Station 1 Physical Properties

5 CLEAVAGE

The manner in which the mineral tends to break in a specific direction.

1. Use the magnifying glass to analyze the sample's cleavage.

2. Determine the sample's quality of cleavage (smoothness in which the mineral cleaves) as perfect, imperfect, distinct, good, fair, and poor.

Good cleavage is easily seen, but it is not totally planar

Perfect cleavage - cleavage is planar (the lines on the surface are another feldspar which has weathered somewhat).

Station 1 Physical Properties

1 COLOR

Closely examine a sample and determine its color.

Note: The color test is the least reliable. For example, the minerals on the right-hand side are all quartz, but their colors are different.

2 LUSTER

The way a mineral reflects light.

Use the pictures and descriptions to classify the sample's luster.

Metallic – reflects light like metal
Adamantine – reflects light like a diamond
Vitreous/Glassy – looks like glass
Pearly – like mother of pearl
Resinous – the appearance of dried pitch, or fiberglass
Waxy – the appearance of smooth wax or a broken candle
Oily – the appearance of an oil coated substance
Silky – the appearance of silk cloth
Dull – not shiny, plain or rough surface
Earthy – similar to soil or clay

Station 1 Physical Properties

3 HARDNESS

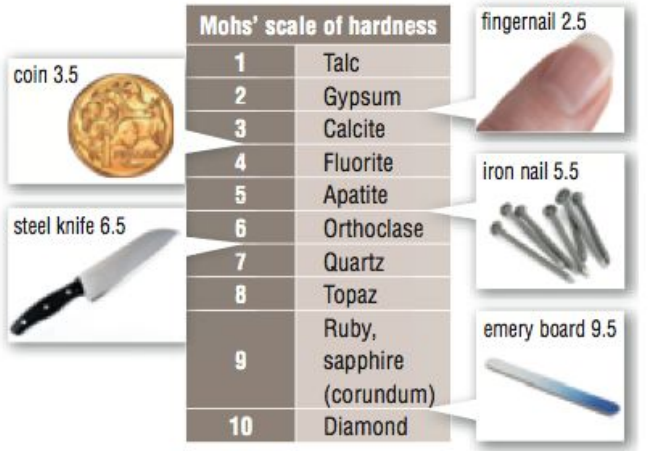
Resistance of a mineral to being scratched.

Moh's hardness scale is way to compare how hard or soft minerals are. **The higher the number, the harder the mineral.**

Determine hardness of sample by taking an item of known hardness and scratching the sample.

If the sample is scratched, then it is <u>softer</u> than the item of known hardness. If not, then it is <u>harder</u> than the item.

1. Use your <u>fingernail</u> to test for hardness of 2.5
2. Use <u>calcite</u> to test for hardness of 3
3. Use a <u>penny</u> to test for harness of 3.5
4. Use _____ to test for hardness of 7



Station 1 Physical Properties

4 STREAK

Color of powdered mineral.

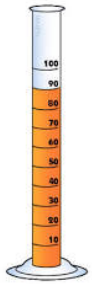
1. Place ceramic streak plate on the table and hold in place with your hand.

2. Take sample and scrape the surface of the streak plate.

3. Is there a streak? What color is the streak?

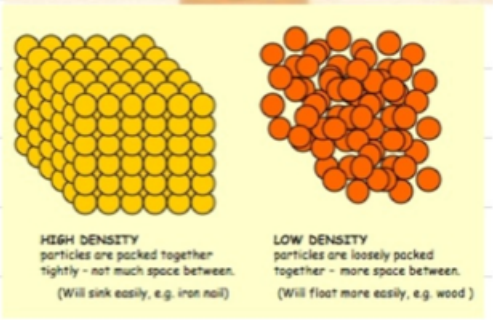
Note: The color of the streak may be different than the color of the mineral.

Station 2 Density



Density is the degree of compactness of a substance. It is measured in the units mass (grams, g) over volume (milliliters, mL). Substances that are more dense will sink in substances that are less dense. That is why wood floats on water. Wood has a density of 0.7 g/mL while water has a density of 1.0 g/mL. Can you think of what physical properties would has that makes it less dense then water?

The figure to the right shows a molecular representation of density and the real world consequences of mixing substances of different densities together. What do you think will happen if we put the unknown mineral into the mixture shown to the right?



PROCEDURE

⇒ Mass the mineral sample on a balance.

1. Write down the mass of the mineral sample.

⇒ Place 50.0 mL of water into a 100 mL graduated cylinder.

2. Write down the exact volume of water in the graduated cylinder.

⇒ Add the mineral sample to the 100 mL graduated cylinder.

3. Write down the volume of the water plus the mineral in the graduated cylinder.

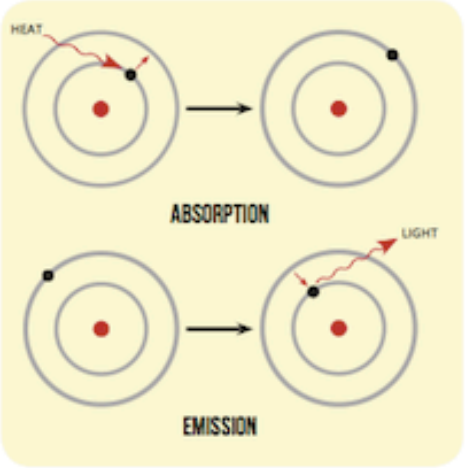
4. Determine the volume of the mineral.

5. Calculate density of the mineral.

Station 3 Flame Test

METAL ION FLAME TESTS

A flame test is an analytical procedure used by chemists to detect the presence of particular metal ions, based on the colour of the flame produced.



When heated, the electrons in the metal ion gain energy and can jump into higher energy levels. Because this is energetically unstable, the electrons tend to fall back down to where they were before, releasing energy as they do so. This energy is released as light energy, and as these transitions vary from one metal ion to another, it leads to the characteristic colours given by each metal ion.

PROCEDURE

1. Obtain a nichrome wire and clean the tip with the Bunsen burner flame.
2. Dip the wire in the pre-powdered mineral getting as much of the powder as you can.
3. Place the wire in the flame and observe what color the flame turns.

Station 4 Acid Test

Some minerals contain a carbonate anion, written as CO_3^-. Carbonate is a negatively charged ionic compound. The presence of CO_3^- can be tested for by the addition of an acid such as acetic acid or hydrochloric acid to the powdered mineral. If the carbonate anion is present, the reaction between the acid and the carbonate anion will bubble upon the formation of carbon dioxide (CO_2) gas.

PROCEDURE

1. Place the powdered mineral sample onto a watch glass.

2. Add a couple drops of 1M Hydrochloric Acid onto the powdered mineral sample.

3. Observe for chemical reactions.