

Recognising Minerals – Teacher Notes

Minerals are natural inorganic substances having regular crystal structure and distinctive chemical composition,
Minerals are the building blocks of rocks,

This section is for those schools that have mineral collections. These are some of the physical tests lower school students can use to classify common minerals. Some of the tests are destructive. It is advisable to use only what can be easily replaced. A reference guide to common mineral characteristics is included in this package.

When a geologist goes into the scrub they usually carry a small pack with tools to help them recognise minerals. They would usually have:

- A hand lens to better see the specimen
- A nail, an old 2c coin, a piece of glass and their fingernails to test the hardness of the specimen
- A magnet
- A little bottle of vinegar (acetic acid)

Geologists often blow on a specimen to clear the surface then breathe heavily on it. The film of moisture often makes mineral features stand out better.

Minerals are examined by the following physical properties

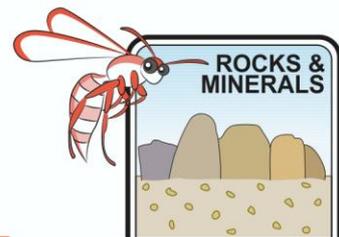
A. Colour

In most metallic ores colour can be a useful clue to mineral composition. Green and blue often indicate copper whilst red usually indicates iron. With crystals trace elements can cause great variety of colour differences. Colour should only be used in freshly broken rock.



Kyanite - its name means "blue"

Note: Colour should be described in as much detail as possible. For example these kyanite samples could be described as dark blue with green and white tinges.



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B. Crystal shape

Or crystalline habit (prismatic, cubic, tabular etc) is due to the arrangement of atoms. Sodium chloride forms cubic crystals whereas calcite forms hexagonal ones.



e.g. Calcite

Note: There is a large bank of terms used for describing crystal shapes. Students might like to stick to common terms (many of these are used for describing minerals).

C. Streak

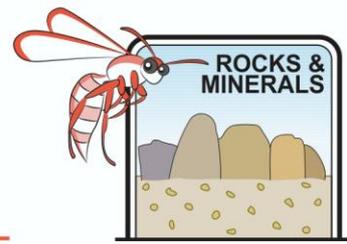
Streak can be determined by scratching the mineral across a white plate or the unglazed side of a white tile. The streak is the colour of the powder of the mineral so it can also be crushed or filed. Often the streak can be a different colour than the mineral appears. Iron pyrites which appears golden to the eye, hence its name “fools gold” has a greenish or brownish-black streak. Streak is a good way to differentiate between iron ores. Haematite is dark red- brown, magnetite is black whilst limonite is yellow.

Note: It is important to be aware that if the mineral is harder than the streak plate you will not be able to produce a streak. Also, many minerals have a white streak so students should look carefully for this.

D. Cleavage

The planes along which crystals break and the angles these surfaces make with each other. This is due to the bonding between molecules. These can be estimated by eye or measured with a protractor. Mica has one cleavage plane which breaks it into flat sheets. Iron pyrites (fool’s gold) has six which break it into cubic prisms.

Note: Many samples are sold in their crystal form. The only way to examine their cleavage is to break them.



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E. Lustre

Light reflected from a fresh face of the mineral gives it its lustre. This depends on the refraction, absorption and reflection of light on the surface of the mineral. Lustres are described as metallic (like a metal e.g. galena), vitreous (like glass e.g. quartz), resinous (like wax e.g. opal), pearly (e.g. mica), silky (e.g. asbestos) and adamantine (e.g. diamond).

F. Transparency

The mineral may be transparent (allows light to pass through), translucent (allows light to pass through but the image is not clear) and opaque (light does not pass through).

G. Hardness

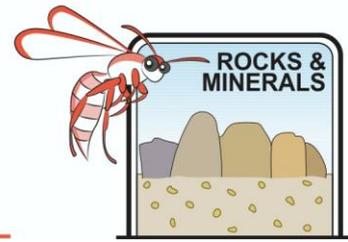
Friedrich Mohs created a scale (the Mohs Scale) of hardness relative to some common minerals and commonly accessible materials. By comparing the ability of one mineral to scratch another, a scale has been developed.

10	Hardest	DIAMOND			
9	↓	CORRUNDUM			
8		TOPAZ		As a rough guide we can use:	
7		QUARTZ			
6		ORTHOCLASE FELDSPAR	6.5	Steel nail	
5		APATITE	5.5	Knife blade	
4		FLUORITE	5	Glass	
3		CALCITE	4	“Copper” coin	
2		GYPSUM	2.5	Finger nail	
1		Softest	TALC		

Note: Mohs scale is a comparative scale, there are large jumps in hardness along this scale (in particular from 9 to 10). Using this scale you might find an unknown mineral is scratched by orthoclase feldspar but scratches apatite you can say that it's hardness is less than 6 and more than 5. Or if you don't have a set of Mohs scale minerals an unknown mineral may be scratched by glass but not by a 'copper' coin. You can say its hardness is greater than 4 and less than 5.

H. Specific gravity

This measures the relative weight of the mineral compared with an equal volume of water. (Weigh the stone in air. Then place the stone in a measuring cylinder full to the brim with water. Weigh the volume of water displaced by the stone OR since 1mL of water weighs 1 gram estimate the weight by measuring the volume of water displaced. Divide the weight in air by the weight of water). Precious stones such as diamond, zircon and rubies are easily distinguished by this process.



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For more advanced students an activity on how to measure specific gravity is described at:
<http://serc.carleton.edu/quantskills/activities/14212.html> or
<http://www.education.com/science-fair/article/heavy/>

I. Special characteristics

Examples might be:

Halite (salt) has a specific taste

Magnetite is magnetic

Calcite is bi-refrangent (an image passed through it doubles up) and effervesces with acid

Gold is highly malleable (soft)

Talc feels greasy