

## GEOL 241: Minerals

Geologists study rocks, and since a rock is simply an aggregate of minerals, mineral identification is a fundamental skill for the work of most geologists. In this lab we will learn how to identify some common minerals from their physical properties.

### Station A. Reaction with Acid and Magnetism

Carbonate minerals (calcite and dolomite) are easily identified by their reactions with hydrochloric acid, HCl. Calcite fizzes vigorously on contact with HCl. Dolomite will not fizz unless it has been scratched. In the following section you will identify the three ‘mystery minerals’ 1–4.

1. Use HCl to identify which is calcite and dolomite. The remaining two samples are of quartz and halite (table salt). Use hardness to distinguish these, noting that quartz is harder and thus can scratch halite. **Please dry the acid off the samples when you finish.** Of course, an easy way to distinguish halite (table salt) would be by its salty taste. For obvious hygienic reasons do not perform a taste test on these samples 😊.

Mineral	Sample Number
Calcite	
Dolomite	
Halite	
Quartz	

2. Magnetite is easy to distinguish from many similar looking metallic minerals by its strong natural magnetism. Use the magnets to discover which of the three mystery minerals, labeled A, B, and C is magnetite.

Magnetite is sample (circle its letter):    **A**        **B**        **C**

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### Station B. Luster and Color

**Color** can help in mineral identification, but it is often unreliable. Notice the variety of colors of quartz in the sample tray. Slight chemical contamination or internal crystal irregularities produce significantly varied colors.

**Luster** describes the way a mineral reflects light. Metallic minerals are opaque, are usually shiny, and always have a streak. Non-metallic minerals have many types of luster, which are referred to as vitreous (glassy), resinous, silky, earthy, etc.

**Streak** is the color of a mineral in powdered form. It is determined by scratching the mineral against a porcelain plate. If a mineral is harder than porcelain, you cannot assess its streak, and we say it has "no streak".

Take a good look at the minerals samples (gypsum, calcite, and olivine). The luster of gypsum can be described as silky, calcite can be termed pearly, and olivine is generally considered vitreous (or glassy). For each of the remaining samples, describe their colors, luster, and streak.

<b>Mineral</b>	<b>Color</b>	<b>Luster</b>	<b>Streak color</b>
Galena			
Talc			
Quartz			

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### Station C. Fracture and Cleavage

Mineral cleavage is the development of regular and smooth fracture sets in minerals that develop along weakly bonded planes within the crystal lattice.

Some hints for identifying cleavage:

- Look for parallel planar breaks within and along the sides of the mineral sample.
- Repeated sharp corners or edges may define intersecting cleavage planes.
- Count any set of parallel surfaces only once.
- Count only broken surfaces; crystal faces formed during crystal growth are not cleavage planes.
- Hold the mineral to a light, and turn it. Cleavage planes reveal themselves with a flash of light, similar to what happens when you "catch light" with a mirror.

For the minerals in the sample tray, record how many cleavage planes each has.

	<i>Mineral</i>	<i># of cleavage planes</i>	<i>angle between cleavage planes</i>
1.	calcite	_____	_____
2.	halite	_____	_____
3.	hornblende	_____	_____
4.	muscovite	_____	_____
5.	pyroxene	_____	_____
6.	quartz	_____	_____

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### Station D. Hardness

Mineral hardness refers to how easily a mineral surface is scratched, and it is one of the most common means of mineral identification in the field. Moh's hardness scale ranges from 1 (soft) to 10

(hard). Some common objects that can be used to test mineral hardness include your fingernail (H=2.5), and metal blades and glass (H=5.5), and steel files (H= 6.5). Thus if you can scratch a mineral with your fingernail, it must be softer than 2.5; if a mineral scratches glass, it must be harder than 5.5. For minerals harder than 6.5, it is best to use other minerals to test their hardness.

The tray at station D contains five minerals. Use your fingernail, the glass, the metal spike, and the minerals themselves to determine their approximate hardness on Mohs scale.

1. quartz \_\_\_\_\_
2. feldspar \_\_\_\_\_
3. biotite \_\_\_\_\_
4. garnet \_\_\_\_\_
5. calcite \_\_\_\_\_

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## Station E. Mineral Identification.

Station E: Use the handout and mineral property charts to identify the 10 following minerals and complete the mineral identification worksheet below.

Sample number	Hardness	# and angle of cleavage planes	Luster	Other (color, twinning, misc.)	Mineral Name	Chemical Formula
1						
2						
3						
4						
5						

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Sample # and name	Hardness	# and angle of cleavage planes	Luster	Other (color, twinning, misc.)	Mineral Name	Chemical Formula
6						
7						
8						
9						
10						

# Notes