

Science 7, Period \_\_\_\_\_

Name \_\_\_\_\_

Lab # \_\_\_\_\_ Mineral Identification

Date \_\_\_\_\_

**Background Information:**

Scientists who study minerals are called mineralogists. Minerals are essential to various needs within society, such as minerals used for bettering health and fitness, essential components of metal products used in machinery, essential components to building materials such as limestone, marble, granite, gravel, glass, plaster, cement, and plastics. Minerals are also used in fertilizers to enrich the growth of agricultural crops. All rocks are made from minerals.

In this lab, you will be determining the identity of eleven unknown minerals by performing tests on them and using several reference materials, including a dichotomous key. Always begin your identification at each station using the dichotomous key, and confirm your answers by using the other reference materials.

1. Make sure each box of your chart is filled in.
2. For streak color, you should use the streak plate (unglazed tile).
3. For density, you should use the information in your reference materials. You should not calculate the density yourself.
4. For hardness, you should use the available reference objects and complete the scratch test (fingernail, penny, steel nail, glass, etc.).

Sample	Color	Streak Color	Density (include units)	Hardness	Mineral Name
1					
2					
3					
4					

5					
6					
7					
8					
9					
10					
11					

**Conclusion Questions:**

1. What is the difference between cleavage and fracture?
  
  
  
  
  
  
  
  
  
  
2. What is the hardest known mineral? The softest known mineral?



## Dichotomous Key for Mineral Identification

1a. no streak. Go to #2

1b. any colored streak. Go to #3

2a. cleaves into thin sheets. Go to #4

2b. does not cleave into thin sheets. Go to #5

3a. red streak = hematite

3b. other streak color. Go to #6

4a. green, brown, or black color = biotite mica

4b. colorless, yellow, or brown color = muscovite mica

5a. hardness of 7, colorless = quartz

5b. hardness of 7, pink to red color = rose quartz

6a. hardness of 1 or 2. Go to #7

6b. hardness of 3 or more. Go to #10

7a. white streak. Go to #8

7b. other color streak. Go to #9

8a. has 2 cleavage faces = gypsum

8b. irregular cleavage/fracture = talc

9a. yellow streak and color = sulfur

9b. black streak = graphite

10a. cleavage (6-sided rhombohedral) = calcite

10b. fracture. Go to #11

11a. attracted to a magnet. Go to #12

11b. not attracted to a magnet. Go to #13










12a. black streak and color = magnetite

12b. green-brown streak, gold color, metallic luster = pyrite (fool's gold)

13a. earthy luster = bauxite

13b. metallic luster = chalcopyrite

## Properties of Common Minerals

LUSTER	HARD- NESS	CLEAVAGE FRACTURE	COMMON COLORS	DISTINGUISHING CHARACTERISTICS	USE(S)	MINERAL NAME	COMPOSITION*
<b>Metallic Luster</b>	1-2	✓	silver to gray	black streak, greasy feel	pencil lead, lubricants	<b>Graphite</b>	C
	2.5	✓	metallic silver	very dense (7.6 g/cm <sup>3</sup> ), gray-black streak 	ore of lead	<b>Galena</b>	PbS
	5.5-6.5	✓	black to silver	attracted by magnet, black streak	ore of iron	<b>Magnetite</b>	Fe <sub>3</sub> O <sub>4</sub>
	6.5	✓	brassy yellow	green-black streak, cubic crystals 	ore of sulfur	<b>Pyrite</b>	FeS <sub>2</sub>
<b>Either</b>	1-6.5	✓	metallic silver or earthy red	red-brown streak	ore of iron	<b>Hematite</b>	Fe <sub>2</sub> O <sub>3</sub>
<b>Nonmetallic Luster</b>	1	✓	white to green	greasy feel	talcum powder, soapstone	<b>Talc</b>	Mg <sub>3</sub> Si <sub>4</sub> O <sub>10</sub> (OH) <sub>2</sub>
	2	✓	yellow to amber	easily melted, may smell	vulcanize rubber, sulfuric acid	<b>Sulfur</b>	S
	2	✓	white to pink or gray	easily scratched by fingernail	plaster of paris and drywall	<b>Gypsum (Selenite)</b>	CaSO <sub>4</sub> •2H <sub>2</sub> O
	2-2.5	✓	colorless to yellow	flexible in thin sheets 	electrical insulator	<b>Muscovite Mica</b>	KAl <sub>3</sub> Si <sub>3</sub> O <sub>10</sub> (OH) <sub>2</sub>
	2.5	✓	colorless to white	cubic cleavage, salty taste 	food additive, melts ice	<b>Halite</b>	NaCl
	2.5-3	✓	black to dark brown	flexible in thin sheets 	electrical insulator	<b>Biotite Mica</b>	K(Mg,Fe) <sub>3</sub> AlSi <sub>3</sub> O <sub>10</sub> (OH) <sub>2</sub>
	3	✓	colorless or variable	bubbles with acid 	cement, polarizing prisms	<b>Calcite</b>	CaCO <sub>3</sub>
	3.5	✓	colorless or variable	bubbles with acid when powdered	source of magnesium	<b>Dolomite</b>	CaMg(CO <sub>3</sub> ) <sub>2</sub>
	4	✓	colorless or variable	cleaves in 4 directions	hydrofluoric acid	<b>Fluorite</b>	CaF <sub>2</sub>
	5-6	✓	black to dark green	cleaves in 2 directions at 90° 	mineral collections	<b>Pyroxene (commonly Augite)</b>	(Ca,Na)(Mg,Fe,Al)(Si,Al) <sub>2</sub> O <sub>6</sub>
	5.5	✓	black to dark green	cleaves at 56° and 124° 	mineral collections	<b>Amphiboles (commonly Hornblende)</b>	CaNa(Mg,Fe) <sub>4</sub> (Al,Fe,Ti) <sub>3</sub> Si <sub>6</sub> O <sub>22</sub> (O,OH) <sub>2</sub>
	6	✓	white to pink	cleaves in 2 directions at 90°	ceramics and glass	<b>Potassium Feldspar (Orthoclase)</b>	KAlSi <sub>3</sub> O <sub>8</sub>
	6	✓	white to gray	cleaves in 2 directions, striations visible	ceramics and glass	<b>Plagioclase Feldspar (Na-Ca Feldspar)</b>	(Na,Ca)AlSi <sub>3</sub> O <sub>8</sub>
	6.5	✓	green to gray or brown	commonly light green and granular	furnace bricks and jewelry	<b>Olivine</b>	(Fe,Mg) <sub>2</sub> SiO <sub>4</sub>
7	✓	colorless or variable	glassy luster, may form hexagonal crystals 	glass, jewelry, and electronics	<b>Quartz</b>	SiO <sub>2</sub>	
7	✓	dark red to green	glassy luster, often seen as red grains in NYS metamorphic rocks	jewelry and abrasives	<b>Garnet (commonly Almandine)</b>	Fe <sub>3</sub> Al <sub>2</sub> Si <sub>3</sub> O <sub>12</sub>	

\*Chemical Symbols: Al = aluminum    Cl = chlorine    H = hydrogen    Na = sodium    S = sulfur  
 C = carbon    F = fluorine    K = potassium    O = oxygen    Si = silicon  
 Ca = calcium    Fe = iron    Mg = magnesium    Pb = lead    Ti = titanium

✓ = dominant form of breakage

PHYSICAL PROPERTIES OF MINERALS

start here ↓

Density ↓

<u>Mineral Specimen</u>	<u>Streak</u>	<u>Hardness</u>	<u>Color</u>	<u>Specific Gravity</u>	<u>Unusual and other properties</u>
1. Talc	white	1	white, green, gray	2.7-2.8	greasy feel, sectile (tenacity)
2. Fluorite	white	4	green, yellow, purple	3.18	forms cubic crystals and often fluoresces
3. Feldspar var. Microcline	white	6	white, red, green	2.54-2.57	
4. Corundum	none	9	brown, pink, blue, red	4.02	often forms hexagonal crystals
5. Hematite	dark red	5.5-6.5	red, brown, black	5.26	note the variety in color and that streak
6. Hematite	dark red	5.5-6.5	red, brown, black	5.26	is the most important identifier of hematite
7. Pyrite	green/brown	6-6.5	pale brass yellow	5.02	is brittle and has conchoidal fracture
8. Graphite	black	1-2	black	2.23	greasy feel
9. Calcite	white	3	white, yellow, brown, blue	2.71	often fluorescent and has many colors
10. Agate	none	7	white, gray, brown	2.65	often banded or multicolored
11. Halite	white	2.5	colorless, white, pink	2.16	salty taste
12. Magnetite	black	6	iron-black	5.18	magnetic
13. Quartz	none	7	colorless to white	2.65	conchoidal fracture & 6-sided crystals
14. Mica var. Biotite	none	2.5-3	green, brown, black	2.8-3.2	thin sheets are elastic (tenacity)
15. Mica var. Lepidolite	none	2.5-4	pink, lilac, to gray	2.8-2.9	thin sheets are elastic (tenacity)
16. Mica var. Muscovite	none	2-2.5	colorless, yellow, brown	2.76-2.88	thin sheets are elastic (tenacity)
17. Gypsum var. Selenite	white	2	colorless	2.32	bladed gypsum
18. Gypsum var. Alabaster	white	2	white, gray, yellow	2.32	massive gypsum
19. Gypsum var. Satin Spar	white	2	white, gray	2.32	fibrous gypsum
20. Rose Quartz	none	7	pink to red	2.65	does not form crystals
21. Bauxite	brown	1-3	gray, yellow, red	2-2.55	pisolitic (round, pea sized) crystal habit
22. Milky Quartz	none	7	colorless to white	2.65	conchoidal fracture
23. Galena	lead-gray	2.5	lead-gray	7.4-7.6	the weight of galena is a dead give away
24. Sulfur	yellow	1.5-2.5	yellow, green, gray	2.05-2.09	smells and is a poor conductor of heat
25. Limonite	yellow/brown	5-5.5	yellow, brown, red	4.37	