

Minerals of the World

Golden
Collection



Gold
Gold



Calcite
Calcit



Unakite
Unakit



Rock Crystal
Bergkristall



Chalcopyrite
Chalkopyrit



Hematite
Hematit



Red Gypsum
Gips



Talc
Talk



Cornelian
Karneol



Amazonite
Amazonit



Opal
Opal



Aquamarine
Aquamarin



Labradorite
Labradorit



Copper
Kupfer



Magnesite
Magnetit



Aventurine
Aventurin



Lapis Lazuli
Lapis Lazuli



Black Onyx
Onyx (schwarz)



Lepidolite
Lepidolith



Halite
Halit

Gold

Gold is a mineral formed from a single chemical element. It is a unique material, with ductility (ability to stretch to form fine threads) and malleability (ability to form thin sheets) that are second to none. A single gram of gold could be stretched to form a thread 2.5km long, or it could be flattened to cover an area of $2,000\text{m}^2$. Its malleability is such that sheets less than one tenth of a micrometre (one millionth of a metre) thick can be produced.

TRADITIONAL CRAFTS

Gold's qualities, colour and value have made it highly sought after for use in coinage and jewellery for centuries, while its malleability has made it perfect for covering other, less valuable materials. In

churches, for example, wooden altarpieces were often covered with a very fine layer of gold, known as gold leaf. This was done for two reasons: the gold leaf both embellished the wood and protected it from the ravages of time. In fact, gold leaf has been widely used in fine arts and crafts through the ages.

MODERN INDUSTRY

Gold is an excellent conductor of both heat and electricity. It has many applications in the electronics and space industries, as well as in dentistry and even in making glass.

This gold sample comes from Spain, where extraction of this mineral has been going on since antiquity. Traditionally, gold was mined in Las Médulas (León) and Rodalquilar (Almería), but the deposits in these places have now been exhausted. Until very recently, gold was also extracted in the valley of the river Narcea (Asturias).



DID YOU KNOW?

- * Spain's Rio Tinto mines have been producing gold for 5,000 years and still do so today.
- * Pure gold has 24 carats – this sample has 22 carats, making it just over 91% gold. Gold leaf like this is immersed in 96° alcohol. In the manufacturing process 1kg ingots are subjected to two stretching processes, one mechanical (using rollers) and the other manual (using hammers).
- * You can eat gold – in the form of edible gold leaf which is laid or sprinkled on the top of desserts and other dishes – even curries. The tradition derives from a wish to demonstrate the wealth of the host, or in some cases, from the belief that gold has health-giving properties.
- * You can drink gold too – it is increasingly popular to add tiny gold flakes to champagne or cocktails, whilst Goldwasser, a herbal liqueur containing gold flakes, has been produced in Gdansk since the end of the 16th century.
- * The intense colour of cranberry glass, popular in the Victorian era when it was made into wine glasses, decanters, vases and bowls, is created by adding gold chloride to molten glass.

Calcite

Calcite is calcium carbonate that crystallizes in the trigonal system; it is also the most abundant chemically-precipitated mineral on the Earth's surface.

PROPERTIES OF CALCITE

Calcite is a mineral with over one hundred morphological varieties. It may be transparent, translucent or even opaque and can adopt almost every colour imaginable. The main criterion differentiating it from other trigonal carbonates is its hardness (3 on the Mohs scale). This is slightly less than

that of other carbonates, such as magnesite or siderite (4-4.5), or dolomite (3.5-4), for example. Another helpful property for distinguishing it from other minerals of similar appearance is its vigorous reaction to acids, even acids as weak as vinegar: the effervescence it produces on contact with them can be seen with the naked eye. Calcite does not melt easily but dissociates at temperatures attainable with a Bunsen burner into lime and carbon dioxide.

The calcite samples in the collection come from Brazil. They consist of massive calcite, with its characteristic glassy to mother-of-pearl sheen. Calcite is a relatively soft mineral that can be scratched with a penknife but not with a fingernail. Great care should be taken when handling it, as samples lose their original beauty if exposed to mechanical shock; this leaves a white mark, white being the colour of calcite dust.



DID YOU KNOW?

- * Calcite is calcium carbonate crystallized in the trigonal system.
- * It varies widely in colour in nature, due to impurities. However, pure calcite is white or colourless.
- * Calcite is a soft mineral, so soft that it can be scratched with a copper penny.
- * Another defining feature is its tendency to react with acids, even weak acids, such as vinegar.
- * Calcite may become dissolved in groundwater and then precipitate out again, forming stalactites and stalagmites in cave systems.

Rock Crystal

Rock crystal is a variety of quartz characterised by the absence of impurities. This makes it both transparent and colourless, and hence it is also known as 'hyaline quartz' (hyaline meaning 'glassy'). Indeed, the ancient Greeks thought that rock crystal was water that had been eternally frozen in prehistoric times.

BEAUTIFULLY TRANSPARENT

Rock crystal occurs as hexagonal prisms terminating in a pyramid, also of hexagonal appearance. The crystal form is an important identifying characteristic of this variety of quartz, as it could otherwise be confused with other

transparent minerals, particularly phenacite, beryl and topaz (which are colourless when they lack impurities). That said, these minerals are a bit harder (7.5-8) than quartz (7). Rock crystal may also be mistaken for some minerals of the apatite group, although the relative softness of these minerals (5-5.5) can be used as a determining factor. Because of its outstanding beauty, rock crystal is usually cut for mounting in jewellery and ornaments. It is also widely used to manufacture precision instruments, owing to its piezoelectric and pyroelectric properties.

The samples in the collection come from Brazil. Together with Switzerland and the United States, this South American country has the world's finest deposits of rock crystal. Apart from their transparency, one of the

most attractive features of the samples is their form: hexagonal prisms ending in pyramids also of hexagonal appearance. These pyramids actually consist of two trigonal rhombohedra rotated relative to each other.



DID YOU KNOW?

- * Rock crystal is the transparent and colourless natural form of quartz.
- * A relatively common, yet beautiful and durable mineral, it has been used to make everything from jewellery to crystal balls and chandeliers.
- * Rock crystal is one of the least expensive of all gemstones. Nevertheless, it is sometimes used to imitate diamond.
- * Like diamond, rock crystal is considered one of the birthstones for people born in April.
- * Rock crystal has long been revered for its clarity and beauty. The ancient Greeks believed that it was actually water that had been eternally frozen by the Gods.

Chalcopyrite

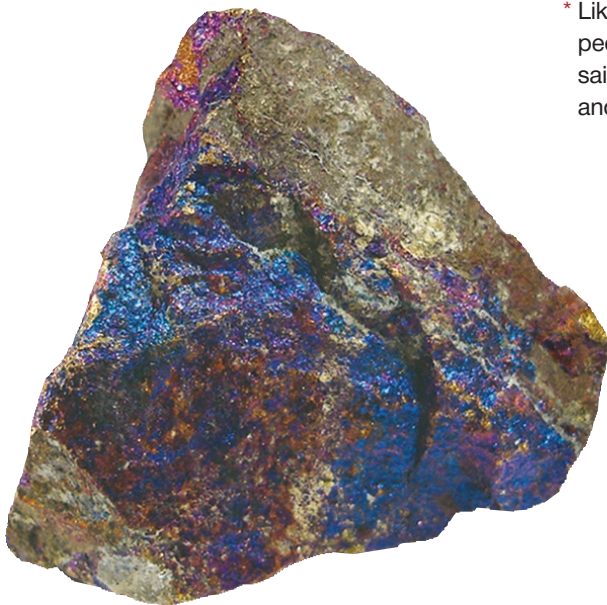
Chalcopyrite is a sulphide of copper and iron. Its name is due to its similarity to pyrite; the prefix chalco- comes from the Greek word chalkos, meaning 'copper'.

COPPER PYRITE

Despite the external similarity between chalcopyrite and pyrite, these minerals are easily distinguished from each other by their chemical and physical properties. Pyrite is much harder (between 6 and 6.5 on the Mohs scale) than chalcopyrite (3.5 to 4) and melts at a much higher temperature. Furthermore, chalcopyrite turns a flame green, due to the copper in its structure. The most

handsome examples are found in lodes, in association with quartz, fluorite, calcite, dolomite, sphalerite and galena. Chalcopyrite is one of the main sources of copper; its mines yield not only this metal but also considerable quantities of gold and silver, which occur as impurities in some deposits. Copper from chalcopyrite has long been used to make brass, an alloy of copper and zinc used in domestic utensils, and in scientific and measuring instruments.

The samples in the collection come from Morocco, a country with many chalcopyrite deposits scattered about its territory, including those at Bou Madine in the Anti-Atlas, Hajar and Kettara in Marrakesh area, Aouan, Bou-Agrao and Hamman in the Meknes region, and those in the Uarzazate and Taroudannt provinces. The samples come from massive blocks, which, when freshly cut, reveal the dark or brassy yellow colour typical of chalcopyrite. The surfaces of the samples are covered with an oxidation layer characterised by lilac, green and bluish tints.



DID YOU KNOW?

- * Chalcopyrite is a naturally occurring sulphide of copper and iron.
- * Its name refers to its copper content and its similarity to pyrite (iron sulphide).
- * Like pyrite, chalcopyrite is sometimes referred to as 'fool's gold'. It is also known as 'yellow copper'.
- * Chalcopyrite is an important copper ore. In some places it occurs in huge masses and is mined for the copper it contains.
- * Like many minerals, chalcopyrite is believed by some people to have certain spiritual and healing powers. It is said to be useful in helping to alleviate breathing problems and in combating tiredness, particularly mental fatigue.

Hematite

Hematite is one of the principal ores of iron, as about 70% of the mineral consists of this metal.

RED IRON

Like other oxides, hematite is slightly soluble in some acids, especially hydrochloric acid. It may be confused with ilmenite, and the best way to distinguish them is to examine the colour of the streak they leave – red for hematite and black for ilmenite. Hematite is also very similar to goethite and lepidocrocite, although these tend to look brown and not so red. In addition to its use as an iron ore, hematite has

been used since ancient times to make a red pigment; this was employed by Cro-Magnon man to paint pictures inside caves and by many North-American tribes to make paints for adorning the body. Hematite becomes magnetic if it is heated for long enough.

The samples in the collection come from Brazil, a country which, together with Italy, Great Britain and Mexico, has the best hematite deposits, many of them worked for their iron ore. Particularly famous are examples from Serra das Águas and Pedra Preta in Bahia, and those from many deposits in Minas Gerais. The samples are massive dense aggregates that have been polished to bring out their metallic sheen and handsome reddish-grey colour. The considerable ability of the samples to reflect light explains why this variety of hematite, called specularite, was used as a mirror by many ancient peoples, including the Aztecs.



DID YOU KNOW?

- * Hematite is a natural form of iron oxide, more specifically iron(III) oxide (Fe_2O_3).
- * A widespread mineral, it is mined as an iron ore. Hematite is actually around 70% iron.
- * In the past, hematite was used to make everything from mirrors to body paint. Mixed with clay to form ochre, it was also used to paint cave walls.
- * Today, hematite is sometimes used to make jewellery. It is also considered a healing stone by some people, and is said to be helpful in relieving problems with cramp and blood disorders.
- * As well as being abundant on Earth, hematite is known to occur on Mars. It was first detected there by NASA's Mars Global Surveyor in 2001.

Red Gypsum

Red gypsum is a variety of gypsum (hydrated calcium sulphate) that forms in evaporitic environments from chemical precipitation from waters rich in such substances. Its colour is due to the inclusion of ferruginous clays present in the water in which it occurs. The word gypsum (from the Latin gypsum) is used to describe both the mineral and the single-mineral rock that it often forms.

A FAMILIAR MINERAL

Red gypsum can be identified by its low degree of hardness (2 on the Mohs scale) and its solubility in hot water and dilute hydrochloric acid. It is used mainly to manufacture a binding material used in building, although it is also employed as a flux in the metal and ceramic industries, and as a fertilizer in agriculture. Red gypsum usually contains crystals of aragonite and haematoid quartz.

Red gypsum is a very abundant mineral and is found throughout the world. In Spain, the country from which the sample in the collection comes, it is found mainly in layers in the Iberian Mountain System and Betic Ranges, and associated with clays dating from the end of the Triassic period. Samples of gypsum are easy to identify. Their appearance varies between earthy and fibrous. Some of them contain small crystals of haematoid quartz, a variety of zircon – these crystals are distinguished by their conspicuous dark red colour and bipyramidal appearance. As gypsum is a very soft mineral that exfoliates easily, it has to be handled with great care. The slightest shock will leave a disfiguring white mark on its surface, the colour of gypsum's streak.

DID YOU KNOW?

- * Red gypsum is a very abundant mineral found in many different places right around the world.
- * In some places it occurs in enormous masses. Some of these are so large that they are considered layers of rock.
- * Red gypsum is an important mineral in the construction industry. It is used in the manufacture of some kinds of cement and may also be added to soil to harden it before building work commences.
- * Like all forms of gypsum, red gypsum is very soft.
- * As well as being easily scratched it exfoliates easily and should therefore be handled with care.



Talc

This phosphate of magnesium is the softest of all minerals and sits at the bottom of the Mohs scale.

A VERY FAMILIAR MINERAL

Talc can have a wide range of colours: most often it is white, green, yellow, brown or black. In addition to being very soft and one of the few sectile minerals in nature (it is easily cut with a knife), it is smooth and slippery to the touch, owing to the ease with which its small crystals exfoliate. It has a highly characteristic oily to mother-of-pearl sheen. Talc is an extraordinarily stable mineral from a chemical perspective.

It is insoluble in all acids and very resistant to chemical weathering processes. The only mineral it can be confused with is pyrophyllite, which has the same structure and is a little harder (1.5 on the Mohs scale) but contains aluminium instead of magnesium. In addition to its use as 'talcum powder' in skin care, the high resistance of talc to heat and electricity and its extreme chemical neutrality make it suitable for many industrial applications producing different thermal, electrical and chemical insulators.

Talc is a very common mineral in many countries. The samples in the collection come from Spain where the steatite variety is particularly abundant (in Andalusia, Leon and Catalonia). Talc is easily worked with a lathe and so can be used to make decorative articles. The samples are foliaceous masses with a greyish-green colour. Great care should be taken when handling the samples, as a slight blow can shatter them, a brush with another object can scratch them, and regular handling causes them to lose their beautiful oily sheen.



DID YOU KNOW?

- * Talc is common and widespread mineral. It is mined in many parts of Europe and the USA, as well as other countries, such as South Africa.
- * Talc is the softest mineral of all. It occupies the lowest rung on the Mohs scale, with a hardness of 1.
- * Talc is best known to most people in its powdered form, as talcum powder. However, it has a large number of other industrial applications.
- * The name talc comes from the Arabic word talq, meaning "pure" and is thought to be an allusion to the colour of its powder.
- * Although physically soft, talc is surprisingly resistant to heat, electricity and acids.

Cornelian

Cornelian is a variety of chalcedony – microcrystalline quartz. Its name derives from the Latin word *carneulus*, meaning ‘flesh coloured’.

MUCH IMITATED

Cornelian owes its blood-red, orange or brownish-red colour, sometimes with yellowish hues, to inclusions of haematite or limonite. Cornelian was valued as a gem by most of the great civilizations of the past, from the Kingdom of Ur in Mesopotamia to Napoleonic France. Tibetan Buddhists still value it highly today. It is no surprise, therefore, that cornelian has been and still is one of the

most imitated and treated of all minerals. Many “cornelians” sold today were originally unattractive chalcedonies that were impregnated with a solution of ferrous nitrate and then heated to bring out their colour. To differentiate the natural from the treated mineral, the edges of the mineral’s bands should be examined. In natural examples, the borders of different bands should be well defined and uniform, whereas in treated examples they appear quite blurred.

The cornelian samples in our collection are obviously natural examples and come from Brazil, the country with the world’s greatest deposits of this mineral. These deposits are located both in the state of Minas Gerais and in many places near the border with Uruguay. The samples have colours ranging from fleshy- to brownishred and have been polished to show off the mineral’s colour and banding.



DID YOU KNOW?

- * Cornelian (sometimes called carnelian) is a form of chalcedony, or microcrystalline quartz.
- * It is named for its colour, which ranges from pale orange through blood-red to almost black.
- * Cornelian is a semiprecious stone and has been used for decoration and in jewellery since the dawn of civilisation.
- * It is sometimes confused with sard, another form of chalcedony. However, sard is harder and usually somewhat darker in colour.
- * Cornelian is thought by some people to have certain healing properties. Among the powers attributed to it are the ability to calm bad temper, increase the appetite and boost personal energy.

Amazonite

Amazonite, also known as Amazon stone, is an attractive variety of microcline – potassium feldspar with the same chemical composition as orthoclase but crystallizing in the triclinic system.

MINERAL OF AMAZONIA

Amazonite has a characteristic bluish-green colour caused by impurities of lead and water within the feldspar's crystal lattice. The mineral exfoliates very easily and its sheen varies

between glassy and mother of pearl. It may be confused with chrysoprase and the turquoises, although the mineral it most resembles is jadeite. In fact, amazonite was the name given by the conquistadors to some green stones used by certain tribes in the Amazon River basin to make jewellery. When it was discovered that these stones were actually jadeite, the name amazonite was instead given to the green variety of microcline, even though it does not occur around the Amazon basin.

The amazonites in the collection come from Russia. For a long time this mineral was only known from the Miyask region of that country; however, important deposits have recently been discovered in the USA (Colorado), India, Brazil and Kenya. The samples are light-green crystalline aggregates with a typical sheen somewhere between glassy and mother of pearl. Some examples exhibit white striations composed of albite (sodium feldspar). These structures, consisting of small plates of albite inside the microcline, are called pertites.



DID YOU KNOW?

- * Amazonite is a green variety of microcline, a type of potassium feldspar.
- * For a long time, it was known only from a certain area of Russia. Today, it also occurs in parts of the USA, India, Kenya and Brazil.
- * Amazonite has a beautiful green colour caused by impurities of lead and water.
- * It is sometimes used in jewellery, usually polished into a cabochon.
- * Like many minerals, amazonite is thought by some people to have certain healing powers. According to them, it may help ease the symptoms of osteoporosis and cramp, among other ailments.

Opal

Opal, a hydrated silicon oxide, is a common mineral present in many rocks and formations. In its high-quality 'noble' form it has been a much sought-after gem.

DECEPTIVE APPEARANCES

Opal is a fairly common species of mineral. Being amorphous, it does not form crystals but occurs as a series of very smooth surfaces with a characteristic conchoidal fracture. Its colour is very variable: colourless in some cases (hyalite), it may range from snowy white to intense red (fire opal) or to the rich hues of the so-called noble opals. Its degree of transparency also differs a good deal, ranging

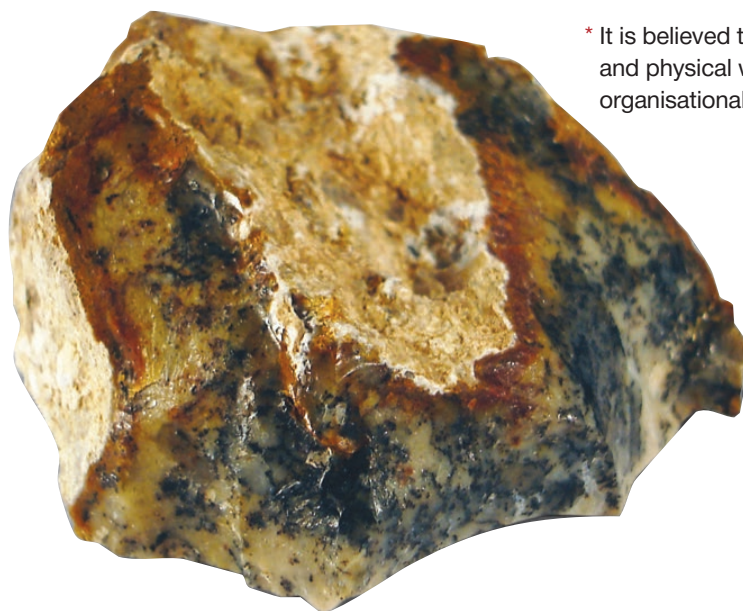
from transparent to completely opaque. A curious form of opal is menilite, which has nodules that are sometimes rounded or on occasion adopt animal-like shapes. The ease with which opal forms and substitutes other minerals makes it a frequent fossilising mineral. Gastropods and even a crocodile have been found fossilised in noble opal.

It is highly prized in its gem varieties (mainly noble opal and fire opal), although in some cultures superstition has connected it with misfortune. Opal can also replace other minerals, preserving their crystal form or may cover the surface of other species in the form of dendrites of pyrolusite or goethite.

The samples in the collection are dendritic opal from south-western Brazil, where formations of this mineral are associated with post-volcanic processes. Black dendritic forms similar to fossil plants cluster on the opal, the colour of which can vary from white to grey but may occasionally be yellow. The most desirable examples are those with dendrites on an opal of uniform colour or with a range of different hues.

DID YOU KNOW?

- * Most authorities suggest that the word opal is derived from the ancient Sanskrit for 'precious stone'.
- * Opals often contain a wide variety of colours, and superstition dictates that such an opal bestows good luck since it represents the characteristics of all gems.
- * At a microscopic level, opal gems are made up of minute spheres of silica stacked in an ordered way.
- * The largest opal was found in Coober Pedy, Australia, in 1956. It weighed 3.45 kg.
- * It is believed that dendritic opal helps with spiritual and physical well being and enhances a person's organisational abilities.



Aquamarine

Together with emerald, heliodor and morganite, aquamarine is a gem variety of beryl. It is one of the best known and highly prized of gems included in all collections throughout history. It was particularly valued by the Arabs and in the Orient.

HUGE CRYSTALS

Aquamarine usually occurs as blue or bluish green crystalline masses and can occasionally have a sea-green hue. Its degree of transparency is also very varied and examples can range from translucent or almost opaque, which tend to be worked into cabochons, to transparent. The latter stones are the most sought after

by gemmologists and collectors and are usually faceted. Individual crystals are rarer, although when they form they can grow to a huge size, like the large prism 2 metres long and 60 centimetres wide found in Madagascar near the capital Antananarivo. This crystal, which is totally transparent and deep blue in colour, was unusual in that it could be cut easily. The most common form of crystalline beryl is an hexagonal prism with flat faces at either end, although the lower face is sometimes missing as it is lost during growth. Less usual are pyramidal forms, which occur in the same crystal with different orientations and produce dome-shaped terminations.

The samples in the collection come from the state of Minas Gerais in Brazil, which is particularly rich in gem-bearing pegmatites. These have been worked for over a century, and aquamarine is found regularly. Examples are massive with some parts clearly crystalline, usually transparent and coloured blue with greenish tints. Some of them may contain inclusions and coverings of other minerals typical of pegmatites, such as quartz, muscovite and lepidolite.

DID YOU KNOW?

- * Darker varieties of aquamarine are known as maxixe.
- * An aquamarine crystal is believed to soothe fears and boost courage.
- * The stone is traditionally carried aboard sailing vessels as a talisman against dangerous seas.
- * As a variety of beryl, the chemical formula for aquamarine is beryllium aluminium cyclosilicate.
- * The name beryl is derived from the Greek for colour of the sea and originally referred to any turquoise stone.



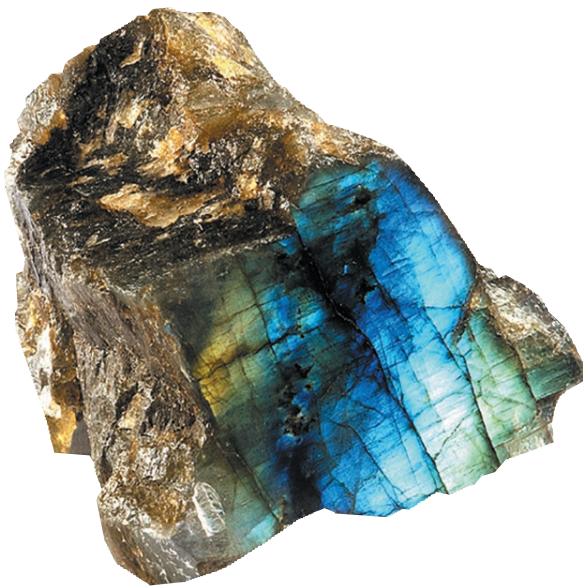
Labradorite

Labradorite, thought to be a separate species until a few years ago and now considered a variety of anorthite, belongs to the isomorphic series of plagioclases. Its name is taken from the Labrador Peninsula in Canada, where it was discovered in 1770. The name labradorite is used specifically to designate examples of anorthite containing 50% to 70% calcium and 30% to 50% sodium. Anorthite and andesine, which have rather more sodium than calcium, occupy intermediate positions in the isomorphic series.

A PLAGIOCLASE

As labradorite is a mineral of the plagioclase series, it is very difficult to differentiate it from its closest neighbours in the series – andesine, with somewhat less calcium, and bitownite, with somewhat more. It is also difficult to distinguish from the calcium-poor minerals of the series (albite, oligoclase and andesine) and from the potassium feldspars (orthoclase and microcline). However, none of these dissolves in hydrochloric acid, whereas the calcium-rich members (labradorite, bitownite and anorthite) do so. Moreover, all feldspars are soluble in hydrofluoric acid.

The labradorite samples in the collection come from Madagascar, a country with many deposits, such as the Soamiakatra deposits in Antananarivo province and those of Benonoky, Ankafofia and Antsohamamy in Toliara province. The samples are massive labradorites, of a white or greyish colour and polished to bring out their spectacular glassy sheen. The labradorite in most of the examples has been altered in places to form greenish minerals, typically illite, of the mica group. These alterations are concentrated along planes of weakness and in cracks in the samples.



DID YOU KNOW?

- * Labradorite is a variety of anorthite and belongs to the isomorphic series of plagioclases.
- * It was first found in 1770 in the Labrador region of Canada, hence its name.
- * When viewed from certain angles, labradorite exhibits a subtle but rather beautiful shimmering effect. This is known as labradorescence.
- * Labradorite is sometimes used in jewellery and is occasionally sold under the alternative name of spectrolite.
- * It is believed by some people to have healing properties, relieving anxiety and aiding in problems with digestion.

Cooper

Copper is a metal that can occur pure in nature without combining with other chemical elements. Such occurrences are known as 'native copper'.

CLOSE ASSOCIATION WITH HUMAN BEINGS

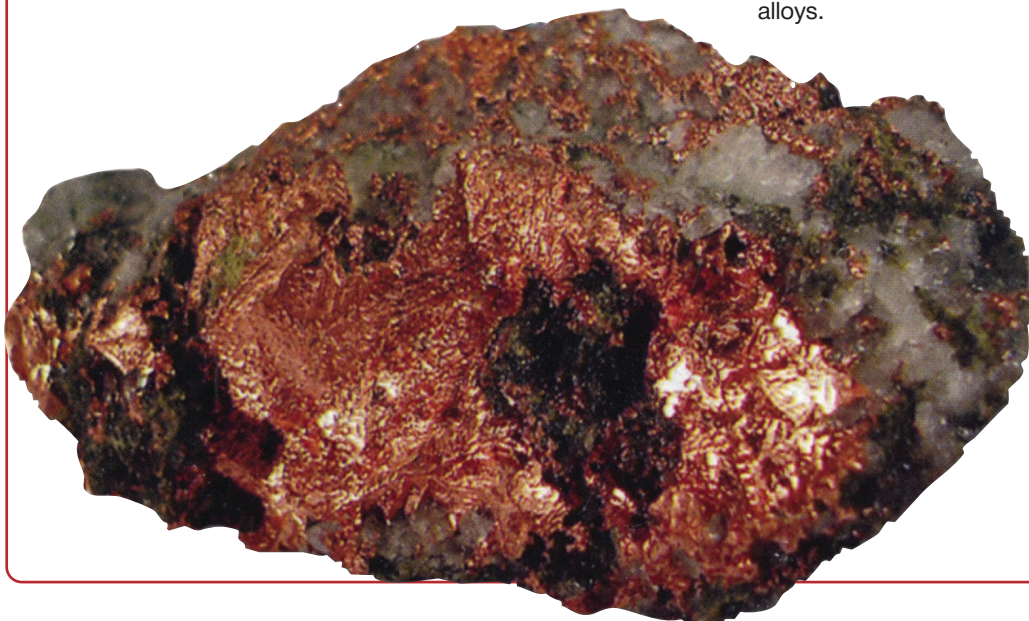
Native copper tends to occur in compact, dense masses with a characteristic coppery red colour. It is a relatively dense, ductile and malleable metal that does not exfoliate and fractures into scales and flakes. Its main physical property is its excellent conductivity and so it is widely used

to make electric cables. Its melting point is quite low at 1,082 °C, so that it is easily melted and alloyed with other metals. Mixed with zinc, it forms brass, and with tin, bronze. All these properties mean that copper has been used since prehistoric times. From a chemical perspective, copper is readily attacked by acids, especially nitric acid in which it quickly dissolves. It is almost always a secondary mineral produced by the reduction of copper sulphide deposits.

The samples in the collection come from the United States, a country in which there are excellent deposits of native copper such as at Keweenaw near Lake Superior and Bisbee in Arizona. It is found in compact or laminar masses where freshly exposed surfaces reveal the mineral's typical copper-red colour and patches of green malachite. It is particularly important to avoid subjecting samples to shock, since, being a very soft, ductile and malleable mineral, it is easily damaged. Another significant feature is its high density, so that even small samples can be quite heavy.

DID YOU KNOW?

- * Copper wrist bands are used by many to treat arthritis and other aches and pains, although medical science throws doubt on their effectiveness.
- * Copper has the chemical symbol of Cu, which is derived from its Latin name cuprium.
- * Copper is the 27th most common element in Earth's crust – out of 90.
- * 15 million tonnes of copper is refined every year and mostly used in electronics or added to alloys.



Magnetite

Magnetite is a double iron oxide belonging to the ferric spinel group, of which it is the principal representative. This mineral is found widely as it may have a sedimentary origin, accumulating in placers, or an igneous or metamorphic source.

CHARACTERISTICS OF MAGNETITE

Magnetite is a black mineral with a metallic sheen, scoring 5.5 to 6.5 on the Mohs scale. It may occasionally occur as well-developed crystals but, when it does so, they tend to be octahedral or rhombododecahedral. Its main property is magnetism which is exhibited by nearly all examples. It may

be easily confused with other oxides, especially chromite and ilmenite. Magnetite is distinguished from chromite, a mineral also belonging to the spinel group, by the fact of its solubility in hydrochloric acid, whereas chromite is insoluble and is not magnetic. However, it is very difficult to distinguish it from ilmenite and, therefore, very precise chemical tests are sometimes needed for this. Magnetite is an important ore of iron.

The magnetite samples in the collection come from the United States, a country with many deposits in the states of Alaska, Arizona, Idaho, Maine and Michigan. Some of these examples are only weakly magnetic and can hardly attract a needle. In some of the samples the faces of an octahedron may be seen, although others are clearly amorphous. Additionally, it is possible to see small yellowish patches of limonite or goethite produced by the action of atmospheric gases on magnetite.



DID YOU KNOW?

- * Strongly magnetic samples of magnetite are known as lodestones.
- * A magnetite crystal is believed to help heal a relationship after a serious quarrel.
- * Tiny magnetite crystals have been found inside the bodies of animals and are thought to be used in navigation, such as during long migrations.
- * The name magnetite is derived from Magnesia, an ancient region of Turkey where the mineral was commonly found.
- * Magnetite stones are said to help with arthritis and circulation problems.

Aventurine

Aventurine is a cryptocrystalline variety of quartz, a variety of chalcedony characterised by its light green colour. Although the origin of its name is unclear, it seems to be based on an anecdote from the early 18th century: A glassmaker from the famous Murano workshops tipped some thin pieces of copper by accident (*per avventura* in Italian, meaning 'by misadventure') onto molten glass. The glass immediately turned a beautiful green colour with a lustre similar to that of native aventurine.

GREEN QUARTZ

Aventurine differs from other varieties of cryptocrystalline quartz with same chromatic range, such as prase or chrysoprase, by its

very distinctive green hue produced by small laminar inclusions of fuchsite, a chromium-rich variety of muscovite. These laminae also produce an optical effect that is both curious and attractive, and known as aventurescence. This is characterised by surface lustres, which change with the angle at which light falls upon them. Some examples have reddish or brown patches due to inclusions of haematite or goethite. Due to its hardness and optical qualities, aventurine is a classic gemstone. It was much admired by the emperors of ancient China and, more recently, by the Russian tsars. In former times the mineral was widely believed to carry healing energy, hence aventurine talismans are found in archaeological excavations.

The samples in the collection come from the Brazilian state of Minas Gerais, which has continued to produce handsome examples for decades; other producer countries are India, Russia, South Africa and Tanzania. Brazilian aventurine is characterised by its translucency and by its fine grain, which allows it to be given a delicate polish, bringing out its beautiful uniform green colour. Hence, most mined examples are used for making jewellery and are worked into statuettes or polished into spheres, pyramids or cabochons.



DID YOU KNOW?

- * The distinctive shimmer of aventurine is described as aventurescence.
- * The orange and brown sparkle seen in many samples comes from iron impurities
- * Aventurine is known as the “Stone of Opportunity” because it brings good luck to those who carry one.
- * Glass imitations of aventurine are called goldstones.
- * Southern India is the traditional source of aventurine. It has been mined there for hundreds of years.

Lapis Lazuli

Lapis lazuli is a variety of lazurite, which explains its characteristic blue colouring. It usually contains variable quantities of other minerals such as calcite and wollastonite, as well as small pyrite crystals that produce a metallic lustre.

A VALUABLE STONE

Lapis lazuli's composition means that it reacts in an unpredictable manner when cut. However, once cut, it is an easy stone to polish. As lapis lazuli is very valuable and expensive, there are many imitations, of which the

best example is the German lapis or Swiss lapis. This is produced from jasper and dyed with blue colouring, although it lacks the golden lustre of pyrite. Artificial lapis lazuli also exists, which has a similar chemical composition to the natural form. However, the inclusion of pyrite is less ordered and the stone is much softer. The most valuable pieces of lapis lazuli have been used as ornaments, such as in Tutankhamun's mask or the St Petersburg Cathedral columns.

The lapis lazuli samples in this collection come from Afghanistan. The best deposits of this gem are found in Afghanistan, Chile and Russia. This sample is extracted from the Sar-e-Sang mines in Afghanistan, known as one of the best mines in the world and found at high altitude (between 3,500 and 5,500 metres). The sample is made up of various minerals so the properties of this sample of lapis lazuli vary from one sample to the next. The blue from lazurite and the white from calcite are clearly visible, whilst the golden metallic lustre produced by pyrite is much harder to spot.



DID YOU KNOW?

- * Lapis lazuli has been mined in Afghanistan for over 6,000 years.
- * Jewellery and ornaments made from lapis lazuli have been found in tombs and burial mounds relating to ancient Egyptian, Mesopotamian, Greek and Roman civilisations.
- * In ancient Egypt, lapis lazuli was used in amulets, ornaments and jewellery. Cleopatra was said to have used a powdered form as eye shadow.
- * It has played a major part in art, being ground into a powder to use when creating the artist's pigment ultramarine blue, used for thousands of years until the 19th century, when a synthetic paint replaced it.
- * Many virtues have been linked to the stone, such as strengthening the bond between two people, attracting love and guaranteeing faithfulness.

Black Onyx

Onyx or black onyx is a variety of chalcedony (microcrystalline quartz) characterised by bands of colour in which black alternates with very dark shades of grey. When these bands are white they are much finer than the black ones.

VARIETIES OF ONYX

As it consists of quartz microcrystals, black onyx can be worked relatively easily and can also be polished. Small examples may be mistaken for certain agates; however, the latter have concentric bands whereas those in onyx tend to be straight. It may also be confused with some minerals with similar banding and colours. This is the case with onyx-

opal in which the bands are of opal, and with marble-onyx that has bands of calcite. The black bands can sometimes assume brown, orange or grey hues, with a gradation of colour from black onyx through sardonyx with brown bands to carneolonyx with orange bands or chalcedonyx with grey bands. Onyx has been a favourite choice to make cameos, the cut of which enhances its black and white stripes.

The samples in the collection, which come from China, exhibit a pattern of thick black bands alternating with thin white ones. As the samples are pieces of larger examples, some of them are completely black as they are too small to include the thin white bands. In addition, very thin brown or grey bands of chalcedony can be seen in some of the examples. The samples have been polished to enhance the waxy sheen characteristic of this variety of chalcedony.

DID YOU KNOW?

- * A piece of black onyx is said to help provide clarity during confusing events.
- * Black onyx is believed to help entrepreneurs and inventors
- * The word onyx means claw or fingernail in Greek and refers to the pale flesh-colour of many examples of onyx.
- * Onyx was a traditional material used for carving trinkets and jewellery by ancient Roman and Greek craftsmen.



Lepidolite

Lepidolite is a phyllosilicate of the trioctahedral mica group. It contains elements such as lithium, potassium and fluorine.

A RADIOACTIVE GEM

The main properties of lepidolite are firstly its virtual insolubility, even in strong acids, and secondly the way some examples are slightly radioactive owing to the presence of small amounts of rubidium and caesium. The radioactivity is so weak that it poses no risk to the health and so samples do not have to be kept in the lead containers typically used to accommodate other radioactive

minerals. Like most phyllosilicates, lepidolite has a laminar structure, resembling the pages of a book, and may be confused with other phyllosilicates like muscovite, zinnwaldite, trilithionite and polyolithionite. As a result, very precise tests are required to identify and distinguish them from each other.

In addition to being a lithium ore, some lepidolites are used in gemmology, especially when they are found as inclusions in quartz. However, their low hardness rating and frequent cleavage makes them difficult to work with.

The samples in the collection come from Brazil, which along with Zimbabwe, Sweden and Argentina, has the largest deposits of lepidolite. The main ones, located in Minas Gerais, are the Urupuca, Jonás, Urucum, Arqueana and Morro Redondo mines. Samples typically have a laminar structure and a soft violet sparkle when viewed perpendicularly. The temptation to separate the layers should be avoided, as otherwise the sample will lose its spectacular appearance.

DID YOU KNOW?

- * The name lepidolite means “scale stone” and refers to the mineral’s layered crystals that break off easily.
- * Lepidolite was used by Germans Robert Bunsen and Gustav Kirchhoff to extract rubidium salts, the first known compounds of this new element, in 1861.
- * Owning a piece of lepidolite is said to instill a sense of optimism and make the owner lucky.
- * Lepidolite is reputed to aid restful sleep and to guard against nightmares.
- * The mineral is a source of lithium, a light metal used in rechargeable batteries and anti-mania medications.



Halite

Halite or rock salt, composed of sodium and chlorine atoms, is one of the most abundant substances on Earth, as it is formed when sea water evaporates.

PROPERTIES OF HALITE

Halite crystallizes in the cubic system, sometimes in the form of colourless or white cubes. It may have a reddish hue due to the remnants of bacteria which lived in salty water and were trapped in the crystals. It is a soft mineral, scoring 2.5 on the hardness scale, and exhibits perfect exfoliation; also, it dissolves easily in water. These properties make it difficult to keep intact. Halite may be confused

with other chlorides, especially sylvite and carnallite, although halite's salty taste is one way to distinguish them. Furthermore, sylvite is a powerful astringent whereas carnallite is bitter and much less stable, even dissolving in moisture from the air.

To check halite's salty taste, you should not try to lick it! Some minerals which look like halite may be poisonous, so it is not advisable for the mineral to touch the tongue directly. Instead, you should run a damp finger over the sample and then carefully test that. Halite is an excellent preservative and also has many applications in the chemicals industry.

The samples in the collection come from Spain, a country noted for its halite deposits at Cabezón de la Sal in Cantabria and at Cardona in Catalonia. In some examples it is possible to make out a few crystal faces, whereas others are quite amorphous. Its colour varies from white to reddish, although some examples are colourless. The reddish hues are due to salt bacteria which have become trapped inside the mineral as an impurity.



DID YOU KNOW?

- * Halite is highly soluble and so samples must be kept dry at all times.
- * The name halite is derived from the ancient Greek words for "salt" and "rock".
- * Colourless halite crystals are believed to promote healing, while pink ones are good for clearing the mind of emotional clutter.
- * The Wieliczka Salt Mine in Poland has been continuously worked since the 14th century. Its excavated chambers have been carved with halite statues, stairways and even a chapel.

Unakite

Unakite is one of the few rocks to have been traditionally used in jewellery making, as it contains a number of colourful minerals. Its name is taken from the place where it was discovered, the Unaka mountain range dividing the states of Tennessee and North Carolina in the USA.

ONE ROCK, THREE MINERALS

Unakite is a crystalline granitic rock that is hard and compact and has a rich mineral composition. There are three basic minerals: epidote, quartz and potassic feldspars, generally orthoclase or microcline. Unakite may

form large rocky masses, but in many of the best-known deposits it occurs as rounded pebbles near river beds and lakes and is therefore easily accessible. Its appearance particularly depends on the proportions of its minerals composition: if quartz predominates, the example will have a lighter colour; if epidote is the main mineral, the colour will be pistachio green; and if orthoclase (or microcline) is more abundant, it will generally have a pinkish hue. The rock is easy to work and polish, and so the Native American people of the area once used it as a material for making pendants and idols.

The samples in the collection come from South Africa, one of the principal sources of this kind of material, along with the United States and Brazil. South African examples tend to be very rich in epidote and orthoclase but with a low quartz content, imparting a beautiful chromatic balance between green and pink. They are especially important in the production of stone ornaments, such as spheres, pyramids or animal figurines. Samples which have been polished acquire a sheen that highlights their mineral composition and enhances their beauty.



DID YOU KNOW?

- * Many unakite pebbles have been ground down by thousands of years of pressure beneath a glacier.
- * The three main ingredients of unakite are said to make it a balancing stone, working on the emotional, spiritual and mental levels. It is especially useful after hearing bad news.
- * Unakite is said to benefit the female reproductive system and to be helpful during pregnancy.
- * Unakite does not form individual crystals, but is found in so-called massive forms that can be shaped into ornaments
- * The shiniest unakite stones are those that contain a lot of quartz. However, too much quartz dulls the colours.