ACTIVITY 17: PROPERTIES OF MINERALS

Aim: To use tests employed by geologists to identify minerals within a rock sample.

Equipment:

- set of hardness test minerals
- coin
- nail
- piece of glass
- minerals kits
- streak plate
- Geiger counter
- U.V. light source

Procedure:

A. Moh's Scale of Hardness.

1. Use the Internet to find a definition for "Moh's Scale of Hardness". Record this in your notebooks.

2. Copy the following table into your notebook. Then test the hardness of the materials across the top of the table against that of the samples in the box. Place a √ or X next to each sample to indicate whether or not the sample gets scratched or not.

Name		**Finger nail**	**Coin**	**Nail**	**Glass**
Talc	1				
Gypsum	2				
Calcite	3				
Fluorite	4				
Apatite	5				
Orthoclase	6				
Quartz	7				
Topaz	8				
Corundum	9				

Using this table, record the hardness of finger nail, coin, nail and glass

B. Streak and Colour.

3. Distinguish between 'colour' and 'streak' as used to describe a mineral.

Write definitions in your notebook.

4. Select 4 mineral samples and describe the colour of the mineral and its streak in a table like this one drawn in your notebook.

Name	Colour	Streak

ACTIVITY 18: MINERALS

MINERALS

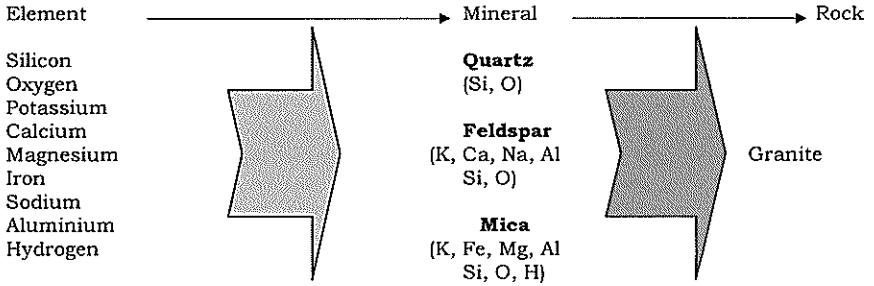
Minerals are _____ _____- which are found in the Earth's surface. They are formed when there is a chemical reaction between two or more _____. There are about _____ different minerals though only _____ are common in the Earths crust.

Two broad groupings of minerals:

1. Rock forming minerals: found in all rock types.
2. Ore Minerals: sources of metal.i.e.

Haematite → Iron
Bauxite → _____
Azurite → _____

Minerals are basically grouped according to their chemical composition. There are eight groups



Physical Characteristics o f Minerals

These are determined by the arrangement of atoms within the molecules and the way in which molecules are linked together.

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Topaz	8				
Corundum	9				

Using this table, record the hardness of finger nail, coin, nail and glass

B. Streak and Colour.

When minerals are rubbed on rough surfaces a mark of a special colour is produced. This is called the mineral's STREAK.

1. Distinguish between 'colour' and 'streak' as used to describe a mineral.Write definitions in your notebook.

2. Select 4 mineral samples and describe the colour of the mineral and its streak in a table like this one drawn in your notebook.

Name	Colour	Streak

C. Cleavage.

1. Record a definition for cleavage in your notebook.

Select 4 samples to sketch.

Name	Name
Name	Name

COPY AND COMPLETE IN YOUR NOTEBOOK

D. Radioactivity.

Select 4 samples from the kit and describe the level of radioactivity for each. For the last two rows compare the radioactivity of two samples from another kit (e.g. quartz).

Name	High activity	Medium activity	Low activity

E. Fluorescence.

Describe the appearance of 4 mineral samples under normal light and under ultraviolet light (U.V.)

Name	Under normal light	Under U.V. light

F. Magnetic properties:

A few minerals are attracted to magnets.

ACTIVITY: Move the magnet near the supplied sample.
Record your observation in your notes.

What is the name of this mineral? _____

What is significant about this name? _____

Some special characteristics of some minerals:

a. DOUBLE REFRACTION:

Some minerals do strange things to light as it passes through them. e.g. calcite.

ACTIVITY:
1. Place the calcite specimen on the CROSS below and rotate it SLOWLY.
Observe what happens to the cross as the calcite rotates.

+

2. Place the crystal over some writing on this page.

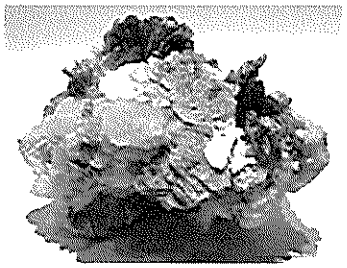
Record your observation in your notes.

b. POLARISING EFFECT:

Certain minerals produce interesting colour patterns when placed between materials called POLAROIDS.

ACTIVITY: Place the supplied MICA sample between the two polaroids and slowly rotate one of polaroids.

Record your observation in your notes.



Muscovite mica

Biotite mica

4. Tests

Select several samples from Kit B and do various test on them. Record the results of the tests you carry out in a table similar to the one below:

Name of sample	Hardness	Streak	Colour	Cleavage	Radioactivity	Fluorescence

ACTIVITY 22: DESCRIBING ROCKS

This activity is made up of three parts:

1. Looking at crystals.
2. Observing a "Red Label" collection of rocks.
3. Investigating how the rate of cooling controls the size of mineral crystals.

EQUIPMENT for Part A

- 1 Stereomicroscope
- Hand lens.
- Three samples of different crystals that are easy to identify with a hand lens e.g. $CuSO_4$, NaCl, fertiliser.

EQUIPMENT for Part B

- "Red Label" rock collection
- Hand lens
- Mounted needle
- 1 Stereomicroscope

EQUIPMENT for Part C

- 3 large test tubes
- 3 beakers - 250 mL
- cotton wool
- ice
- hot supersaturated KNO_3 solution (must be retained – do not pour down sink)

PROCEDURE for Part A: (Do not spend too much time on this section)

1. Use your hand lens to look at the various crystals that you have been given. Move a single crystal away from the others so that you can observe it more closely.
2. Your teacher has a stereomicroscope that you can look through to observe crystals in greater magnification.
3. In your notebook, draw a diagram of the shape of the different crystals.

PROCEDURE for Part B:

Geologists must train themselves to be careful observers. By observing special features of rocks, such as grain size, colour, lustre, feel, amount of weathering, they can determine the useful minerals that are in the rock.

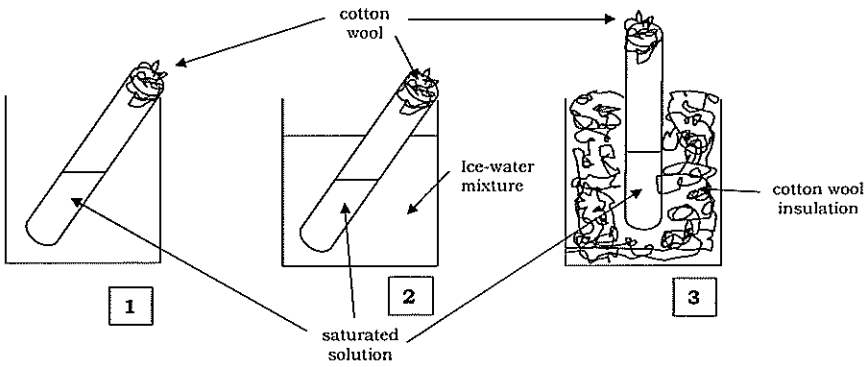
1. Closely examine the rocks from the "Red Label" collection. What can you observe? Are the rocks grainy or smooth? Do they have jagged edges or are they rounded and smooth?
2. If you can break off small pieces of rock, you can use the mounted needle to pick out some of the smallest pieces. Use a hand lens to look at these pieces.
3. Draw up a table similar to the one below, leaving space to describe four different igneous rock samples. (Your teacher will tell you which four rock samples to examine)

ROCK SAMPLE	OBSERVATIONS	CORRECT NAME
1		
2	COPY AND COMPLETE IN YOUR NOTEBOOK	
3		
4		

PROCEDURE for Part C:

In observing rocks you may have seen that the size of their crystals and grains varies. Some have coarse grains and others are fine grained.

1. Collect your equipment and label test tubes 1, 2 and 3.
2. Set up the equipment as shown in the diagram below and place about 25 mL of hot supersaturated KNO_3 (potassium nitrate) in each test tube.



3. Store the beakers in a suitable place until the next science lesson.
4. What do you think this investigation is trying to show?
5. Next period: Observe the changes which have occurred in your test tubes. Write down your observations using the heading: **RESULTS:**

CONCLUSION for Part C:

Discuss in your group and write down how the rate of cooling affects the size of the crystals that formed.