silver in concentrations that are not insignificant. However, if the copper weren't mined, then the mine wouldn't be profitable merely from the extraction of the minor metals.

Minor metals can also be very disruptive metallurgically, because they are often very complex to separate from each other. For a long time, praseodymium and neodymium were thought to be the same single element. Hafnium and zirconium are also not easy to separate at economically justifiable costs. But, as we see time and again, science keeps on developing new ways of separation.

Otherwise, minor metals play a very important role, because some elements don't have suitable mining sites where it would be economically viable to mine only them exclusively.

When observed from the opposite perspective, the minor metals situation is a quite important information source for versed investors. For example, should a copper mine be forced to stop production due to political unrests, then this will also affect the less regarded minor metals, which could then experience direct and sudden price increases.

For such cases, you will find hints for private investors in the periodic table for metals investors. They at least offer indications for a sensible investment if an impending shortage of an industrial metal is likely to occur, which will result in a jeopardized extraction of critical metals.

Metallic crystallization

One of the most important properties of metals is their ductility, meaning their deformability, which prevents a breaking point leading to a macroscopic rupture, as would be the case with the commonly known crystals. During small deformation, the atomic cores stack together, whereas their electrons stay free and the layers of the crystal structure within very small, subordinated single crystals glide over one another.

Binding forces act within the metal. In the simplified model, in which we imagine the atomic cores as spheres, they act undirectedly in all direction.

In this way, so-called close-packing forms for the small spheres. In principle, the following thoughts are of pure geometrical nature and apply both on the large and small scale.

Let us first imagine a flat surface of spheres that form the typical hexagon pattern, which always occurs when round objects with the same radius are laid next to each other.

Everyone has most likely seen this pattern once before, when patterns with round elements have to be arranged into a surface, like e.g. with small round tiles on a bathroom floor.

One can now easily imagine these round structures as small spheres. It now becomes clear that a second, above lying layer has two options for locking into the pattern below.

In variant one, the third stacked densest layer is again positioned exactly over the first layer. This variant is called hexagonal close-packed. It has the layer sequence AB-AB-AB. In the other locking option, only the fourth layer is situated directly above the first layer. This variant is called cubic close packed. Its layer succession is ABC-ABC-ABC.

Apart from the packing based on a hexagon layer, there are also two packing variants that result from a cube as elementary cell. These two possible packings of spheres are called body-centered cubic and face-centered cubic.

So, if our small elementary cell is a cube in which the corner points are occupied with atoms, then further atoms can be brought into the bond in two ways. In variant one, a further atom is positioned in the center of every resulting free area. In variant 2, a central atom is placed within the center of the cube.

This variant is the lowest possible packing of atoms. Its coordination number, meaning the number of direct neighbors, is eight. If you turn the face-centered cubic variant of packing in space, then you will discover that it is identical with the surface succession ABC-ABC-ABC.

Thus, the two approaches of packing result in two possible variants, of which the respective second variants are geometrically congruent. As a result, we are left with only three options of close-packing.

Osmium crystallizes in the hexagonal close-packed form in the space group $P6_3/mmc$ (space group number 194) with the lattice parameters a=273,5 pm, c=431,9 pm as well as two formula units per elementary cell.

It crystallizes to an extremely dense structure, which, together with the especially heavy nucleus of the atom, results in Osmium actually having the highest density of all elements and compounds.

I would like to deliberately leave out the not yet discovered transuranic elements, because with half-life periods of just a few nano seconds, they don't really play a role in the investment market.

If metals can now be crystallized in a defined structure, then this also changes their physical and chemical properties.

With Osmium, the crystallization makes it become even less chemically vulnerable. It is now not only non-toxic, but also extraordinarily noble in line with the definition of precious metals.

Product form

When you purchase a metal, then it is always present in a special product form due to its properties. At the same time, the necessity for sensible storage is also taken into account by the product form.

The variety of product forms includes semi-finished products, meaning pre-processed metals like aluminium profile, copper wire or nickel foam, as well as powder, ingots, rods, metal sheets, round mintage and of course coins and bars, which are common in the world of finance.

The product form often depends on the further use in the industry, but sometimes it is simply formed due to a necessity or a practical consideration that relate to the handling.

For example, gold dust may have been a great medium of exchange in gold mining towns, but today the minted coin is definitely much preferred.

Osmium is delivered in product forms that are mostly flat, except for pearls and 3D objects. These shapes are optionally round, which is how they are produced in crystallization, or they are already cut into Bars, Starrows or other finished shapes.

Oxide powder

Some metals oxidize easily and therefore become useless as a metal for storage, at least on their surface. Instead of storing these metals in a very complex way, it makes sense to just store them as an oxide to begin with. The metal oxides of lanthanoids are such cases. The beautifully colorful oxides are also easy to batch in their powdery form and can be easily poured.

So, the separation also enables the creation of packaging in small and large amounts. The problem with this form of storage is the certification of the oxide, because it can be easily stretched with simple flour.

In doing so, it loses its value. It should not be removed from the original packaging, except by the trading company that produces the certificates or of course by the client.

Bars and coins

For investment metals, the classic bar, also referred to as bullion, prevailed centuries ago. The bar form also exists for strategic metals, for example for indium.

When the application gets more technical, the classic bar form becomes less important. New bars are constantly entering the market and must always establish themselves first, but they also have an interesting effect on prices and packaging.

States raise part of their money through the sale of their gold in the form of coins as a means of exchange to the private investor. Because of their minting, packaging and distribution, coins have a higher value than their pure metal content. This is also generally accepted. As a conclusion, lots of extra money can be made by selling gold in large amounts but packaging it in small batches.

The same effect applies to bars and was also used to earn more money. When calculated as a percentage of the gold content, one gram of gold always costs more than a whole kilogram. This difference can amount to a full 10 percent.

But what will happen when 100-gram bars enter the market as split-bars, combi-bars or Starrows, which can be split into one hundred smaller bars themselves? We will probably only really be able to observe this effect when a crisis heads our way and makes payments in gold become adequate. And maybe, the first small bars will soon start to appear on eBay.

The bullion coin is a really interesting medium, which can also be referred to as an investment coin.

If the rarity value of a coin that was minted in small numbers leaves you cold, but you prefer the minted form because it is easy to resell and you value the purity of the metal, then you should consider bullion coins.

Bullion coins have a high mass and a uniform embossment, which is produced in high quantities and therefore cheaply. This is why they also have a smaller surcharge for production. With Osmium, the smaller disks are the equivalent of this product form.

By the way, coins can also be issued by states. In general, they are round and thin. They carry defined embossments that depict their value in a currency. They are an official means of payment which has to be accepted by any bank.

A coin must include the year of mintage, the issuing state, the nominal value and the currency unit. The nominal value is stated as a number. The currency unit could be DM, Dollar or Euro.

Usually, portraits of important statesmen, kings, symbols of the states or personalities are embossed on one side of the coin in order to make distinction easier and to incentivize collectors to buy the coin.

Coins distinguish themselves from medals and round mintage. The round mintage can be produced from any desired non-toxic metals or alloys and is mostly issued by companies that introduce it to the collector's market.

With new technologies, it will also be possible to give round mintage serial numbers, which will encourage the exchange between collectors.

Semi-finished products and other product forms

At any given time, the purchase of strategic metals may confront you with an unusual product, which is why I would like to make a short distinction between these forms.

Semi-finished products are metal sheets, foils, wires, tubes or metal tapes, so-called coils. Finished products and building elements are not counted as semi-finished products, because they are already pre-produced for use.

It would also not make sense to buy building parts as a metals investor, because they are constantly changing in the industry. Semi-finished products are always prepared for further processing and are therefore cheaper to buy.

The pourable product forms are e.g. granulate and powder. The theorem of metals applies here once more, meaning the batching size can easily be changed, but an analysis is necessary at almost every sale, unless the sale takes place between two companies that have known each other for decades.

The pourable goods are also practical, because if you purchase a commodity basket and name a fixed investment volume, it makes sense to “round up” this investment with silver or a different pourable good.

Investment boxes for Osmium e.g. use Osmium-Diamonds and Osmium-Squares to round up the larger pieces to the total price of a box on the day of dispatch.

Sadly, the companies that perform metal investments only seldomly offer giro collective safekeeping of pourable goods, although they are ideal for the investor. Through simple separation of the batches, every investor can easily receive his/her goods physically at any time. The goods are stored safely by the provider and are certified.

Still, what you initially hold in your hands after the purchase is of course only paper. However, the significant difference is that you actually own what it says on the paper.

Periodic table for metal investors

Apart from the conventional periodic table which you know from school, there is also a periodic table that sorts all metals for the metal investors.

With this periodic table you can quickly get a picture over which metals are related to other metals and how they belong together.

Furthermore, the table contains the element symbol, the name of the element, its atomic number, information on which metals it is mined with, the density, the deposits on the continents, the abundance in the earth's crust, the entire amount in the earth's crust, important ores, electronegativity, electron configuration, significance in the industries and the allocation to investment groups.

History of crises

The historian, publicist and writer Dr. Volker Ullrich defines the term "crisis" in the history lexicon of the ZEIT (a renowned German magazine) in the following way:

With the American war for independence (1775 – 1783) and the French revolution of 1989, CRISIS ultimately becomes an epochal threshold term. Reinhart Kodelleck calls it the "structural signature of modern times".

The term crisis of course covers many different areas: The media always talks about economic crises, finance crises, environmental crises and energy crises. It always affects social, economic, religious and political areas of life.

One mustn't underestimate that the outcome of a crisis often entails an upheaval or a revolution.

Whatever the real consequences may be: Every time and in every era when the word CRISIS emerged, it left most people with a feeling of insecurity or even fear.

After every crisis and as soon as the circumstances got back into calm fairways, experiences of the survivors remained vivid for the next generations. Experience is talked about and sometimes people learned something from it.

Politically, the crisis regions were always heavily shaken, but this political shake-up always caused new dynamics.

During some periods, productivity of industry and farming grows faster than the purchasing power of the population. The average families don't earn large amounts. Nevertheless, banks generously hand out loans to private persons. In doing so, they try to boost consumption further in order to earn their share from the growing economy. This way, a so-called credit bubble is formed, which is held up artificially.

The process actually repeated itself in all time periods and in all crises with the same pattern, as if it were taken from a blueprint. Interestingly, we are not talking about 2008 here, but about a point in time 80 years earlier, meaning 1928.

We would like to begin with the subject of world economic crises all the way back in antiquity and, through the middle ages, span it all the way into modern times.

Greek history

In the 8th century before Christ, king Midas of Phrygien was granted a wish. He wished that everything he touched would turn into gold.

So much for mythology. This story, which is surrounded by myths, could have emerged from the fact that king Midas simply wanted to enrich himself in a fraudulent way.

The stockpile of metals for coin production was limited. He planned on reducing the amount of metal in coins, because by decreasing the metal content, the money supply could be increased. The rich and the savers who invested their wealth in coins subsequently lost their purchasing power.

Due to the excess money, one can best describe this as a drastic currency revaluation or devaluation. Whenever such a thing was uncovered in the middle ages, the responsible mint masters were executed.

The Roman Republic

Many decisive processes of change took place during the Roman Republic. It is still up for discussion and research has not settled upon whether these processes cumulated to a crisis or whether it was a development without any alternative. The term state comes from the Latin word res publica. It means public matter.

The three political institutions in Rome at the time of the republic were the senate, the magistrates and the people's assembly, but the senate represented the actual government. This was formed by the consulates and the tribunes of the people. They usually held meetings twice a month.

The doors had to stand open, which meant it was a public meeting. People commented on reports that were put forward, discussed motions, changed them and added amendments to them.

The order of speakers was exactly defined and complied with their past political career and the previous positions. The upper class provided the most influential members. It was them who talked about and discussed all points. The decision was formed by majority vote.

The senate had many more functions in the judiciary and legislative. It represented the jury courts and set the taxes for both the Roman public and the provinces, meaning the areas under direct Roman rule. The senate also controlled the executive branch. It determined the commander as well as the number of troops and, not only in emergencies, controlled security

Rome expanded and money became a "co-ruler". An agricultural reform was carried out and civil war raged on the streets. After the proscription, Sulla rebuilt the state. Pompejus, Crassus and Caesar joined forces.

After the Gallic war, the triumvirate also came to an end. Caesar reformed and was stabbed to death in the senate. He was succeeded by a second triumvirate, that of Octavian, Marc Anton and Lepdius, which was called the "three man rule for state order".

With the proscription of the political enemies like Cicero and the defeat of Caesar's assassins, Octavian and Marc Anton ended the Roman Republic. After his victory in the civil war against Antonius, Octavian received the honorary name Augustus and established the principate. Herewith began the Roman Imperial Period.

We would categorize the crisis between the Ides of March (44. BC.) and the beginning of the principate. The principate meant the end of the Roman Republic. Although Cicero already described a crisis in his De Imperio Cn. Pompei in 66 BC., many members of the public seemed to have already had invested fortunes in Asia and lost it all. The lending business in Rome collapsed due to the reduced financial solvency.

„For it is impossible that many people lose their belongings without plunging others into the same misfortune with them. Save the state from this danger! Because – believe me, as you can see it for yourself – this credit system and this financial market, which is centered on the forum of Rome, are tightly interwoven with the monetary system of Asia. These cannot fall without the latter being shaken and imploding as a result of the same movement."

nam tum, cum in Asia magnas permulti res amiserunt, scimus Romae solutione impedita fidem concidisse. non enim possunt una in civitate multi rem ac fortunas amittere, ut non pluris secum in eandem trahant calamitatem: a quo periculo prohibete rem publicam. etenim - mihi credite id, quod ipsi videtis - haec fides atque haec ratio pecuniarum, quae Romae, quae in foro versatur, implicata est cum illis pecuniis Asiaticis et cohaeret; ruere illa non possunt, ut haec non eodem labefacta motu concidant

In the Middle Ages

The Middle Ages, or Medieval Times, begin with the fall of the Roman Empire and end with the greatest time of upheaval. They thereby cover a thousand-year history. Many things colluded in putting an end to the Middle Ages: The discovery of America by Christopher Columbus or Luther's reformation were among them.

In these thousand years, new societies with different classes formed in all European countries. Around the year 1000, Europe was covered almost entirely by sparsely populated, rural areas, which one could easily consider underdeveloped, because the centers of education could be found in the Orient, especially in the Islamic countries.

But there was economic stability! Due to the feudal system, the broad base of farmers was bound to their rulers. The church also received their money. The German lords expanded their territory toward the East by sending settler convoys who were permitted to farm their own land, which they had to make usable first by cutting down the forests. Trading towns flourished.

Artistic sacred structures emerged, towns were established or expanded. Spain became the center of culture and science, not just in the area of medicine.

Despite of many national wars, the population increased during the High Middle Ages, but was decimated again by the end of the Middle Ages due to the crusades. From 1250 onward, the disputes between kingdoms increased, the conflict between Empire (German Emperor) and Sacerdotium (Pope) was heading for its peak. The church itself was fighting internally against growing corruption and was shaken by divisions.

But one of the biggest disasters for the population was the plague. In the middle of the 14th century, it started to spread across the whole of Europe. A third of the population lost their lives to the black death. That was 25 Million people.

Of course, there was chaos, which had a 1:1 impact on the economy. The fault lay with international trade, which introduced the illness on ships via rats and flees.

The trade in the German towns during the High Middle Ages was booming, even more so during the Late Middle Ages. Luxury goods, which were mostly transported, were delivered to nobility and clergy, respectively the church. The significance of craftsmen in the towns increased enormously, Belgium started to manufacture clothing.

The importance of shipping trade must also be mentioned. Because although the trading routes were dangerous due to attacks from Wikings or Arabs, they supplied Western Europe with beeswax and furs as well as other trading goods.

Oriental spices, fruit and silk were marketed from Venice and other Italian harbor towns. Trade capitalism from north to south and from west to east. The guilds controlled and were responsible for good quality everywhere.

The towns were responsible for the wellbeing of their citizens. This is why the magistrate normally built up a town stockpile of corn, where grains were bunkered for hard times. The citizens were meant to survive and a “Kipper and Wipper”-style inflation was to be prevented this way.

Silver was a safe investment for citizens and free farmers. No matter if it was from the Goslar pits or the margraviate of Meissen. They belonged to the German emperor. Barbarossa used silver to partly pay for his crusades. It was one of the very few safe currencies.

However, every travelling dealer or prospective buyer had to exchange into the currency of the town he visited. Depending on the town, the money had to be exchanged on site into a gulden, a large gold coin in Florence or into pennies. An example was the Munich Penny, a small silver coin. By the way, the price always had to be equal to the value of the coin!

But in all these centuries, achieving soul’s salvation was the most important goal. This is why, on the other hand, the church possessed the greatest wealth. The village priest lived off the church tithing; the higher clergy lived from the sale of indulgences and the simony, the buying of church offices. This is how the Vatican was able to invest in gold, property, estates and art.

Despite all the wars and illnesses, certificates of debt were created in Italy in the 14th century. They were called prestiti or prestanze. Today we know them as government bonds. Three men are held responsible for today’s financial system: The Pope, a Florentine banker and an English craftsman, who went into the hundred-year war as a tailor. At first a mercenary soldier in Italy, he ascended to a well-paid leader of a small army.

After much fame and glory, the Florentine rulers wanted to install him as a military leader with almost 60 years of age. However, they didn't have enough money. They could have increased taxes, which wouldn't have led to much enthusiasm amongst the rich merchants. Alternatively, they could have borrowed money. This is why it is said that the history of mercenary is a history of debt.

Peruzzi was one of the leading banks is Florence, with branches in many European towns. Due to religious reasons and in accordance with the bible and the Council of Vienne, they weren't allowed to charge interest.

The solution to this problem was a simple change of wording. They renamed the interest rates and called them commission fee, premium or surcharge.

This bank also speculated wrongly in Europe. They sensed prey in the war between England and France. But the battles were expensive and the returns were small. The English king couldn't pay his debts and the Peruzzi went bankrupt. The competitor bank suffered a similar fate. The first banking collapse took place in Florence.

The 1557 bankruptcy of the Habsburg family in Spain

The Florentines found a way of working around the interest rate ban of the church. They initiated repayable taxes, because a similar system already existed in Venice. You would receive back your payed taxes with a profit. This way, the church didn't mind, because the citizens only received a kind of compensation for their taxes, which they would have had to pay to a certain degree anyway.

And lo and behold: The town treasury filled up with money again. They were basically borrowing their own money. A revolutionary idea? The British historian Niall Ferguson certainly thought of it that way in his book *The Ascent of Money. A Financial History of the World.*

In any case, every tax payer received a debt certificate as a receipt. They lent the state money. The state borrowed money from them. A government bond, so to speak. Because you got back your money plus interest, this debt certificate could be seen as cash.

However, speculations began in this system, because everything would follow the future situation in the city of Florence. One could argue that the Italians invented securities trading.

The Habsburg family fared similarly to the ruling dynasty of Florence. On the one hand, they had financed their wars with the help of German and Italian banks, on the other hand, they had lived beyond their means for many years. In the year 1557, all this came to an end.

Spain, which was ruled by them, became bankrupt. The consequences were insolvency and therewith loan defaults, which led to the failure of several banks. However, the large players survived, like for example the Fugger family.

The first country that adopted the government bond system of Venice and Florence was the Netherlands. In 1568, the country fought the Spanish rulers despite a theoretical military inferiority of 1:13. And they defeated Spain.

The Netherlands had taken on many high loans in order to be able to match this global power. One the other hand, no one in Europe was willing to lend Spain money any more, because they never paid back their debts. This is how creditworthiness decided over victory and defeat.

The year 1929 with the „Black“ Days

From the 24. of October onward, also known as “Black Thursday”, the markets on Wall Street collapsed. The collapse became more and more dramatic until “Black Tuesday”, the 29. of October. Great capital losses resulted for the investors.

As a consequence, trust in the stock market fell through the floor. People were selling and selling and the buys were steadily decreasing. The losses were high and finally led to the first stock market crash in history.

Please, dear readers, don’t mistake Black Thursday with Black Friday! Black Friday is a bank holiday in the USA after Thanksgiving and marks the beginning of the traditional Christmas shopping season. It is also usually followed by a family weekend. On this day, retail in the USA makes its highest turnover of the year! Many stores open really early before dawn, because the people that are looking for special deals, sales and giveaways have often been waiting patiently in front of the stores throughout the night in order to snatch up the best bargains.

Already then, it was the Dow Jones index that indicated the average value of the 30 most important American shares on a point scale. Over the next three years until July 1932 it lost 90 percent of its value. This was an incredible loss!

By the way, the economic boom of the 1920s also had its flipsides. The stock corporation law was hardly legally regulated.

Thus, companies were sometimes able to emit vastly overpriced shares. Speculation was very common.

Even one year before Black Thursday, stock prices were already totally disconnected from the real economy.

In fact, there were only 1,5 million so-called major shareholders in the USA. From 1920 to 1929, the total number of shareholders increased fivefold from 4 to 20 million.

However, shareholders lost their trust in the economy toward the end of the decade. Prices collapsed. It should also be mentioned that over 30% of stocks were bought on credit.

Of course, these loans originated from banks that demanded them back in total, never mind the losses of shareholders that resulted from the decline in the value of shares. The situation was therefore especially dramatic for shareholders who had indebted themselves. Greed reigned here too.

Was this the worst global economic crisis ever to occur since the existence of the capitalist economic system? This crash certainly led to a chain reaction with long-lasting influence over the next decades.

Sadly, the biggest crises most certainly still lie ahead of us…

FAQ – frequently asked questions

What is Osmium?

Osmium is a transition metal and belongs to the Group 8 elements (iron, ruthenium, osmium, hassium) of the Periodic Table.

The symbol for Osmium is Os and its atomic number is 76. Osmium is a primordial chemical element, i.e., it has existed in its current form since before the earth was formed—unlike hassium, for example, which can only be synthesized since 1984.

Osmium is one of the rarest metals on earth. Before its crystallization became possible, it was only available in its non-crystalline, toxic form. The crystallization process was established only in 2013, after 40 years of laboratory work. This finally allowed traders to deal with osmium.

Why is the crystalline structure of Osmium called “fingerprint”?

Crystalline osmium has a special micro-geometry. Every line of the edge of any single crystal in the structure has a specific angle in relation to the next adjacent crystal. And, in comparison to human fingerprints, which are biological, osmium does not change at all over time.

This means that for all practical purposes, the structure will last forever. Therefore, the security for identification purposes can be compared to but is actually even higher than for a biological fingerprint.

How much Osmium is produced annually?

The annual production since 2019 is about 1000 kg. A significant amount is used for crystallization, the remaining amount in the form of Osmium compounds is used internationally in industry and academic research.

At the moment, production is steadily increasing as more and more contracted mines are separating the Osmium. Thus, more Osmium will be available to produce the approximately two cubic meters that are expected to be mineable.

Despite its toxicity, Osmium tetroxide continues to be used for various purposes, including medical applications, in addition to jewelry production.

The Osmium-Institute has access to the entire extractable Osmium, which can then be crystallized. In addition, the Osmium Institute has options on Osmium which was found in the past.

Osmium is not to be bought from private sources!

Since when can Osmium be crystallized?

Since 2013, when a group of Swiss and Russian scientists demonstrated this process for the first time.

How does trading with raw Osmium work?

There is no traditional trade for raw Osmium, also referred to as osmium sponge, through investors. Osmium-Institutes buy solely from mines and not from speculators. In addition, raw osmium is toxic and therefore not sold to private individuals or investors.

Osmium-Institutes would not purchase raw Osmium for any other reason. The process of ensuring the authenticity of Osmium sponge is expensive and very time-consuming.

In addition, the principles of ethical sourcing must be complied with. This can never be guaranteed for raw Osmium from private hands.

Therefore, mainly crystalline Osmium is traded.

What if I wish to order Osmium and there is none in stock?

Firstly, apart from the Osmium-Institutes, private and institutional sellers with Osmium stock also exist. Through Osmium retailers you can be pre-order if certain pieces of Osmium are currently out of stock and therefore not available.

The price is taken into consideration at the moment the purchase order is made. However, the actual quantity delivered depends on the price on the day of dispatch.

Although it may take some time to crystallize a special piece, you can rest assured that you will receive the specified product for the agreed price. Payment must always be made in advance.

A key reason why investors buy Osmium is the fact that Osmium may become difficult to obtain and they therefore may be approached by interested buyers in the future.

Is there a guarantee for your Osmium shapes and their delivery?

If a shape once existed, then there is a high probability that it can be reproduced. If a product is removed from the assortment, it can still be ordered individually.

However, there are forms, such as the Osmium Round Bar without titanium coating, which are sensitive in handling. For this reason, these shapes are no longer produced extensively and are only produced individually for specific collectors.

How long the delivery time for 2D bespoke designs (from order to delivery)?

Depending on the number of orders, standard delivery time for a new model can range between one and three months. If Osmium ingots are already available and the model has already been generated in CAD, delivery is also possible within a few weeks. As with a sculpture where the stonemason already owns the stone before he starts his work, it is wise regarding short delivery times to already own the Osmium for new figures, so you only have to give the order for the wire EDM process.

Osmium physics

What are the characteristics of Osmium?

Osmium is hard, brittle and has a whitish-silvery-bluish luster.

Density: One of the densest naturally occurring stable elements (22.61 g/cm3), having a density approximately twice as high as lead (11.34 g/cm3).

This means that osmium cannot be counterfeited since every metal core would have less density.

Crystal structure: Hexagonal close-packed.

Bulk modulus: Between 395 and 462 GPa, which rivals that of diamond (443 GPa). Correspondingly, the compressibility is very low.

Is Osmium brittle?

A diamond has a Mohs scale hardness of 10 (defining mineral). Osmium only reaches 7, plus it is brittle. Doesn't that mean that diamonds are much more robust and stable compared to Osmium?

No, they are not. The stability is similar inside the crystal structure of both elements. Abrasion resistance is the magic word. Osmium is not as hard as a diamond but has a higher abrasion resistance compared to diamond; osmium wins the game again.

Does Osmium require metal seed crystals for crystallization?

Osmium bars, including Osmium-Diamonds and Osmium-Stars, do not require a specific substrate. As part of the crystallization process, these basic shapes are directly grown on sapphire glass substrates, which are separated from the grown crystals once the crystallization process is completed.

Note that the Osmium crystals closer to the original glass substrate have a finer structure than those crystals further away. They look almost flat, but their structure can be seen under a microscope.

Is Osmium substitutable?

Let's start with the term substitutability. The term does not just refer to whether a metal needs to be used in a particular process to achieve a desired result. So, for example, it might concern the question of whether it will be possible to use iron instead of platinum in catalysts. Platinum would then be substitutable and it would no longer be needed. In an important and huge industry this would of course have an influence on the price and thus on the entire market.

However, substitutability also applies if the entire process can be replaced. For example, it is no longer necessary to use special metals for piston rings if the entire car is simply powered by electricity instead of gasoline. Or even worse, if public transport suddenly becomes so well-developed, inexpensive and fast that we practically don't need cars anymore.

This would apply to Osmium in many ways, but the question does not arise. Of course, one could build the hull of a submarine with Osmium, so that it can dive into the Mariana Trench thanks to its incredibly huge compression module. Or you could build an

effective gamma radiation shield for a spaceship to Mars. Osmium can also be used as a superconductor at low temperatures to conduct electricity without any resistance.

But all these applications are simply not feasible because of the small amounts of Osmium available. And vice versa, Osmium would always be replaced and substituted, because a conventional submarine can also dive down very deep and because any nail file lasts very long, even if it cannot reach the abrasion resistance of Osmium.

But where Osmium cannot be replaced now or ever in the future, is its myth. Osmium is simply the rarest and, in its crystalline form, undoubtedly the most beautiful of all metals. There is no doubt that in the future it will partially substitute diamonds on the diamond market, but it will never be able to be substituted itself. But the dissemination of Osmium will probably bring with it a special form of substitution. Thanks to the impossibility to counterfeit Osmium, it will replace cash for many wealthy people if value is to be preserved or handed over.

How far does the Osmium sparkle reach and what is the story behind the Osmium sparkle?

A physicist knows that there are actually only two ways to generate parallel light. Either a laser is used here on earth, or a very distant lamp is used as the light source.

One such lamp, for example, is our sun.

The sun's rays travel so far to us on earth that the light only has a minimal beam widening when it reaches the earth, which the human eye is unable to perceive.

Parallel light cannot be emitted by a light bulb on earth because it is spherical and we are very close to it. When we hold an object close to such a light source, we will always have a core shadow and a half shadow. We are all aware of that.

But if you want to be seen at a distance, you need parallel light. (In Karl May's novels, for example, Old Shatterhand used a mirror on a mountain to warn his blood brother Winnetou of his enemies. We all still remember that...)

The reason is that parallel light still has enough brightness even at a distance so that it can still be detected by the retina of the eye.

Especially when it hits the eye directly, the brain decides that the incoming signal from the optic nerve could be important, since a sudden brightening has occurred.

The so-called Osmium sparkle works quite similar. When you are e.g. standing in the sun at a cocktail party and the sun's light shines onto the Osmium you are wearing as jewelry, the many small crystal surfaces act like hundreds of tiny mirrors that keep the sun's light parallel and are perceived as a sparkle by the eye.

With that, the brain puts attention on the line of sight and you will be seen. How does this compare to diamonds, which also sparkle quite nicely?

Well, the diamond has on its surface only a semi-permeable surface that can reflect, as the special thing about the diamond is precisely its refraction in the inner primers.

If the surface did not let light through, then it would not be able to diffract the light. The amount of directly reflected light is inevitably very low because the diamond lets in a lot of light.

Since the speed of light within diamonds is different from the speed of light in air, the light is diffracted into its components, in other words, its wavelengths.

Although this refraction is very colorful, the energy of each color is of course lower than that of the entire beam of mixed, so-called white light. So, if a ray of a diamond hits the eye, it will have a certain color, but almost no energy left to be perceived.

Especially not at a distance, as each wavelength now falls out of the diamond in a different direction.

Therefore, one can observe the colorful reflections of diamonds only in immediate vicinity. So, to be really noticed at a party in the future, you will choose Osmium and no longer diamonds, which are only suitable to impress people in near proximity.

Osmium chemistry

How does Osmium react to acids and bases?

At room temperature, noble metals do not react with any chemical reagents, including strong acids and bases. What about Osmium?

Crystalline Osmium is extremely durable and resistant against strong acids and caustic solutions. Only oxidized acids stand any kind of chance against Osmium

Can Osmium be manufactured?

If Osmium could be "manufactured", this would devalue the metal and its price!

Osmium cannot be synthesized from other materials for a very simple reason: It is a chemical element, which, by definition, cannot be broken down any further. In addition, Osmium is extremely rare.

On the other hand, diamonds can be synthesized by simulating the high pressure and high temperature conditions of the earth's mantle, thus forcing carbon atoms to arrange in a diamond crystal structure. In fact, carbon is the fourth most abundant chemical element in the universe, very much unlike Osmium.

Can Osmium tarnish (just like silver)?

No, it can't. The tarnishing of surfaces is always a chemical reaction, often with oxygen, whose reaction products are deposited on the surface and change color and reflection properties there.

Under standard conditions, however, Osmium does not react with oxygen or any other substances. Even at very high temperatures and with the formation of Osmium tetroxide, tarnishing cannot occur, as the oxide is gaseous and volatile.

All color differences are exclusively deposits of other metals from the cut or the reaction vessel. Hydrochloric acid removes the differences. Condensation of moisture in the crystal structure can also cause optical effects that change the luster. Furthermore, crystallization can result in a precise alignment of the crystals, which has visual effects that could look like sediments.

Is OsO_4 produced when using the wire eroding process?

Yes, in tiny quantities. However, it is immediately reduced back to metal on the non-precious wire. The individual Osmium atoms are drawn electrically onto the wire and sedimented here. The continuous wire has room temperature and cools the Osmium immediately.

The process is so fast that Osmium tetroxide production is out of the question. Only a few atoms manage to escape reduction and escape as Osmium tetroxide.

The odor of Osmium tetroxide is therefore also not perceived in the wire EDM process, even from a short distance. Still, safety measures at work must be complied with.

Precious metals

What is a precious metal?

A precious metal is a rare, naturally occurring metallic element of high economic value. Chemically, precious metals tend to be less reactive than most elements. They are usually ductile and have a high luster.

The following eight precious metals exist:

Coinage metals: Gold, silver.

Platinum group metals: Ruthenium, rhodium, palladium, Osmium, iridium, and platinum. They have similar physical and chemical properties and tend to occur together in the same mineral deposits. However, they can be further subdivided based on their behavior in geological systems:

Iridium-group platinum-group elements: Osmium, iridium, ruthenium

Palladium-group platinum-group elements: Rhodium, platinum, palladium

Palladium-Gruppe Platin-Gruppe Elemente: Rhodium, Platin, Palladium

Is Osmium as safe as gold in time of crisis?

Yes, that's the way it is and how it stays. This is a standard answer. However, it is never wise to follow a statement without further verification for thousands of years because the world is changing constantly. First of all, it is certainly true that gold is traded in a very liquid market. This means that it is possible to sell gold quickly in almost any denomination. Prices are moderate to low, but they move sideways because of the incredibly high quantities of gold that can still be mined despite high demand.

At first glance, this is a good characteristic, because gold serves the purpose of maintaining value, and this strategy does not have as its primary objective an increase in value. Nevertheless, it is always wise to balance risks and provide for an increase in value in the metal portfolio.

Let's take a closer look at the scenario of a crisis. In case a war actually breaks out in a country or when one of the major internationally accepted currencies collapses, physical metals gain in value. There are two different winners. One is industrial metals such as copper, which can no longer be mined in a war region or which simply cannot leave the country. This situation has occurred time and again in recent years, when terrorists were causing problems in a country.

On the other hand, there are the precious metals, which generally have no industrial significance. In any case, industries do depend on a defined amount of gold that they need in constant supply. In fact, in an emergency, for example for the production of computer chips, sufficient quantities are always directly available. It is rather questionable whether in a case of war in a country, the production of such chips can be continued regardless of the crisis.

Therefore, precious metals exist with their special use as currency substitutes. In contrast to all fiat currencies in the world, they can never and under no circumstances be subject to inflation, especially because of their physical nature. The amount you can mine is available and nothing beyond that. Reprinting simply fails in the precious metals market!

With Osmium, one is particularly well endowed nowadays for many reasons:

Osmium is very limited, with only 44,000 kg in the earth's crust. Osmium has to face extreme increases in value. Osmium is the new ‘safe haven’ currency of the super-rich. Osmium can never be forged because the crystal structure of each piece cannot be reproduced.

This is ten thousand times safer than a fingerprint. The Osmium Identification Code database is stored in a decentralized manner and cannot be hacked. Osmium can be transferred to another person anywhere in the world in seconds with the Owner Change Code.

Osmium for investors

What are the most important facts about Osmium for investors?

Osmium has one of the highest value densities of all metals.

To date, Osmium has had a stable price development.

Osmium is impossible to forge.

Can be traded across the globe.

Only a few people possess Osmium.

What makes Osmium a viable alternative to gold?

Compared to osmium, there is a lot of gold; new gold mines constantly open. The gold price is relatively unstable and subject to fluctuations. Gold is already traded on the stock exchanges, but osmium is expected to be listed soon, too.

Osmium has an extremely high value density. An average sports car is worth as much as only 4 cubic centimeters of osmium.

Unlike gold, osmium cannot be counterfeited. Because of its characteristic of having one of the highest densities of all materials, it cannot contain a core made from another equally dense material.

Compared to osmium, gold is not rare and traded by a very large number of people. Currently, it can be assumed that gold will not run out any time soon. However, osmium may no longer be mined in 20 years and will then become extremely difficult to acquire.

Investment security is another important factor. Even if a piece of osmium is stolen, chances are high that it can be tracked down in the osmium database.

Osmium has a unique crystal structure that allows any sample to be identified even without a certificate.

For how long does the Osmium-Institute in Germany have the world-wide Osmium license?

For how long does the Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH (Osmium-Institute Germany) have the worldwide license from the Swiss crystallizer to certify and distribute Osmium? In other words, how big is the risk that there will suddenly be a different channel that is in competition with the market structure that we plan to establish?

There is no limitation in time, as long as the Osmium-Institute Germany complies with the law. In this case, the contract is transferred directly to the Swiss crystallization company. However, this is very unlikely since all parties involved have made it their declared goal to build a structure that is equally secure for manufacturers, retailers and customers.

How difficult is it to copy the crystallization process?

It is currently not possible to copy the complicated and delicate process. What's more, the process is dangerous in laboratory. Temperatures and pressures are extremely high and hard to control.

In fact, more than 160 individual production process steps would have to be identified and copied. First, every step takes more than 3 months, given that one knows what needs to be done and how. And second, it takes at least 40 years to master the entire process chain with almost no option to speed things up.

What is the current crystallization capacity for crystalline Osmium?

The current production rate is high enough for the existing market and can be doubled every three months if necessary. Adjustment of the production capacity will be

managed as the demand increases. The bottom line is that every delivery can be arranged if the material is prepaid; in the worst case, delivery times are up to six months.

All available shapes and products can be seen at http://www.buy-osmium.com. If listed here, the piece you love can be delivered to you in almost no time.

Which are the main markets for crystalline Osmium?

There are two main markets into which Osmium may be sold: Jewelry and investment.

If Osmium is used for jewelry, such as an expensive ring or an exclusive watch, this Osmium will be permanently taken out of the market.

This means that only Osmium stemming from investments can be bought back in the future when production rates will eventually go down. This may lead to price increases, as there is less Osmium available with constant or increased demand. This scenario is also referred to as the "Osmium Big Bang."

What does the world of finance mean by the term Osmium BigBang?

The term Big Bang is used to describe a scenario in which prices increase very quickly. In the Osmium business, this is the day when Osmium can no longer be bought from mines in the future to satisfy demand. Mines have only limited Osmium available.

Then, prices may increase if Osmium can only be repurchased from investors. Investors may then have the opportunity to sell their osmium at higher prices. Since no other sources will be available from this point onward and since not everyone will want to sell, an extreme price rally may start.

The Osmium Big Bang should not be confused with a speculative bubble (as in real estate markets, for example), as the shortage will be real at this moment and cannot be compensated.

Which Osmium products are expected to increase most in terms of value?

There are Osmium 1 g Medium Edged Bars, Osmium Small Curved Bars (rings), 0.1 g Osmium Diamonds and Osmium Stars, 10-30 g Osmium Big Round Bars (wafers) and some other shapes. The most exclusive product will be the extremely rare Osmium Pearl.

Osmium Diamonds and Stars are suitable for small investments, whereas clients planning to invest more will generally buy Big Round Bars. These clients have the option of having the bar cut so they can then resell the resulting shapes, including 2D Shapes like Osmium Diamonds and Stars, to customers including, but not limited to, jewelers.

Although it is impossible to make reliable predictions about future price developments, Osmium Pearls with a diameter ranging from 11 to 15 mm may increase a lot more in price than other Osmium products. The reason is that the production yield for Osmium Pearls decreases with increasing production rate due to the employed crystallization process.

The total number of Osmium Pearls on the world market is expected to be only a couple of thousand.

Is there a price guarantee for Osmium?

Since Osmium Institutes are not trading, but certification institutes, there is no buy-back. The repurchase is even prohibited by law for the institutes.

The owner must sell to a jeweler or another investor in the future. As these emerging markets grow very rapidly, there are opportunities to sell later at a higher price.

In addition, a trading platform is under preparation for future selling and buying of Osmium between private parties. Private parties can use the site www.osmium-preis.com to set a price between seller and buyer in a transaction.

What is the Osmium bet?

The “Osmium bet” describes a scenario where Osmium investors are speculating that Osmium will become even rarer, that its value will increase, and at the same time the secondary market for Osmium, in which Osmium is used for the manufacture of jewelry, will grow.

Moreover, these investors expect the market to be much more accessible in the future than it was a few years ago, when Osmium was mostly unknown.

Which products are recommended for which investor?

The decision as to which Osmium piece to purchase, which semimanufactured Osmium shapes to store for the next generation or which Osmium jewelry to buy, should take into consideration one important factor: The shape of the semi-manufactuerd product!

When Osmium is used in the jewelry industry, by a larger manufacturer or just a small jewelry business, it must be possible to cut the desired shape from an Osmium Big Round Bar or an Osmium Bar. When cutting, the Osmium shapes are positioned in a way that minimizes offcuts, i.e. the Osmium which can no longer be used after cutting. The reason is that the offcuts need to undergo the complete crystallization cycle once again, thus involving considerable effort.

For this reason, pure investors should rather buy finished products like Osmium Diamonds and Osmium Stars or Starrows, because these can be resold more easily to jewelers. People who associate investment with jewelry may also purchase all other shapes. In any case, when purchasing bars or round bars, it should be clear that these products are semi-manufactured products which can be further cut into almost any shape. The larger their surface area, the easier it is to realize shapes without significant offcuts. These products may also be sold to other investors or banks.

In general, all investors should aim for an investment period of 10 to 15 years for the purchase of the metal. Osmium is certainly not a product for short-term and speculative trading.

What is the significance of offcuts in an Osmium bar?

The area adjacent to the outermost edge of an Osmium bar inevitably turns into offcuts because this area is very difficult and often impossible to process. It is for this reason that shapes are preferably cut out from the center section of a bar. As a result, the area of the center section should be as large as possible in relation to the circumference.

This means that larger bars and round bars imply less offcuts and are therefore more suitable for investors. It is therefore recommended to purchase the largest possible shape with the funds available rather than purchasing two or more smaller bars.

An exception to this are pre-cut shapes such as small animal shapes, inlays, Osmium Diamonds or Star Rows. These shapes are already finished products and can be resold in that shape.

Why is it assumed that the value of Osmium will rise?

Whether a metal rises or falls in price depends solely on demand and supply. Or to put it more precisely, it depends on whether a buyer is found who is ready to pay the price you want to achieve for your metal.

This principle applies both in daily life and in macroeconomics. It is a little odd, however, that the principle is not always respected when it comes to one's own assets.

So, what will probably happen to the price of Osmium in different scenarios?

1. The crystallization of Osmium is ceased because raw Osmium is no longer available. In this case the price will surely rise, as no additional Osmium can be delivered.

2. A crisis occurs and people have to leave their country. In this case an owner will take the Osmium with him or her. People may buy Osmium as an escape currency early enough to leave the country with the metal. The advantage of Osmium is that it has the highest value density of all metals and for this reason the value of a huge villa can easily be transported in one’s pocket.

3. No crisis breaks out and crystallization continues. In this case, Osmium will simply continue to be traded and processed into jewelry. Over time, however, two aspects will inevitably change the market. On the one hand, there will soon be no more raw Osmium, so it will no longer be possible to crystallize as soon as the supply of raw Osmium reaches zero. On the other hand, people may lose Osmium goods and/or process Osmium into jewelry. These pieces will never return to the market for investors. Thus, inevitably, the amount of goods asymptotically also decreases towards zero. Osmium will therefore rise in value and price in these cases.

Surely there could also be scenarios which could lead to falling osmium prices in special situations. However, the market seems to reflect that only temporary sales of significant amounts of Osmium could achieve this.

What are diamonds worth, anyways?

Diamonds are forever. This was once upon a time the main slogan of the Dutch company DeBeers, which has been controlling the diamond market for decades with a huge market share.

Of course, this is not true, because diamonds burn in fire just like a piece of wood. On the other hand, they are subject to the myth of being incredibly rare. That is why people believe that diamonds have value. However, to be honest, they are absolutely beautiful.

If one can believe undefined sources, the blood diamond issue was also thrown into the market by a company in order to undermine competitors. This is absolutely conceivable, because companies of this size can be incredibly brutal in the market. They can, after all, to a large extent control an entire market, precisely because they have foresight. And also, because they can finance campaigns to achieve their goals with a lot of money, perseverance and good marketing. Only in this way, and for the sake of visibility, CocaCola invented Santa Claus and spread him around the world. After all, we are all buying a brown soft drink now, even in the cold season. Ingenious.

However, the diamond market has changed dramatically. With the introduction of artificial diamonds to the market, DeBeers was confronted with competition. Therefore, the company has put the technology of diamond growing, which they have mastered

for decades, in the right light and now sell man made diamonds with moderate success. It was even achieved by the lobbyists of the company that the diamonds do not have to be given an identifier. This is particularly perfidious sine if you own diamonds in your family heritage, they are suddenly worth nothing, because they have the same value as synthetic diamonds. Hardly anyone can see the difference.

It is also interesting that DeBeers offers a machine that can find a miniature difference in the layering of the crystals. The funny thing is that the intention is to detect a worse quality with natural diamonds. So, the new marketing strategy is: Hello clients, please purchase the new synthetic diamonds for less money, but please buy more individual pieces. This enables them to argue that they do not need to dig any more holes in the earth for the sake of the conservation of nature. On the other hand, they are attacking all companies like Swarovski, which sell cheap trinkets as expensive stones. Now the diamond has suddenly become so cheap that it can be used in costume jewelry.

It is interesting to take a closer look at the raw materials market, because carbon is one of the cheapest materials ever, considering that it can be used to produce diamonds atom by atom. In fact, the raw material is so cheap that people produce it themselves. With each breath, a human being produces 80 micrograms of carbon dioxide from the food he ingests by processing it in his body. The mass fraction in carbon dioxide is 12u to 32u between carbon and the two oxygen atoms involved. So, in relation to the whole molecule with 12u to 44u (this is the so-called molar mass) about a quarter. Thus, our lungs exhale a quantity of about 20 micrograms of carbon per breath.

If we assume that we need 0.2 grams for one carat, this would take us 10,000 breaths. We breath every four seconds. This gives us a number of 40,000 seconds to exhale one carat. After 11 hours the diamond is ready. If we now estimate the costs that will presumably be used in plasma for crystal growing, then in addition to our zero Euros for carbon, there are also a few Euros for electricity and the machine. That's how the poor company DeBeers still earns a lot.

For this reason, it is simply better to buy the unforgeable and unmistakable Osmium-Diamonds.

Is Osmium sold in a pyramid scheme or Ponzi scheme?

The answer is clearly no. Revenues are generated only by selling Osmium; there are no "joining fees" or financial investments other than the cost of conducting business. Two different ways to place Osmium on the market exist: You can either sell Osmium as a wholesaler or a retail seller, or engage in intermediary sales by establishing relationships with end customers and receiving a commission.

Stakeholders in the sale of Osmium, including but not limited to state institute partners, wholesalers, retail sellers and partners engaging in intermediary sales, are rewarded for their efforts given that each have different roles to play in the import and sale of Osmium to the end user. This commission model is divided into four levels, so that every partner can enjoy commissions.

Rarity of Osmium

How rare is Osmium compared to other precious metals?

Osmium is not only the rarest precious metal on earth but also the rarest metal in general. Gold occurs 1,500 times more often than the sunshine element Osmium.

Another example is the comparison with platinum. In 250 single 40 ton truckloads filled to the brim with platinum ore, you will only find one ounce, i.e., about 30 g of Osmium.

Since Osmium is mined together with platinum, this is the best comparison, because there is no other source than associated mining with platinum or nickel.

Does Osmium have a "memory"? What about hysteresis?

Hysteresis occurs when a process moves to the state where it can regulate itself. They occur in measurement and control systems due to time delays and prolonged effects after a change in regulation. In metallurgy, there are memory effects, such as memory metals, which can regain their former form through temperature changes.

Also, a tension can arise in a metal, which is generated by mechanical work, which can lead to cracks in the metal. So, you can bend a metal several times, but at some point it will break. This applies to any metal in any form of use, even very good spring steels. Also, it is said in esotericism that metals and liquids can remember effects and then have an influence on humans based on them.

All esoteric statements about Osmium are nonsense and must under no circumstances be equated with scientific research.

Osmium price

What do carbon-based diamonds cost in comparison to Osmium-Diamonds?

Currently, Osmium-Diamonds cost approximately one tenth the price of traditional diamonds. Some experts expect that this may completely change in the future.

Diamonds may also be very beautiful, but compared to Osmium, they are simply not rare. Especially since they can be manufactured at low cost in the laboratory.

What does the term "harvest rate" mean when referring to Osmium?

The most important aspect of daily pricing is the harvest rate. The harvest rate is the amount of Osmium that actually can be used after growing the crystals and does not have to be returned to the process. The resulting reject of unusable crystals must be re-distilled several times and recrystallized with great technical and monetary effort.

Why was crystalline Osmium once comparatively cheap?

With the first crystallization of Osmium, the market developed very quickly and Osmium was purchased by many investors and customers who wanted to be the first in the market.

Although crystallization was born, the quality of the first pieces was still lacking. For example, Osmium round bars with individual elevations of up to 3mm were created.

Not knowing which qualities would be possible in the future, these pieces were sold.

Today, the granularity, which corresponds to the grain size of the crystals of a surface, is much better. However, this is only partly due to the improved crystallization process. Primarily, the current high quality is due to the improved quality control and the return of pieces with deviating crystallization quality to the process. This recycling

necessitates expensive and complex processing. The goods cannot be delivered and it may occur that Osmium enters a furnace up to five times until the quality for delivery according to current standards is possible.

During the first year of crystalline Osmium sales this was particularly noticeable. The reason was that customers wanted better surfaces and the watch industry needed better surfaces so that the watch-hand could move over an Osmium watch face without scratching. In addition, jewelry containing Osmium was not supposed to pull threads from clothing or cause people to injure themselves on individual crystals.

With the selection of pieces now improving almost on a monthly basis, the production price also increased.

In our modern times, however, many other factors are involved in pricing.

Osmium World Council

In which way is the precious metals industry involved in the market introduction of Osmium?

The purpose of the Osmium World Council is to be a discussion board for other market players encountering Osmium. These include jewelers, other associations, mining companies and politicians.

It is part of the German Osmium-Institute.

Its most important tasks are:

Internationally securing the Osmium supply for jewelry manufacturers.

Collaborating with associations in the precious metals sector and mining companies.

Spreading specific knowledge about Osmium through the internet and other media.

Supporting scientific platforms with specific knowledge about Osmium.

Avoidance of too rapid and volatile changes in the Osmium price.

The goal: Osmium must stay affordable for every investor

The Osmium-World-Council aims to be the link between an investor and an end customer in the market. For this reason, an Osmium index is in the making and preparations are being made to make Osmium tradable on international exchanges, also in the form of a security.

Osmium resale

Can I resell Osmium that I have purchased?

This always depends on the market demand. A good strategy may be to have Osmium products that are versatile in their use. An Osmium Diamond, for example, can fit into nearly any kind of jewelry without having to alter its form.

Osmium is sold mainly to the manufacturing industry and the producing jewelers, as well as directly to other investors or collectors.

Each party can be certain that Osmium cannot be counterfeited. If an Osmium piece has been allocated an Osmium Identification Code, then it is genuine, has its individual certificate of authenticity and can thus be securely sold between private persons. If necessary, local Osmium-Institutes can issue a new, personalized certificate to the buyer.

A sales guarantee does not exist.

Who is willing and able to buy Osmium from investors?

Private sales transactions can be organized by buyers and sellers at any time. In addition, jewelers all over the world are likely to be the future buyers. If in the coming years the demand rises, then private individuals and investors may have the opportunity to sell directly to jewelers.

The Osmium Database is used to facilitate transactions that do not involve an Osmium-Institute to ensure that the two interacting parties have certainty that the specific product is genuine and is sold at the correct price.

What is the Osmium secondary market?

In a secondary market, a group of customers can only purchase a product from members of a primary market.

For Osmium, the primary market refers to the investor market and the secondary market refers to the jewelry market, because only in the latter the "sunshine element" is used and consumed.

For the secondary market to offer returns which investors may deem acceptable, Osmium needs to be used and processed as jewelry. However, Osmium stocks should not deplete too soon to ensure availability for investors at affordable prices for some time in the primary market. Therefore, a profitable secondary market from an investor's perspective requires a balancing act between supply and demand:

Initially, larger quantities of Osmium should be owned by investors whilst the jewelry market is relatively small. At the point when investors begin to resell on a larger scale, the secondary market needs to be ready to take up the increased supply without the price falling. So, the bet which investors are making also has a time component; when will what happen? If the secondary market is established too late, the Osmium price may plummet and then strongly increase. However, a more predictable behavior of the Osmium price would naturally be healthier for the markets.

In this context, resale ability decreases at the beginning of the market launch for investors with a short-term investment horizon.

If, in time, as supplies deplete, the Osmium price increases whilst in the hands of investors, not fabricators, investors with a long-term perspective will benefit from this development. In the transition of the Osmium market away from pure marketing towards trading, osmium will inevitably have to find its way first and prices are expected to be very volatile.

Experts therefore generally assume that Osmium has the potential to perform well in the first few years. Then, after a consolidation phase in which buyers may be able to purchase Osmium at competitive prices, total shortage of Osmium may occur, a scenario which is referred to as the Osmium Big Bang. At this stage, it is impossible to predict the development of the Osmium price, because the fact that a metal can no

longer be supplied except via investors is new for metal markets and is likely to have a tremendous impact.

Why are Osmium-Institutes generally not allowed to purchase crystalline Osmium or buy it from the free market?

As Osmium-Institutes represent the interests of mines and manufacturers, they are primarily concerned with introducing new products to the market. Recycling and trading are therefore not part of the institutes' area of responsibility.

Osmium-Institutes are basically scientific organizations with tasks in the field of knowledge acquisition, knowledge verification, knowledge mediation and they are the international certification body. As such, they must remain neutral.

In addition, Osmium-Institutes organize the initial introduction to the market. Hence the name "Osmium Institut zur Inverkehrbrigung und Zertifizierung von Osmium" - translating to "Osmium-Institute to introduce and certify osmium".

It is not their function to trade Osmium, which is even prohibited by the Osmium World Council. The Osmium-Institutes would gain a competitive advantage through the in-house identification of the Osmium and their publicity, thereby becoming international competition for the affiliated retailers.

The establishment of a trading platform for Osmium in physical form or as a certificate will therefore never be operated by an Osmium-Institute, but by companies that have expertise in this type of trade. The most successful and sensible selling option are other investors and the commencing jewelry market. Osmium is by no means suitable for short-term speculation.

Can a private person sell to another private person?

Yes, this is possible. The buyer will get the original certificate from the seller and compare the specific Osmium product with the certificate by means of visual inspection. This is sufficient to confirm that the certificate matches the specific Osmium product. Recertification via an Osmium-Institute is another option (a service fee of €70 applies).

Osmium products can easily be identified via the Internet by means of the OIC (Osmium Identification Code) for a particular osmium piece.

Private individuals can verify the price for every certified Osmium piece via the Internet.

Safety information

Crystalline and metallic Osmium are harmless and absolutely innoxious. Allergic reactions are not known of.

However, the Osmium tetroxide is toxic and volatile. Dusts can lead to lung infection with hyperemia all the way to pulmonary edema, as well as skin or eye damage.

When the metallic Osmium in powder form is exposed to air, small amounts of Osmium tetroxide always form, which is why caution is also required for this element form.

Metallic Osmium is easily flammable as finely spread powder or dust, but doesn't burn in compact form.

In order to put out Osmium dust fires, metal fire extinguishers of the class D or extinguishing powder must be used. Under no circumstances can you apply water, due to the high danger of explosion from the forming hydrogen.

To prevent Osmium tetroxide from forming, crystalline Osmium also mustn't be heated over 400 °C (the oxide doesn't emerge at room temperature and temperatures below 400 °C). For this reason, the processing with methods such as high-temperature soldering or welding is not possible.

The formation of Osmium tetroxide can be first noticed by a pungent smell of garlic.

Data sheet of Osmium compared to other precious metals

Symbol	Ag	Au	Pt	Os
Name	**Silver**	**Gold**	**Platinum**	**Osmium**
Atomic number	**47**	**79**	**78**	**76**
Atomic mass (u)	107.86	196.96	195.08	190.23
Melting point (°C)	961	1064	1772	3027
Boiling point (°C)	2163	2807	3827	5012
Density in g/cm³	10.5	19.32	21.45	22.61
Thermal conductivity (W/mK)	429	317	71.6	87.6
Hardness (Mohs)	2.5	2.5	3.5	7
Compression modulus (GPa)	103.6	171	276	443
Superconductivity (K)				0.66

Data such as the density of Osmium are measured and exist on the basis of calculation of the crystal structure. The figures may vary.

On the following page you can see an analysis sheet of crystalline Osmium:

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P.O.#

Date of Analysis 21-nov.-2017
Customer ID: **Os**

échantillon d'Osmium

Job # F0HH8412
Sample ID: F171115022 - CB
Issued on: 22/11/2017

Element	Concentration [ppm wt]	Element	Concentration [ppm wt]
Li	< 0.005	Pd	< 0.01
Be	< 0.005	Ag	< 0.01
B	< 0.005	Cd	< 0.01
C	-	In	< 0.01
N	-	Sn	< 0.005
O	-	Sb	< 0.005
F	< 0.05	Te	< 0.005
Na	< 0.005	I	< 0.005
Mg	< 0.005	Cs	< 0.005
Al	< 0.005	Ba	< 0.005
Si	< 0.005	La	< 0.005
P	< 0.005	Ce	< 0.005
S	< 0.01	Pr	< 0.005
Cl	< 0.01	Nd	< 0.005
K	< 0.05	Sm	< 0.005
Ca	< 0.01	Eu	< 0.005
Sc	< 0.005	Gd	< 0.005
Ti	< 0.005	Tb	< 0.005
V	< 0.005	Dy	< 0.005
Cr	< 0.005	Ho	< 0.005
Mn	< 0.005	Er	< 0.005
Fe	< 0.005	Tm	< 0.005
Co	< 0.005	Yb	< 0.005
Ni	< 0.005	Lu	< 0.005
Cu	< 0.005	Hf	< 0.005
Zn	< 0.01	Ta	< 5
Ga	< 0.01	W	< 0.05
Ge	< 0.01	Re	< 0.05
As	< 0.01	Os	Matrix
Se	< 0.01	Ir	< 0.1
Br	< 0.01	Pt	< 0.1
Rb	< 0.005	Au	< 0.5
Sr	< 0.005	Hg	< 0.1
Y	< 0.005	Tl	< 0.5
Zr	< 0.005	Pb	< 0.5
Nb	< 0.005	Bi	< 0.01
Mo	< 0.005	Th	< 0.001
Ru	0.45	U	< 0.001
Rh	< 0.005		

H, C, N, O recommended by Interstitial Gas Analysis (Internally equipped)

C.BAZILLE [Analyst]

Approved by

Osmium-Institute Processing Guidelines

The intention of this document is to set standards, and to give guidance to the industry on technical and other issues in connection with the manufacturing of osmium jewelry and related products.

Publisher: Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH (Osmium-Institute Germany)

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Correct at the time of publication of this book.

Basic information

Osmium is a precious metal respectively a noble metal.

There are eight metals in the precious metals respectively noble metals group: Silver, gold, palladium, platinum, rhodium, iridium, ruthenium, and Osmium

Note: Osmium is the last noble metal which is introduced to the jewelry market.

This group of eight chemical elements is referred to as noble metals because of their ability to withstand chemical reactions (chemical inertness) and hence their resistance against e.g. corrosion and decolorization. Within this group, Osmium forms part of the platinum metals subgroup due its chemical similarity to platinum. In fact, Osmium is mined together with platinum.

Osmium is a very dense noble metal with a whitish-silvery-bluish luster. Osmium is not only chemically inert but also resistant against mechanical scraping. Osmium has gained popularity as more and more equipment and techniques are being developed to facilitate its use as the jewelry metal of choice. Osmium has a very high melting point and is therefore delivered in precut two-dimensional (2D) shapes.

Due to its high specific gravity, products made of Osmium are significantly heavier than an equivalent product made of gold. Since its discovery, Osmium has been used only in very specific applications because it has exceptional properties. The element with the atomic number 76 has the highest density of all precious metals and also of all other stable elements and substances. It has an extreme abrasion resistance and reflectivity. The properties that Osmium develops during crystallization soon led to Osmium being dubbed the “unforgeable metal”.

The myth

Through a series of publications and the ingenuity of traders, customers, chemists and investors, many stories and occurrences in relation to Osmium have transpired in recent decades and years, some of which are backed by facts and others that originated from the esoteric market.

At the beginning of this document, we would like to provide some of the facts and explanations to explain, not to transfigure, the myth of Osmium.

Osmium was discovered very late and had its first application as filament in light bulbs. These emitted a cozy, soft light. However, Osmium was just too rare and expensive to continue to be used in the lighting industry.

Note: The myth around Osmium has been further fueled by Osmium traders. Osmium is now also known by a number of nicknames, including:

- THE sunshine element
- THE unforgeable
- THE sparkle
- THE resplendence metal
- THE generation metal
- THE eternal precious metal

In many Internet publications and in English speaking regions, it has prevailed that the article before Osmium is written in capital letters.

The expression “THE sunshine element” is derived from the whitish-silvery-bluish luster that emanates from the surface already in diffuse light, an effect which is massively amplified when exposed to direct sunlight. Since light cannot penetrate into the crystal structure, it is reflected when hitting the surface. Small surface areas having direct reflection alignment with the human eye can unfold their full reflection effect, whereas other areas of the crystal surface can then only be poorly seen.

For this reason, Osmium seems to sparkle, i.e. to shine by reflecting numerous small, light blue flashes when direct sunlight or an LED light source in a dark room hit its surface. As either the Osmium object, the light source, or the viewer move, the Osmium crystal constantly generates new patterns of reflective surfaces. This

phenomenon produces the characteristic Osmium sparkling effect, which is unparalleled in nature.

Osmium is also called “THE unforgeable” since all attempts at counterfeiting are bound to fail due to its specific physical properties. There exist a number of publications on this subject on the Internet. This document will discuss in greater detail why security with Osmium is particularly high.

The expression “THE generation metal” implies that Osmium is usually purchased with longer holding periods in mind to pass it on to the next generation. The Osmium investment market is anticipating the so-called osmium Big Bang, the particular point in time when Osmium will have completely disappeared from the market and can only be bought from investors. In such a scenario it may be possible to achieve high profits.

Every precious metal is a chemical element and thus indestructible and endowed with infinite durability. The expression “THE eternal precious metal” stems from the fact that Osmium cannot be chemically modified by everyday substances that could lead to its dissolution or damage. There are no acids, caustic solutions or other solutions in which Osmium can be dissolved. Unlike silver or other metals, Osmium will never “rust” or tarnish.

Caution with esoterics

The expression “THE resplendence metal” was given to Osmium in the esoteric market for the first time in Austria. Esoterics credited Osmium with special powers such as the ability to “donate life energy”, repel “earth rays” and provide health benefits if worn on the body due to its ability to generate energy flows much higher compared to any other substance.

The first pieces of jewelry on this market actually looked pretty, resembling wristwatches with a small eye in which an Osmium diamond could move freely, like floating in a bubble. However, the beauty of jewelry is not a measure of the properties that a material possesses. The only health application of Osmium that has been scientifically accepted to date is the treatment of osteoarthritis in joints such as the knee with Osmium tetroxide, which is used for this purpose in very small amounts only.

Statements and selling propositions which are often used in the esoteric market lack a scientific foundation, but nevertheless further increase the myth surrounding Osmium. The thesis that Osmium can repel earth rays (which, of course, do not exist in the electromagnetic spectrum) is possibly based on the shielding effect of Osmium against gamma radiation, which is a very real physical phenomenon.

Note: *We urge all traders and partners to distance themselves from esoteric statements about Osmium and to only state actual facts in a sales conversation; these are truly impressive enough.*

Impossible to counterfeit

Osmium is entirely dimensionally stable in its crystalline appearance and cannot be changed reversibly by mechanical or chemical means. This characteristic distinguishes it among other properties of easily malleable gold. A significant advantage arising from this property is the fact that Osmium cannot be counterfeited.

Its crystalline surface is recognized with extreme reliability similar to a fingerprint.

Explanation:

The unique structure of the friction ridges of a human finger is used for the recognition of a fingerprint.

For Osmium, the edge of any single crystal is the analogue to the friction ridges. Every single such edge is inclined in three-dimensional space, forms a specific angle with the level metal bottom surface and also has a clearly defined surface. Also, each crystal sticks out of the base material with a clearly identifiable length.

Even a standard 3 mm Osmium diamond contains already more than 1,000 such macroscopic features. At the microscopic level, there are millions of features. For a larger surface area of an Osmium structure, the number of variables multiplies accordingly.

For this reason, while a 10,000-fold higher security in comparison to a fingerprint is often mentioned, the actual security is many times higher. Exact numbers cannot be given as, in case of doubt, ever smaller structures could be considered.

When gold is forged, a piece of metal of comparable density is often covered with a more or less thick gold coating. Alternatively, a gold ingot is filled with another metal.

For Osmium, only one metal is known that differs from Osmium in density by just a few hundredths of a gram. This metal is iridium. However, no forgery can be carried out with iridium either, since not only have both metals high melting points but coating them at these temperatures also means that the other metal would lose its shape. However, this case is just hypothetical, because Osmium is delivered in very thin structures as bars so that a real “interior” does not even exist.

Attempts to crystallize iridium ingots must also fail because iridium has a different crystallization structure so that it is clear and visible to the naked eye whether it is ruthenium, iridium or Osmium ingots respectively bars.

Note: Thanks to the additional security resulting from the density, one can justifiably claim that osmium cannot be forged.

Purity (fineness) and chemical inertness

The raw Osmium which is used in the crystallization process already has a purity of 99.99%. During crystallization, this purity is further increased by at least a factor of 10 to 99.9990% up to 99.9995%.

Osmium is resistant to corrosion and decolorization by all common and oxidizing acids. Typical acids are hydrochloric acid, sulfuric acid, nitric acid, and phosphoric acid. The experiments were carried out with concentrated acids and dilute acids with increased hydrogen ion activity and very low pH levels.

Chemical determination of Osmium

Note: This section has been adapted from the German article Aufschluss (Chemie) as published on Wikipedia (download: 7 June 2018).

Leaching is a method in inorganic chemical analysis in which poorly soluble substances, very often oxides, silicates or sulfates, are converted with the aid of leaching agents into a compound which is soluble in acids or water.

One way of detecting Osmium is via Osmium tetroxide. A simple detection mechanism would be the characteristic odor of Osmium tetroxide, which is not recommended due to the toxicity of Osmium tetroxide. However, chemical detection methods are possible. A sample containing Osmium is combined with benzidine or potassium hexacyanoferrate solution on filter paper. With benzidine, the paper turns violet in the presence of Osmium tetroxide, and bright green with potassium hexacyanoferrate.

In modern analytics, these detection methods do no longer bear any importance. Today, Osmium cannot only be detected by means of instrumental methods such as neutron activation analysis, voltammetry, atomic spectrometry or mass spectrometry, but can also be quantitatively determined with high accuracy. NMR spectroscopy and X-ray diffraction allow the structural analysis of organic and inorganic Osmium compounds.

Specific settings and the calibration of employed measurement devices are important for detecting Osmium based on electronic methods. Equipment needs to be calibrated with real Osmium samples, otherwise false measurements may be produced indicating the presence of iridium instead of Osmium.

Fine Osmium in crystalline form has a purity of 24 carat in the carat system. There are no other alloys used during crystallization. Osmium alloys are used in insignificant amounts in some industries. A prominent example is the prototype meter in Paris, which contains 7 kg of Osmium.

The weight of osmium diamonds is sometimes indicated in carat, similar to carbon-based diamonds. Due to their small size, this unit of mass equal to 0.2 grams certainly makes sense in the metal segment, as well. The fact that the weight of osmium diamonds is indicated in carat is because the first osmium diamonds are already used in

jewelry instead of conventional diamonds; therefore, the carat unit may be used by jewelers when quoting prices.

At this point it should be clearly mentioned once again that the osmium diamond has no relation to the carbon-based diamond except its reflectivity in sunlight.

Osmium pieces having a round shape with 3 mm diameter are referred to as osmium diamonds because they can be set into premium jewelry in a way similar to conventional diamonds.

Summary:

Crystalline Osmium does not change its color, its crystalline structure or other critical properties.

Analyzing Osmium specimen in non-wet chemical regimes

Note: This section has been adapted from German article **Röntgenfluoreszenz** (X-ray flourescence) as published on Wikipedia (download: 7 June 20189:

X-ray fluorescence (XRF) is a common method for analyzing Osmium. It is based on the emission of characteristic secondary (or fluorescent) X-rays from a material that has been excited by high-energy radiation. The phenomenon is used in X-ray fluorescence analysis for the determination of the elemental composition of metals, glasses, ceramics and other materials.

Exposing materials to short-wave X-radiation may lead to emission of one or more electrons and hence ionization. If the energy of the radiation is high enough, electrons are knocked out of the inner shells in addition to the bonding electrons. As a result, the electronic structure of the atom becomes unstable and electrons of higher shells fall into the gap created while emitting radiation characteristic of the element.

Soldering Osmium and extreme temperatures

When exposed to extreme temperatures, crystalline bulk Osmium forms Osmium tetraoxide, which is also abbreviated to Osmium tetroxide. This process only starts at temperatures above 400 °C. In addition, airborne Osmium particulates, powder and dusts may slowly form osmium tetroxide at temperatures below 400 °C (673 K), including at room temperature:

$$\mathbf{Os + 2O_2 \rightarrow OsO_4}$$

Therefore, Osmium can be soldered safely at temperatures below 400 °C. Upon request, the Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH can provide results of a study from an accredited laboratory examining the oxidation behavior of Osmium as a function of temperature.

In general, solder adheres well to Osmium. The employed soldering iron needs to be able to indicate the peak temperature at the soldering tip because heat is dissipated slowly for small workpieces. In experimental setups, the formation of osmium tetroxide has not been observed for soldering temperatures not exceeding 450 °C.

When exposed to higher temperatures above 500 °C, Osmium transforms slowly into Osmium tetroxide. The melting point had therefore to be determined under vacuum since it is practically not achieved when Osmium is melted while exposed to atmospheric oxygen.

In principle, one can think of the crystallization of Osmium in a similar way as the crystallization of carbon into diamonds when manufacturing synthetic diamonds. Likewise, diamonds are oxidized under intense heat and eventually transform into carbon dioxide. The word *diamond* goes back to the Greek word *adámas*, meaning “the invincible”. Fire will transform this “invincible” gemstone into carbon dioxide above 850 °C.

Diamonds, like graphite, are made of pure carbon and are therefore flammable. Unlike diamonds, bulk Osmium cannot burn. Airborne Osmium particulates, powder and dusts, however, are a flammable solid.

Note:

Currently, approx. 40 tons of synthetic diamonds up to a size of a few millimeters are produced per annum. This is about 330 times higher than the amount of crystallized Osmium.

The formation of Osmium tetroxide, resulting from excessively high temperatures and/or the presence of oxygen, is noticed as a pungent, chlorine-like odor.

Note:

Hot soldering operations or any other works with Osmium at temperatures exceeding 400 °C are not permitted as per these Processing Guidelines. In case the characteristic odor of Osmium tetroxide is noticed, the works need to be suspended immediately and the workshop must be aired.

Cutting Osmium by means of Electrical Discharge Machining

It is possible to cut Osmium by means of Electrical Discharge Machining (EDM), also referred to as wire cutting, or with a water jet.

The water jet method results in coarse and inexact cutting edges and should therefore only be used when precutting Osmium bars or when an overcut needs to be removed during crystal growth. In theory, water jet cutting is many times faster than wire cutting, but the lack of precision renders this method unfeasible for cutting Osmium.

The wire cutting process has become the accepted method of choice due to its very high precision. Unfortunately, it is costly and expensive. To date, alternative methods do not exist since Osmium has one of the highest abrasion resistances of all substances. The precision of the wire cutting method is demonstrated by recently cut Osmium microstructures. These structures are very intricate and deviations from the intended cut geometry are in the range of just one thousandth of a millimeter.

For wire cutting, as with any method, the cutting track must first be set and programmed in a CAD system to minimize the Osmium cutting losses between individual shapes. Shapes and their inverse shapes are ideal because most material will only be lost at the edge of a bar or a disk. An example of this is the Osmium-Diamond and its geometric inverse, the Osmium-Star.

In the cutting track some Osmium will be lost on the cutting wire, which cannot be recycled. As the cutting track is extremely small, the loss of Osmium is also very small. Therefore, this effect does not have to be calculated.

Hydrochloric acid (10%) is used in order to clean the Osmium from the residues of the erosion wire.

Basic facts about Electrical Discharge Machining

Note: This section has been adapted from the German article Drahterodieren (wire cutting) as published on Wikipedia (download: 7 June 2018).

Wire erosion, wire cutting or Electrical Discharge Machining (EDM) is a high precision machining process for electrically conductive materials that uses the principle of spark erosion: A series of electrical voltage pulses creates sparks that transfer material from the workpiece to a continuously rolling thin wire as well as to the separating dielectric medium. The wire is then disposed of. The accuracy of the method is based on the fact that sparks always jump at the point at which the distance between the workpiece and wire is minimal.

Cutting process

The erosion wire is wound on a spool and is guided from there via deflection rollers and the brake roller to the upper wire guide. Two opposite drive rollers pull the wire with a defined wire tension ranging between 5 and 25 Newton and a speed of up to 25 m/min (depending on the material) through the workpiece and through the lower wire guide. The wire is then disposed of. The wire guides above and below the workpiece guide and support the wire and suppress vibrations. Furthermore, the wire guides provide a defined deflection point for conical cuts.

The basic rule is that the wire is positively poled and the workpiece is negatively poled. The resulting electro-migration removes material from the workpiece (metal ions are positively charged). When re-cutting, the polarity may be different or changing, depending on the technology employed by the respective machine manufacturer.

As soon as the erosion wire approaches the workpiece at a very small distance, an electric field is formed at the position with the shortest distance. In this field, positively

and negatively charged ions are strongly accelerated. These ions form an ionized channel between the workpiece and electrode that conducts electricity. Now the ions collide in the discharge channel, resulting in a visible spark. At the same time, a gas bubble forms from the evaporating dielectric and the material (electrode and workpiece). In the gas bubble, the pressure increases evenly and a plasma is formed.

The bubble enlarges until it is spatially confined by the electrode and the workpiece. Now, the current is interrupted by initiating a pulse break and the bubble implodes. This implosion tears molten material from the workpiece and also from the electrode. If the pulse break is initiated too late (pulse duration too long), an arc may occur, resulting in a torn wire.

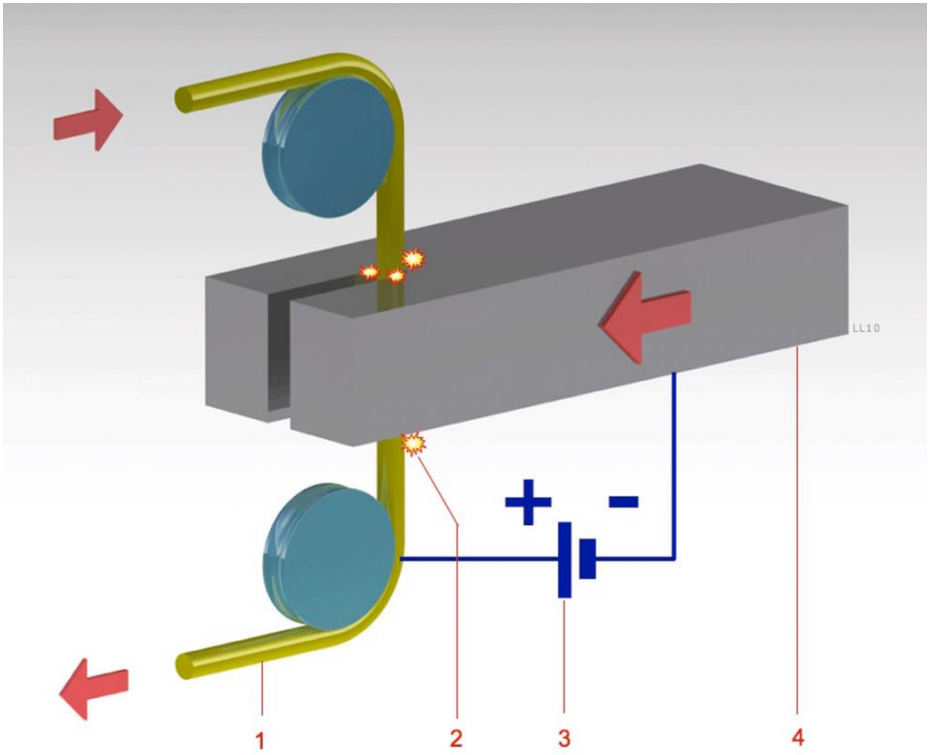


Figure: Basic setup for wire cutting (1: Wire, 2: Area of wire erosion, 3: Voltage source, 4: Workpiece)

The settings of the generator for the operator are specified by the manufacturer. These include e.g. discharge time, discharge break, current and voltage (also open circuit voltage), capacitor capacity, working voltage (servo voltage), maximum feed and the basic generator circuit (mode or pulse mode).

The maximum generator power of wire cutting machines is usually given in terms of roughing power in mm²/min. There are now machines that work with up to 500 mm²/min. However, since such velocities are difficult to control and reduce profitability, the main cut or roughing cut (cut through full material) is carried out at 150 mm²/min to 250 mm²/min. A reference height of 60 mm applies.

Often, recuts are performed with lower generator settings to achieve higher accuracies and better surfaces. To achieve accuracies in the range of less than 2 microns, recuts may occur up to eight times, depending on the manufacturer.

Further erosion methods are sinking and drill erosion. The wire erosion machines are usually designed as a C-frame and have five axes. The machine table carries out the X and Y movement and the upper head, which is attached to the Z axis, performs the U and V movement (U parallel to X and V parallel to Y). By working together of X, Y, U and V, so-called 4-axis contours are possible, e.g. a square on the bottom side and a circle on the upper side.

Brass is used as wire material in most cases. Also, materials such as copper, tungsten and steel are increasingly employed. To increase cutting performance and accuracy, EDM wires are coated with zinc and other materials and/or thermally treated. The standard diameter is 0.25 mm in Europe and 0.2 mm in Asia. Due to their low tolerance (1 µm to 2 µm), EDM wires are available in the range of 0.02 mm to 0.33 mm. Latest developments allow the use of two different wire diameters in one processing sequence.

By means of wire cutting, all conductive materials can be processed independently of their hardness. In contrast, processing times are long and the associated costs are high. On the other hand, extremely small cutting widths are possible even for greater material thickness. The machined contours are sharp-edged and meet highest requirements in terms of accuracy.

Grading Osmium semi-manufactured materials and finished products

The characteristics of Osmium depend on the particular batch. Differences predominantly relate to layer thickness and/or the specificity of the crystallization process.

Whilst diamond grading is a subjective task due to the variety in naturally occurring diamonds, there are internationally accepted standard methodologies to reduce subjectivity.

Example: The Osmium-Diamond

Grading is intended to quantitatively and qualitatively describe a diamond's unique characteristics so that any diamond can be identified by its individual grading report. Grading is simplified for Osmium-Diamonds because the diamond does not need to be polished, but is delivered ready to set into jewelry with or without an alignment "bump".

Nevertheless, there are two characteristics that make up the quality of an Osmium-Diamond.

First, the quality is determined by the characteristics of the crystal surface structure of the Osmium-Diamond and the regularity of that surface structure across its entire surface. Currently, a standard is under development with which this aspect of quality can be expressed in terms of numbers. Second, quality is determined by the layer thickness of the Osmium-Diamond.

Assessments pertaining to the quality of Osmium-Diamonds can be made internationally only by the certified and well-trained Osmium-Institutes. These should be consulted whenever the grade of an Osmium piece needs to be determined.

There is currently a training program under development to enable certified companies to grade Osmium-Diamonds themselves.

For placing on the market, however, every piece of Osmium to be introduced to the market can only be certified in Germany and entered for the first time in the database with its Osmium-Identification-Code.

Osmium-Pearls

Osmium-Pearls are spherically shaped three-dimensional objects consisting of a thin Osmium layer crystallized on a spherical carbon substrate. The thickness of the layer ranges typically between 0.5 and 1.5 mm.

An Osmium Pearl is not meant to imitate a natural pearl made up of alternating concentric calcareous concretions which may form by chance in various saltwater and freshwater mollusks.

Interestingly, however, an Osmium-Pearl is formed in a similar manner. It grows around a crystal nucleus, which is made of carbon having a perfect round shape. However, the process does not take place at saltwater or freshwater temperature, but under extreme pressure at extreme temperatures.

Note:

Historically, all discovered pearls are of natural origin. Already a century ago, the supplies of natural saltwater pearls started to deplete. Even today, these pearls are very rare. They are often traded at international auctions as investments. For this reason, the even rarer Osmium-Pearls are a perfect alternative to conventional pearls.

Grading of Osmium-Pearls

Unlike gemstones such as diamonds, there is no universal international standard for assessing the quality of pearls. Diverse systems have been developed for this purpose. Beauty is the main criterion when choosing a pearl. However, there are evaluation criteria for estimating quality such as color, brightness of reflection, luster, shape, size and surface finish.

For all of the above criteria for assessing the value of a pearl, there is one important factor that is often underestimated. It is said that no two pearls are the same. That is why it is particularly challenging to find matching pairs of pearls for necklaces or earrings.

This difference exists for Osmium-Pearls, which are each perfectly round, only in the form of the crystallization surface, which is used for quality determination.

Note:

Since the crystallization process for Osmium is standardized, the differences between individual Osmium-Pearls are not very high, but still visible.

When determining the weight of the Osmium-Pearl, the weight of the inner carbon sphere is subtracted to obtain the net weight of the Osmium contained in the pearl as well as the gross weight, i.e., the sum of the weights of the carbon sphere, the crystallized Osmium and the functional jewelry findings.

The following grading characteristics may be applied for judging the quality of Osmium-Pearls:

- Maximum crystal height
- Layer thickness of Osmium on the carbon substrate
- Similarity (homogeneity) of the crystals in the visible crystal structure
- Errors caused by crystals broken out of the structure
- Cracks in the structure of the crystal surface
- Spalling around the process-related opening in the Osmium surface respectively the cannulation for applying functional jewelry findings for e.g. studs or chains

Further helpful tips for judging the quality of Osmium-Pearls

- Check the Osmium-Pearl for cracks in the crystal structure. These appear as dark areas, where the underlying graphite substrate can then be seen.
- Check the Osmium-Pearl for reflectance differences across the entire surface.
- Determine the largest protruding crystals and their abundance across the entire surface.
- Check the cannulation(s) for cracks and accuracy.
- Determine the weight of the entire Osmium-Pearl and compare it with the weight of the substrate to determine the actual Osmium quantity.

Note:

Similar criteria can be applied for judging the quality grade of Osmium three-dimensional objects other than Osmium-Pearls.

Processing methods for the conventional manufacture of Osmium jewelry

Joining and setting: The easiest ways to combine respectively join Osmium with other jewelry workpieces is to set an Osmium 2D shape or glue it on level surfaces. Chemical reactions of the Osmium with adhesives that affect the Osmium are unknown.

The setting of Osmium 2D shapes into jewelry is more straightforward than with conventional diamonds, which have a pyramidal or conical shape after cutting of the raw diamond. Thanks to its flat overall structure, Osmium can be easily set and worked into creative jewelry pieces of almost any shape.

Note:

Solder can be chemically removed from the Osmium surface, e.g. by dissolving the jewelry piece in an acidic environment that does not harm the Osmium, but removes the solder.

Processing methods: Osmium is brittle and NOT malleable like gold or silver. It is not possible to make adjustments to the size of an Osmium ring.

The shaping of the Osmium takes place exclusively during crystallization, during which an Osmium surface with a unique crystal structure is formed in two or three dimensions. The only possible modification to this surface is the subsequent cutting by means of EDM. Osmium is therefore purchased in finished geometries or ordered in the desired shape or cut by means of EDM as described in these Processing Guidelines. Accordingly, Osmium cannot be processed in sheets and the diameter of an Osmium small curved bar or ring cannot be changed.

It is not possible to saw Osmium due to its extremely high abrasion resistance and the risk of breaking crystals out of the surface structure.

Attention:

Annealing of Osmium is absolutely forbidden, since Osmium tetroxide will definitely form at the extremely high temperatures that are generated during annealing!

On the other hand, Osmium may be “ground off”, e.g. when removing the alignment “bump” from Osmium-Diamonds. As the “grinding” in fact breaks microcrystals out of

the surface structure rather than being abrasive filing, the cut will always be very coarse.

In general, it must be differentiated whether Osmium is actually ground off or whether crystals break out the surface.

A diamond file cannot grind off the surface of Osmium due to the high abrasion resistance, but instead breaks microcrystals out of surface structure. This has the appearance of filing, where actual material is removed due to material of the file being more resistant to abrasion and dimensionally stable.

When “grinding”, use diamond grinding wheels. Sanding and polishing are processes that cannot applied to Osmium, since the existing crystal structures have perfect gloss and perfect smoothness. Sanding would break microcrystals out of the surface structure parts and possibly even destroy the entire piece of jewelry.

General design guidelines

Since Osmium can be damaged by improper handling, this fact must be taken into account when designing jewelry.

The property that large crystals can be broken out is independent of the extreme abrasion resistance of Osmium. The abrasion resistance refers to the surface of a single closed crystal with a smooth surface.

The following four features must be considered in the design:

1.) Osmium parts of a jewelry piece must not touch each other in a way that allows their surfaces to grind against each other.

2.) If Osmium designs contain “bridges”, these must not be too narrow to avoid bending.

3.) The design must be such that the Osmium is protected by e.g. protrusions in the event of dropping the jewelry piece.

4.) Osmium carrier materials, such as the carbon sphere inside an Osmium-Pearl, cannot and should not be removed.

Specific design guidelines for jewelry with settings

The manufacture of Osmium jewelry necessitates meeting specific design requirements which depend on the chosen design. Osmium is often directly used as a cut shape without employing a second metal.

However, it is often important to use Osmium in combination with other metals.

The reasons for this include:

1. Jewelry becomes less expensive if some parts are made of gold or platinum, as they are about a twentieth of the Osmium price.
2. The use of other metals prevents damage or improper handling of the Osmium as per the Section “General design guidelines.”
3. The specific diffuse reflection effect, which is characteristic of Osmium, can be created in certain parts of the jewelry piece by adding Osmium.
4. If diamonds are not precious enough, Osmium may be used to enhance jewelry further.
5. If care is taken to ensure that bridges in the material are always solid, the durability of a jewelry piece will be increased.
6. If the structures to be created need two colors, metals can be used in combination.
7. Osmium can be used to create an effect of attracting attention with sublimity.

The following must be taken into account at the design stage if Osmium is processed with a second metal:

- Osmium does not have to be cut into pieces to achieve the desired shape. Instead, unique shapes can be directly pre-ordered.
- Since manufacturing a shape requires setup works before the intricate cutting process, at least 20 to 50 pieces should be made for a new series.
- Certain shapes, such as a grain shape, a crescent or other typical inlay can also be manufactured in more significant quantities for use in different jewelry pieces.
- It should be noted that the layer thickness may vary by up to 0.3 mm if employment of an Osmium piece with a single edge length of more than 20 mm is intended. The smaller the shape, the more even the layer thickness.
- If Osmium is used in already manufactured jewelry series, geometries set with diamonds may be cut out and manufactured in Osmium. The Osmium piece can then be inserted without changing the manufacturing process or the design of the jewelry piece.
- Osmium cannot be bent and is not malleable. Therefore, the fit must either be perfect, have an overhang or the Osmium is glued or soldered to a flat surface.
- Inlays can be manufactured to an accuracy of one-hundredth of a millimeter. Bridge widths should not be less than 1 - 2 mm.

If inlays or jewelry pieces require cannulation through the Osmium for further inside cutting with the eroding wire, then the cannulation, the threading of the wire and the cutting need to be calculated separately. This will result in a fairly precise price calculation. Only the layer thickness cannot be calculated entirely in advance.

Designs need to be supplied as an electronic file and contain scaling information. On that basis, the cutting length and area can be calculated.

Pricing for Osmium shapes can be obtained from the local Osmium-Institute which can calculate the price.

General care instructions

- Osmium is brittle and must not be dropped onto hard surfaces to avoid breaking.
- If Osmium grinds against another surface or is bent, crystals may break out of the structure.

Protection against mechanical forces

Osmium is brittle. For this reason, Osmium small curved bars, which some customers wear as rings, may break when dropped on a hard surface. This event cannot be insured, as all documentation, including these Processing Guidelines and the Product Data Sheet, clearly state that small curved bars are of investment form only and not a finished jewelry product.

When Osmium is to be worn as a ring, it is typically set into a concentric titanium sheath that protects the Osmium in case the ring drops on a hard surface. Of course, other protective metals may also be used, but titanium with its slightly resilient material properties has proved to be particularly suitable.

In addition, the different colors of the two metals harmonize very well. In case Osmium small curved bars are not intended to be kept as investment in a safe and worn as a jewelry instead, Osmium small curved bars are supplied directly with titanium sheath.

Figure: Osmium small curved bar set in a titanium sheath to be worn as a ring

Cleaning and storage of Osmium-Pearls and other three-dimensional objects

Osmium-Pearls must not be rubbed between fingers or allowed to grind against each other, subjected to mechanical force such as stress, strain and shear forces, or forced into a product package.

The risk is not material abrasion, which is almost impossible, but breaking entire crystals out of the structure, affecting the surface in its perfection.

Further conditions that must be avoided when wearing Osmium-Pearls include:

- Exposure to dust and grit
- Scratches
- Excessive strain on functional jewelry findings which may be transferred to the process-related hole or cannulation
- Rough mechanical stress
- Hooking crystals on clothes and breaking crystals out of the structure

Clean Osmium-Pearls with warm water and/or substances which do not react with carbon.

Note:

Once damaged, an Osmium-Pearl cannot be repaired and loses its value completely.

Things you can do with Osmium-Pearls, but not with natural pearls include:

- Exposure to perspiration and acids
- Exposure to make-up, ointments, perfume, hairspray, sunscreen, insect repellent, and talcum powder
- Exposure to soap and detergents
- Exposure to chlorinated water in shower or pool
- Storage in safety deposit boxes such as in bank vaults over a long period of time

Cleaning of Osmium bars and other two-dimensional objects

Osmium can be cleaned with warm water, mild dish soap and a very soft brush. A professional pulsed-water cleaning appliance and a soft cloth may also be used.

Rinse Osmium jewelry in a glass of water; pure Osmium may also be swirled in acids.

Always be sure to clean and rinse Osmium jewelry in a suitable container to avoid washing away small Osmium pieces such as Osmium-Diamonds or even an entire piece of jewelry.

Safe storage of Osmium jewelry

Proper storage of jewelry is often underestimated.

Any piece of jewelry, including Osmium jewelry, should never be tossed into a drawer or on top of a dresser as there is a higher risk of scratches and damages.

In general, Osmium should be stored separately in a way that prevents the Osmium from grinding against other items and/or surfaces. Osmium jewelry pieces should be stored in suitable individual boxes or pouches to keep them safe from damage.

Jewelry boxes that feature individually padded slots for rings and posts for hanging necklaces and bracelets are also suitable.

Remember that for small Osmium pieces, the likelihood of confusing the Osmium with other materials is great. Therefore, Osmium should always be individually packed and be labelled with its Osmium-Identification-Code.

Customers shall be informed that individual osmium (jewelry) pieces should be stored separately in a way that prevents them from grinding against other items and/or surfaces.

It is also recommended that particularly intricate items should not be worn when doing manual works such as gardening, exercising or cleaning.

Note:

If the allocation of Osmium jewelry to the corresponding Osmium-Identification-Code can be ensured, the code may also be kept separately from the osmium jewelry during storage in the event of theft.

Valuation, certification and identification

A jewelry evaluation is a document that describes a piece of jewelry or a semi-manufactured product in detail and states its value. A jewelry evaluation is also known as a certificate.

Jewelry valuation is important for buying jewelry and for insurance purposes.

Osmium certificates are issued exclusively by the Osmium-Institutes worldwide and registered in the global Osmium database.

Insurance

There are a variety of reasons why a customer demands a certificate when purchasing a piece of jewelry, but the most common reason is sale or exchange. Many certificates are issued for insurance companies.

According to their respective policy, most insurers would insure unspecified jewelry without proof of value just to a low value. If a claim is filed in case of loss, the insurance company will demand an invoice or a delivery docket as well as a proof of value.

The proof of value typically consists of the certificate, the invoice with a detailed description of the piece of jewelry and/or the delivery docket.

Packaging

Osmium is generally delivered in sales packaging in which every single piece of Osmium is packed in a foil box. The foil boxes carry the Osmium-Identification-Code.

In addition, a flashlight, an Osmium button, a brochure, a ball pen and a USB stick are included in the packaging, in order to have all the data accessible. The USB stick carries facts about Osmium in different languages.

Osmium-Identification-Code for jewelers

Obtaining an up to date valuation of an individual osmium piece (which may differ from the valuation of the osmium jewelry piece) is a straightforward process that only requires submitting the individual Osmium Identification Code on www.osmium-jewelry.com to get access to the certificate of authenticity including high-resolution photographs and to see the current price without spread for buying or selling.

It is possible for the owner or possessor of an osmium piece to register personal information (full name, country of residence, address, phone number) in the international osmium database by adding this information to the existing certificate. This should be ideally done at the time of purchase from private hands or directly with the jeweler.

Osmium can also be owned without registering personal information. In this case, evaluation is solely conducted based on the Osmium Identification Code.

Note:

When a jewelry piece is completed, several elements of Osmium can be combined under an own OIC. This means that only one single code for the entire jewelry piece is the basis for a superordinate certificate of all contained elements.

You can also own Osmium anonymously. In this case, it is only valued via the Osmium-Identification-Code.

Note:

Valuation of an Osmium piece can be solely based on the information that is recorded in the Osmium-World-Database via the particular Osmium-Identification-Code and does not require any additional information, including personal information.

Osmium information portals

In the jewelry market, Osmium is processed and used only in its crystalline form. Before you purchase Osmium, inform yourself on the site www.osmium-institute.com.

Alternatively, Osmium can be ordered on the website www.buy-osmium.com. A picture is available for every product category on offer.

Crystalline Osmium should generally only be purchased when certified.

Osmium is imported to the corresponding destination country by a state institute partner and delivered to the client by value courier.

The delivery times can be very short and only amount to one day for goods that are in stock. Goods that are delivered over borders or have to be produced first can take up to three months to be delivered.

Official internet sites about Osmium

1. Osmium.info

Basic information for when first getting in touch with Osmium. Covers all important information for dealers and sales partners to pass the examination.

2. Osmium-Academy.com (Osmium-Training.com landing page)

Short explanation of the virtual academy - the online training tool. More information about courses and further training.

You can find the contents of the academy in your partner account within the guide line at www.buy-osmium.com

3. Osmium-Institute.com

Covers the tasks of the Osmium-Institute and its employees. Here, all international institutes are listed by their region.

4. Osmium-Onboarding.com

Explains cooperation with the Osmium-Institutes. Platform where new partners can register. Choose your code of reference here.

We are always looking for partners who wish to make the Osmium market their new home and provide jewelers and clients access to Osmium.

5. Osmium-Sales.com

Website covering the sales partner's settlement and basic information. Explanation of the marketing plan / earnings. Password: bigbang

6. Osmium-Identification-Code.com

Check the genuineness of Osmium in real time by comparing the crystal structure, which is available as a scan on the site as soon as the Osmium-Identification-Code is entered. The code is delivered with every Osmium piece.

7. Buy-Osmium.com

Online shop to buy Osmium and Osmium-Jewellery. Access for sales partners. Branded shops for each sales partner.

8. Osmium-TV.com

This channel covers topics about Osmium, introduces new jewellery and new partners. All new information is broadcasted in high definition and 4k resolution.

9. Osmium-Dlc.com

Platform for pictures, texts, short films, flyers, brochures, posters, interviews …
The latest press information and posters can be downloaded here.

Passwords are available at the institutes and can be inquired there.

10. Osmium-Jewelry.com

This website lists all jewellers trading with Osmium worldwide.
Information how to process Osmium and work with the material including a safety guide.

Features up-to-date pictures of new creations and products from the Osmium jewelry market.

11. Osmium-Preis.com

This website covers the current price of Osmium and the related charts. Essential is the 1gr (0,035 oz) price to determine the material price

The price can be displayed in different currencies.

12. Osmium-World-Council.com

The Osmium-World-Council is an international contact point for receiving information about Osmium and enables the development of the Osmium market together with the Osmium-Institutes.

13. Osmium-Dealer.com and Osmium-Partner.com

All connected Osmium retailers are listed on this website. They are ordered according to their sales revenue and inventory level. Moreover, they are geographically sorted and can be queried according to the proximity of the prospective customer.

Further online-tools:

- Facebook-pages with events, news and the possibility to get in touch
- Instagram account with pictures from the world of Osmium and pictures of the Osmium-Faces of many cultures: @Osmium_Institute
- Branded sites of all partners: Osmium-Institutes, trading partners, jewelers, faces
- Provision of i-frames for determining the value of Osmium jewelry with the help of the international Osmium-Database on the internet sites of partners.

Monopoly disclosure of crystalline Osmium

Osmium is a precious metal and is traded internationally. It occurs in platinum mines associated with platinum. Osmium is often offered there as a so-called compound, for example as Osmium tetroxide. Osmium is metallurgically separated from other metals and is only pure enough to be used after a few processing steps.

The pure form of the Osmium is not poured into ingots, as is typical with other precious metals, but bottled. At this stage it is called the so-called Osmium sponge. Osmium sponge is the raw form of Osmium, which is also used for crystallization. The crystallization process is the process of rearranging atoms in the crystal to produce a new crystal structure. When changing the crystal structure, the chemical and physical properties also change.

This monopoly disclosure relates solely to crystalline Osmium.

Crystalline Osmium is therefore marketed exclusively by the German "Osmium Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH". Osmium in its crystalline form is only available for the German Osmium Institute mentioned above from a single source in Switzerland.

The German "Osmium-Institut für Inverkehrbringung und Zertifizierung von Osmium GmbH" has concluded an exclusive agreement with the provider in Switzerland without any time limit. The purpose of the agreement is a regulated introduction into the market via the German Institute, which was exclusively commissioned with this task by the Swiss company. The employees of the institute have the obligation to act according to strict scientific principles and to provide each piece of Osmium with a certificate of authenticity.

In addition, the Osmium Institute Germany maintains a database in which the scans of the Osmium pieces in circulation can be searched internationally. The purpose of the database is to compare the crystal structure of a real piece of Osmium with its scan from certification. Every owner of Osmium has the right to retrieve data about his Osmium from this database at any time if he identifies himself as the owner of the Osmium. Proof is provided by submitting or entering the Osmium Identification Code, which is supplied with each piece of Osmium.

The Osmium-Identification-Code is an eight-digit letter and number code.

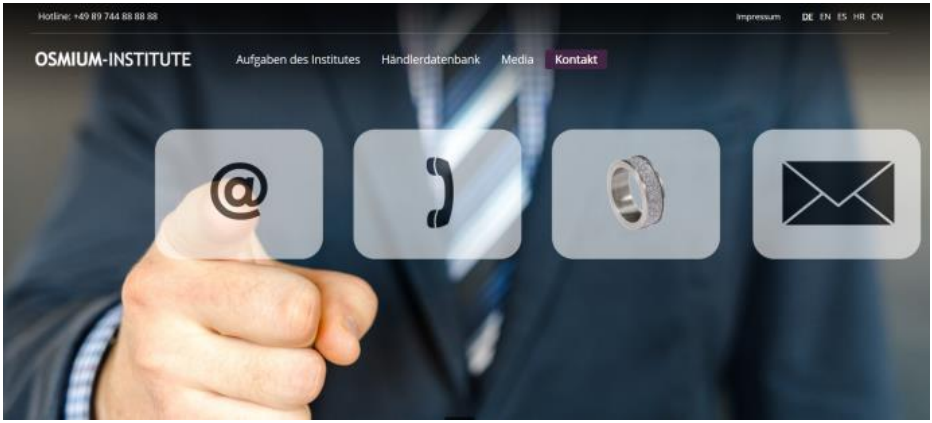
The German Osmium-Institute's sole marketing of Osmium results in a monopoly linked to the monopoly for crystallization, i.e. the process of modifying the crystal structure of Osmium.

Pricing, which takes place in Switzerland, is also linked to the monopoly. Osmium is currently not traded through a trading system. The price is not represented by a market rate. However, the supply of raw Osmium and the demand for crystalline Osmium have a significant influence on the price.

The price shall be established and published each day taking into account the following essential aspects:

Supply of raw Osmium, supply of crystalline Osmium offcut for re-distillation, option contracts for raw Osmium, current stock level of raw Osmium, number of crystallization ovens, electricity price, personnel costs, laboratory safety costs, build-up of reserves, certification and packaging costs, cut prices for crystalline Osmium, demand for crystalline Osmium, current sales of crystalline Osmium and several minor weighted factors.

The most important aspect of daily pricing is the output rate. The output rate is the amount of Osmium that can be used after growing the crystals and does not have to be returned to the process. The resulting waste of unusable crystals must be re-distilled several times and recrystallized with great technical and financial effort.



Quick contact and quick information

www.osmium.info/en	Main page for information
www.osmium-preis.com/en	Daily prices, several currencies
www.osmium-sales.com/en	Sales and marketing partners
www.osmium-jewelry.com/en	Manufacturing of Osmium jewelry
www.osmium-partner.com/en	Providers of services and shops
www.buy-osmium.com/en	Online-shop
www.osmium-institute.com/en	Market introduction and certification

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