**Study Sheet:** Minerals (Use chemical symbols in short answer blanks.) **Name**_____

**Chemistry of Minerals** - The first 3 questions come from the paragraph *above* "Chemistry of Minerals". Tricky, Prof!

1. The 5 characteristics of a mineral are..._____, _____,

_____, _____, & _____

2. Should *ice* be classified as a mineral? Why? Defend your answer. (This is your call.)

3. How is a rock different from a mineral?

~~4. Fill in the table.~~ ~~**PARTICLE** **MASS (AMU)** **NUCLEUS OR SHELL** **CHARGE (+ / - / 0)**~~

| | | | |
|---|---|---|---|
| ~~PROTON~~ | _____ | _____ | _____ |
| ~~NEUTRON~~ | _____ | _____ | _____ |
| ~~ELECTRON~~ | _____ | _____ | _____ |

~~5. Define atomic number. _____~~

~~6. How is an *isotope* different from the normal atom and should we tease isotopes for being different?~~

7. The 8 most common Earth crust elements = _____, _____, _____, _____, _____, _____, _____, & _____. <-Use symbols.

8. When elements form compounds, they share **PROTONS / NEUTRONS / ELECTRONS**. (Circle the correct answer.)

~~9. The first valence shell can hold _____ electrons, the second _____ and the 3rd _____.~~

~~10. What is odd about the valence shells of all noble gasses?~~

~~11. How is an *ionic* bond different from a *covalent* bond?~~

**Formation of Minerals** - Just one question. :)

12. Three ways minerals form are by_____

_____ from magma, & _____

**Silicate Minerals**

13. There are over_____ minerals on Earth but only a few make up the r_____-f_____ m_____

~~14. Draw a silica tetrahedron,~~

~~label the O and Si atoms,~~

~~and write the charge of the~~

~~tetrahedron next to it.~~

~~Good luck, artists!~~

~~I find this difficult.~~

15. Olivine is a _____ color, has the formula _____ & is ferromagnesian as it contains _____ & _____.

The crystal structure of olivine is built from individual _____.

16. Pyroxene is usually _____ in color & contains the elements _____, _____, _____, with other elements in a long silica tetrahedron chain. Its chemical formula is _____ and the X may be _____, _____, _____, or _____ and the Z represents _____, _____ or _____

17. Amphibole minerals are built from _____. The most common form is called _____ & usually _____ in color. (This gets too complicated for GLG101.)

18. Sheet silicates include dark colored b_____ mica & light colored m_____ mica.

19. The 2 most abundant minerals in Earth's crust are _____ & _____. The _____-containing feldspar is common in the *crust* while the feldspars containing _____ & _____ occur more in the rocks of the m_____.

20. The formula for quartz is _____. Impurities in quartz give us the gemstones _____, _____ & _____.

21. Orthoclase feldspar's formula is _____. It is called _____ and often is the color _____ (This comes from the German for "*field stone*...that flakes")

## Non-Silicate Minerals

22. Non-silicate minerals are important to us because...

23. Carbonates include the minerals _____ with the formula _____ & _____ which has the formula _____. That's enough.

24. The most familiar oxide is _____ which can have the formula _____.

25. Why are the rocks of Sedona red?

26. Other oxides include ice w/ the formula _____, bauxite_____, & corundum_____
FORMULA FORMULA

27. A halide that you eat is the mineral _____ with the chemical formula _____.

28. Sulfides contain _____+ sulfur and include _____, _____,

_____ (also known as fool's gold) & _____

29. A common sulfate mineral is _____, the formula is _____ & 1 use is _____

30. Phosphate minerals are used for _____

31. Native element minerals include _____ and sometimes _____, _____, and _____

32. Au, Ag & Cu have _____ luster. Quartz has _____ luster.

Kaolin has _____ luster.

**Identifying Minerals**

33. Malachite is always a _____ color and azurite is always _____.

34. What is a problem with using *only* color to identify minerals?

35. The color of a mineral's powder is called _____

36. The minerals in the Mohs scale from 1-10 are _____, _____, _____

_____, _____, _____, _____,

_____, _____, _____,

~~37. My two favorite crystal habits and mineral displaying that habit are _____ / _____~~

~~and _____ / _____. (You choose. You can use the web to look up different minerals.)~~

38. The tendency of a mineral to break along a flat surface is called _____. Minerals that don't cleave tend

to _____. The mineral _____ shows 1 perfect cleavage. Feldspar, pyroxene, & amphibole,

show _____ cleavages. Halite, calcite & galena show _____ cleavages. Quartz and olivine have _____ cleavages.

39. Special properties include taste as in the mineral _____. The measure of a mineral's density is called

s_____ g_____. The mineral _____ reacts easily with HCL (hydrochloric

acid) and _____ but _____ reacts only when powdered or the acid is warm.

**Vocabulary - Cross out each term as you write it in the correct blank.**

atom / atomic mass / amphibole / atomic number / anhedral / compound / covalent bond / cleavage
crystal habit / density / electron / ~~element~~ / euhedral / fluorescence / fracture / halide / hardness
ion / ionic bond / isotope / lodestone / luster / metallic / mineral / Mohs scale / native element / neutron / oxide
polymorph / phosphate / proton / rock / rock-forming minerals / sheet silicates / silicate / silicon-oxygen tetrahedron
streak / striation / sulfate / sulfide / valence shell

_____ naturally magnetic mineral

_____ the way a mineral reflects light

_____ positive particle in atom's nucleus

_____ parallel lines on a mineral's surface

_____ the basic unit of a chemical element

_____ formed when two elements combine

_____ mineral showing its true crystal habit

_____ mineral made by S joining with a metal

_____ used to determine a mineral's hardness

_____ an atom that has gained or lost electrons

_____ bond created by sharing valence electrons

_____ luster exhibited by gold, copper, silver, etc.

_____ the outermost layer of electrons in an atom

_____ an element that has gained or lost neutrons

_____ number of protons in the nucleus of an atom

_____ earth material made of one or more minerals

_____ term for a mineral that shows no crystal habit

_____ mineral that involves a $PO_4$ ion such as apatite

_____ basic 3-D structure of many silicates, 1 Si + 4 O

_____ irregular breaking of a mineral not along planes

_____ mineral that may occur in multiple crystal forms

_____ largest family of minerals, composed of Si and O

_____ mineral formed by a metal combining with oxygen

_____ light emitted by a mineral under X-rays or UV light

_____ typical form or forms a crystal takes when it grows

_____ part of an atom's nucleus with mass of 1 and no charge

_____ group of ~20 minerals that make up most of Earth's crust

_____ naturally occurring mineral element such as Au, Ag, or Cu

_____ the type of bond that exists between Na and Cl for example

_____ mineral made by bonding with an $SO_4^{-2}$ ion such as gypsum

_____ minerals such as biotite and mica that cleave in one direction

_____ average number of protons and neutrons in the atom's nucleus

_____ color of a mineral's powder, metals are usually dark, nonmetals light

_____ substance's mass per unit of volume, another name for specific gravity

_____ tendency of crystalline materials to split along definite structural planes

_____ mineral's resistance to scratching or the ability of a mineral to scratch other substances

_____ particles found in clouds outside the nucleus, number in an atom = the number of protons

_____ molecule made of usually F or Cl combined w/ sodium or other cation, often from evaporation

_____ solid, naturally occurring Earth material w/ definite chemical composition & internal structure

_____ mineral come w/ many colors, common hornblende is dark brown-black, 2 cleavages @ 54° & 126°, common long needle-like crystals, frequently found in ign. & met. rocks

_____ one of 100+ substances that cannot be chemically interconverted or broken down into simpler substances and are primary constituents of matter.

*Cool mineral page.*

*1/9/25 JS*