

# Minerals

## Mineral Veins

Mineral veins have formed over millions of years in cracks in rocks. Hot water carrying dissolved metal compounds flowed into the cracks. The compounds were deposited on the sides of the cracks. As the temperature or pressure or the composition of the water changed, different minerals were deposited.

- 1 **Cut and polished section of a mineral vein**  
The minerals barite (crushed white crystals; see number 12), galena (grey; see number 9), fluorite (large clear crystals and bands; see number 2), sphalerite (black; see number 9) and pyrite (metallic needles; see number 11) were deposited at different times.

## Halides

These minerals consist of atoms of a metal and a gas such as chlorine or fluorine. An example is rock salt (sodium chloride).

- 2 **Fluorite**  
Calcium fluoride. Large cubic crystals with black zinc ore.

## **Oxides**

Metal oxides sometimes form mineral deposits. Oxides occur in most types of rock and in mineral veins.

- 3     **Hematite**  
Iron oxide, known as Red Kidney Ore.
  
- 4     **Hematite**  
A fragment of kidney ore showing its fibrous, radiating structure.
  
- 5     **Hematite**  
Specular or sparkling ore. A mass of black platy crystals.
  
- 6     **Goethite**  
Iron hydroxide. Also known as limonite or ochre. A kidney shaped mass from St. Just, Cornwall.
  
- 7     **Cassiterite**  
Tin oxide. Black crystals on quartz. This is the main source of tin. It was mined in Cornwall until recently.
  
- 8     **Wolframite**  
Iron tungsten oxide. This is one of the main sources of tungsten. From the East Pool Mine, Camborne, Cornwall.

## **Sulphides**

Sulphide minerals are composed of atoms of a metal and sulphur. They are found in igneous, metamorphic and sedimentary rocks and in mineral veins. Sulphides within mineral veins are amongst the most important sources of the base metals lead, zinc and copper.

### **9 Galena and Sphalerite**

Lead sulphide and zinc sulphide. The galena (silvery grey) here occurs in crystals which are a combination of a cube and an octahedron. The sphalerite is black.

### **10 Chalcopyrite**

Copper iron sulphide or copper pyrites. This is the commonest source of copper.

### **11 Pyrite**

Iron sulphide, iron pyrites or 'Fool's Gold'. Cubic crystals in slate.

## **Sulphates**

Sulphates are minerals containing atoms of metal, sulphur and oxygen. Typically these occur in sedimentary rocks and in mineral veins, where they are associated with metal sulphides.

### **12 Barite with Stibnite**

Barite is barium sulphate. This is sometimes known as 'heavy spar', because of its weight. The clear crystals of barite enclose the needle-like crystals of stibnite (antimony sulphide).

### **13 Gypsum**

Calcium sulphate combined with water. This variety of clear crystal is known as selenite. It forms in some sedimentary rocks, and also on the roofs of caves. It is often found alongside rock salt. These minerals were deposited by evaporation from the drying up of ancient sea beds and lake floors many millions of years ago.

### **14 Gypsum (Satin Spar)**

This variety has fibrous crystals.

## **Fluorescent Minerals**

Some minerals emit visible light when they are placed under an ultraviolet lamp. The energy of ultraviolet light excites the electrons within the crystals of the minerals, and so produces the fluorescence.

Different minerals fluoresce in different colours. Not all specimens of the same mineral fluoresce. It depends on the presence or absence of impurities or imperfections within the crystal.

**Press the switch to turn on the ultra-violet light.**

*PLEASE NOTE: The lamp is on a timer. Please try to avoid exposure to the light for longer than it takes to look at the fluorescence.*

We are sorry that the ultraviolet light is not working and that the bulb cannot be changed at the moment.

The minerals emit these colours under the light:

15 Purple                      16 Green                      17 Pink

15     **Fluorite**

A fluorescent form of calcium fluoride.

16     **Calcite**

Calcium carbonate. This is a fluorescent form of one of the most common minerals.

17     **Autunite**

Calcium uranium phosphate. Although it contains uranium, it is only mildly radioactive, and therefore is not hazardous in this display!

## **Phosphates**

Phosphates are minerals containing atoms of a metal, phosphorous and oxygen. They occur in a variety of different environments such as in veins associated with granites, also metamorphic and sedimentary rocks.

18     **Apatite**

Calcium phosphate. Part of a large hexagonal crystal.

19     **Wavellite**

Aluminium phosphate, combined with water.  
Groups of radiating crystals in a metamorphic rock.

20     **Pyromorphite**

A lead phosphate which occurs in the oxidised areas of lead veins; from Cumbria.

## **Naturally Occurring Elements**

Native elements in their pure form are not common within the earth's crust. Both metals and non-metals are formed in a wide range of different environments. Iron and nickel occur as native metals in meteorites.

### **21 Graphite**

Carbon. Graphite is one of the softest minerals known. It has a slippery, greasy feel. This is because the crystals are made of plates which slide easily against each other.

### **22 Diamond**

Carbon. Diamond is the hardest known naturally occurring mineral. Its hardness is due to a quite different linkage of atoms from that of graphite. It forms small octahedral crystals. Diamonds are formed at great depths within the earth's crust within the pipes of ancient volcanoes. This is a cut-glass replica of the famous Koh-i-noor diamond.

### **23 Copper**

A spongy wire mass with cuprite (copper oxide) and quartz.

### **24 Gold**

Native gold on quartz, in porphyry. Gold occurs in mineral veins, igneous rocks and in alluvial gravel deposits.

## **Carbonates**

Carbonate minerals contain atoms of a metal, carbon and oxygen. They are to be found in sedimentary and metamorphic rocks and sometimes in igneous rocks and mineral veins.

### **25 Calcite**

Calcium carbonate. It is the raw ingredient of limestones and marbles. When found in mineral veins it sometimes shows as spectacular crystals. This specimen is from Wheal Wrey Mine near Liskeard, Cornwall.

### **26 Calcite (Iceland Spar)**

This variety has the property of double refraction; it will produce two images of an object viewed through it.

### **27 Cerussite**

Lead carbonate. A honeycomb mass of interlocking crystals. Cerussite looks like calcite, but is much heavier.

### **28 Siderite**

Iron carbonate. This is sometimes mined as a source of iron.

### **29 Malachite**

Copper carbonate combined with water. The green colour of this mineral is quite distinctive. This specimen is from Cornwall.

## **Silicates**

Silicates are very common minerals, making up to 95% of the earth's crust. Silica is composed of atoms of silicon and oxygen; silicates are more complex compounds in which silica is combined with other metals and sometimes water.

- 30     **Quartz (Rock crystal)**  
Silica. Granite is composed of up to 40% quartz.
  
- 31     **Mica (Biotite)**  
A complex iron silicate. Mica is also a common ingredient of granite.
  
- 32     **Feldspar Group (Orthoclase)**  
Potassium aluminium silicate. This is a crystal of orthoclase in granite from St. Just, Cornwall. Feldspar is an essential ingredient of granites.
  
- 33     **Feldspar Group (Labradorite)**  
An aluminium silicate. The iridescence is characteristic of this mineral.
  
- 34     **Pyroxene**  
This mineral is rich in iron, calcium and magnesium. It is an essential ingredient of basalt.
  
- 35     **Garnet (Almandine)**  
Iron aluminium silicate. Small crystals of it are common in metamorphic mica schists.

36 **Kyanite**

This is an aluminium silicate, found in mica schists.

37 **Tourmaline**

This is a silicate containing iron and boron. It is often found associated with granites.

38 **Prehnite**

This is an aluminium silicate containing water. It is found within the cavities of basalt lavas, where it is deposited by hot watery solutions.

### **Asbestos Group**

Asbestos is the name given to a variety of different minerals which form fibrous crystals.

39 **Riebeckite**

Riebeckite is commonly known as 'Blue Asbestos'. These fibres can be harmful if inhaled.