Matter

What are the different states in which matter exists?

Matter is anything that has _____ and _____.

States of Matter –

1. _____ – definite shape and volume
   Plasticity – ability of a solid to flow or change _____.
2. Liquid – _____ shape and definite volume
3. _____ – indefinite shape and volume
4. _____ – highly ionized gas made up of positive ions and electrons. Exists in lightning bolts and _____. Most common state of matter in the _____.

Matter cannot be destroyed nor created – only _____

What are the 3 basic forms of matter?

Matter can be classified into three different forms:

1. elements
2. compounds
3. _____

Elements

What is the simplest form of an element?

The simplest form of a _____

Atom – the smallest part of an element

- Electron – _____charge traveling at high speeds.
- _____ – positive charge in the nucleus
- Neutron – no charge in the _____

Periodic Table of Elements (pg. 910)

There are 118 known elements. _____ of them are naturally occurring.

Isotopes – atoms of the same element with different _____ numbers.
Ion – An atom with an electric _____.

What is an isotope?

Most common elements in the Universe: _____ & _____
Most common elements in the Earth: _____ & _____
Most common elements in the Crust: _____ & _____

Combinations of Atoms

What are the different chemical bonds?

Why are chemical formulas used?

What is a mixture?

COMPOUNDS

Contain 2 or more elements _____ combined. Most substances are compounds.

- _____ – smallest part of a compound.

- Chemical Bonds

- _____ Bonds – force of attraction between 2 oppositely charged particles.

  1. Ions of _____ charges may bond together to form compounds.
  2. Positive ions are _____
     Negative ions are nonmetals

- _____Bonds

  1. Allows 2 _____ to combine.
  2. Electrons are _____.

- **Chemical Formulas** – Combinations of chemical _____ used to represent different atoms of a compound.

H_2O
KCl
$CaCl_2$
$NaSO_4$
$C_{12}H_{22}O_{11}$

MIXTURES

- two or more substances _____ combined & can be separated by physical means. For example:
  - Kool-aid
  - Seawater
  - _____
  - _____
  - _____

What is A Mineral?

What is a mineral?	➢ A mineral is: 1. _____ occurring 2. inorganic 3. homogeneous _____ 4. definite _____ composition 5. highly ordered _____ arrangement
What common ways do minerals form?	➢ Formation of Minerals: 1. Cooling of _____ 2. Evaporating _____ 3. Existing Minerals Changed by heat or _____
Describe the 9 mineral types, the differences between them, and give examples of each.	➢ Types of Minerals: 1. _____ – Contains oxygen and silicon. Most common mineral type. Most often combined with one or more metallic element. **Example: $K(AlSi_3O_8)$** 2. _____ _____ – Contains oxygen and silicon and either magnesium or iron. **Example: Mg_2SiO_4** 3. _____ – Contains carbon and oxygen. **Example: $CaCO_3$** 4. _____ – Contains oxygen and at least one metal. **Example: Fe_2O_3** 5. _____ – Contains sulfur and at least one metal. **Example: ZnS** 6. _____ – Contains chlorine or fluorine. **Example: CaF_2** 7. _____ – Contains sulfur and oxygen. **Example: $BaSO_4$** 8. _____ – Contains phosphorus and oxygen. **Example: $Ca_5F(PO_4)_3$** 9. _____ – Contains only one element. **Example: Au**

Define Other Key Terms:

1. Acid _____

_____

2. Base _____

_____

3. Chemical Reaction _____

_____

4. Metallic Bond _____

_____

5. Nucleus _____

_____

6. Solution _____

_____

Elements in the Earth's Crust

Write in the matching name or symbol and atomic number for each of the elements below.
The Periodic Table can be found on pg 910 or the inside back cover of the textbook.

		Element Name/Symbol	Atomic Number
1)	Aluminum	_____	____
2)	Calcium	_____	____
3)	Carbon	_____	____
4)	Chromium	_____	____
5)	Copper	_____	____
6)	Gold	_____	____
7)	Helium	_____	____
8)	Hydrogen	_____	____
9)	Iron	_____	____
10)	Lead	_____	____
11)	Magnesium	_____	____
12)	Mercury	_____	____
13)	Nickel	_____	____
14)	N	_____	____
15)	O	_____	____
16)	P	_____	____
17)	K	_____	____
18)	Si	_____	____
19)	Ag	_____	____
20)	Na	_____	____
21)	S	_____	____
22)	Th	_____	____
23)	Sn	_____	____
24)	U	_____	____
25)	Zn	_____	____
26)	Zr	_____	____

ATOMS

Circle the term in parentheses that makes each statement correct.

1. Protons are particles (outside, in) the nucleus of an atom.

2. Electrons are atomic particles with a (positive, negative) charge.

3. An example of matter is (air, heat).

4. The building blocks of matter are (atoms, compounds).

5. (Neutrons, Protons) are particles in the atom's nucleus that have no electric charge.

6. The atomic particles outside of the atom's nucleus are (electrons, protons).

7. Substances made up of only one kind of atom are called (isotopes, elements).

8. Isotopes are atoms of the same element that have different numbers of (neutrons, electrons).

9. Negatively charged particles that move around the atom's nucleus are (neutrons, electrons).

10. Two atoms of the same element that have different (mass numbers, atomic numbers) are isotopes of the element.

11. A difference in the (mass number, atomic number) of atoms means they are of different elements.

12. The nucleus of an atom has a (positive, negative) charge.

13. Carbon-14 is an (isotope, element) of carbon.

14. The mass number of an atom with 12 protons and 12 neutrons is (12, 24).

15. The atomic number of an atom is equal to the number of (protons, neutrons) in its nucleus.

16. In atoms with equal numbers of electrons and protons, there is (a positive, no) electric charge.

17. Anything that takes up space and has mass is (matter, an element).

18. A model of an atom is (larger, smaller) than the actual atom.

19. The nucleus of an atom is made up of neutrons and (electrons, protons).

20. Isotopes enable scientists to determine the (age, size) of ancient objects.

ATOMS

Use the clues given below to fill in the blanks in the table.

- **The NUMBER OF PROTONS in an atom is called the ATOMIC NUMBER.**
- **A neutral atom will have the SAME NUMBER OF ELECTRONS AS THERE ARE PROTONS. Assume all the atoms of elements in the table below are neutral.**
- **The MASS NUMBER of an atom is the number of protons and neutrons added together.**

Element	Symbol	Number of Protons	Number of Neutrons	Number of Electrons	Atomic Number	Atomic Mass
Oxygen	O	8		8		16
Silicon	Si	14	14			28
Aluminum	Al		14	13	13	
Iron	Fe				26	56
Calcium	Ca	20				40
Sodium	Na				11	23
Copper	Cu	29	35	29		
Magnesium	Mg				12	24
Gold	Au	79				197
Silver	Ag		61	47		

MINERAL TYPES

Directions. Using your notes and the chemical formulas below, match the mineral names with one of the nine mineral types. Write the mineral names in the blanks below.

Chemical Formula	Mineral Name
$Ca_5(OH)(PO_4)_3$	Apatite
$BaSO_4$	Barite
$Al(OH)_3$	Bauxite
$Be_3Al_2(Si_6O_{18})$	Beryl
$KMg_3(AlSi_3O_{10})(OH)_2$	Biotite
Cu_5FeS_4	Bornite
$CaCO_3$	Calcite
Cu_2S	Chalcocite
$CuFeS_2$	Chalcopyrite
$Mg_6(Si_4O_{10})(OH)_8$	Chlorite
HgS	Cinnabar
Cu	Copper
Al_2O_3	Corundum
$CaMg(CO_3)_2$	Dolomite
CaF_2	Fluorite
PbS	Galena
Au	Gold

Chemical Formula	Mineral Name
C	Graphite
$CaSO_4 \cdot 2H_2O$	Gypsum
$NaCl$	Halite
Fe_2O_3	Hematite
$Al_4(Si_4O_{10})(OH)_8$	Kaolinite
$FeO(OH) \cdot H_2O$	Limonite
Fe_3O_4	Magnetite
$KAl_2(AlSi_3O_{10})(OH_2)$	Muscovite
Mg_2SiO_4	Olivine
$Na(AlSi_3O_8)$	Plagioclase Feldspar
$K(AlSi_3O_8)$	Potassium Feldspar
FeS_2	Pyrite
SiO_2	Quartz
$Mg_2(Si_2O_5)(OH)_4$	Serpentine
ZnS	Sphalerite
$Mg_3(Si_4O_{10})(OH)_2$	Talc
$Al_2(Si_4)(OH)_2$	Topaz

Silicates

_____
_____
_____
_____
_____
_____
_____

Oxides

_____
_____
_____
_____
_____

Ferromagnesian Silicates

_____
_____
_____
_____
_____

Sulfides

_____
_____
_____
_____
_____
_____

Carbonates

_____
_____

Halides

_____
_____

Sulfates

_____
_____

Phosphates

_____

Natives

_____
_____
_____

Using the given information, answer the questions on the back of this sheet.

MINERAL TYPES

Answer the following questions –

1. Draw a circle around each of the minerals listed below that does **not** belong to the silicate family.

   Plagioclase Gypsum Muscovite Kaolinite Calcite Quartz

2. Write the names of the symbols of the two elements found in all silicate minerals.

   _____ and _____.

3. To which chemical classification group does dolomite belong? _____

4. From what element do the sulfates get their names? _____

5. Give an example of an oxide. _____

6. Which of the rock-forming mineral groups makes up the largest group of minerals in Earth's crust?

   _____

7. What commonly used metal is extracted from hematite? _____

Atoms, Elements & Minerals Review Questions

True or False.

_____ 1. The particles of a solid are more tightly packed than those of a gas.

_____ 2. Isotopes are atoms of the same element that differ in atomic number.

_____ 3. All known elements are naturally occurring.

Choose the best response.

_____ 4. Which of the following has a negative charge?

a. neutron b. nucleus c. proton d. electron

_____ 5. Particles in atoms that do not carry an electrical charge are called

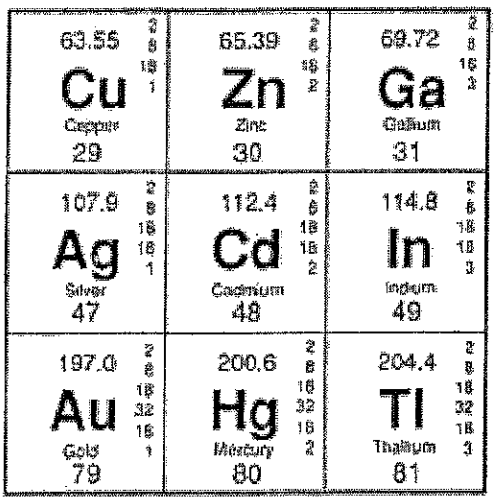
a. neutrons b. nuclei c. protons d. ions

_____ 6. Atoms of an element with an atomic number of 8 must have:

a. 8 neutrons b. 8 protons c. 16 neutrons d. 16 protons

_____ 7. Different elements are made up of different kinds of:

a. electrons b. protons c. molecules d. atoms



_____ 8. According to this table, how many electrons does the element silver (Ag) have?

a. 47 b. 61
c. 108 d. 148

_____ 9. How may neutrons could an atom of the element zinc (Zn) have?

a. 30 b. 36
c. 65 d. 95

_____ 10. Which of the following is shared between atoms in a covalent bond?

a. neutron b. nucleus c. proton d. electron

_____ 11. How many atoms of potassium (K) are represented by the formula K_2SO_4?

a. 1 b. 2 c. 4 d. 6

_____ 12. Color and hardness are examples of an element's

a. physical properties b. chemical properties c. atomic structure d. molecular properties

_____ 13. The mass number of an atom is equal to its

a. mass number
b. electrical charges
c. total number of neutrons and protons
d. total number of neutrons

_____ 14. A material with a definite shape and volume is a

a. compound b. liquid c. gas d. solid

_____ 15. A liquid does not have a definite

a. shape b. volume c. chemical formula d. mass

_____ 16. A material that contains two or more substances that are not chemically combined is

a. a mixture b. a compound c. an ion d. a molecule

Completion

17. The smallest complete unit of an element is an _____

18. The smallest complete unit of a compound is a _____

Critical Thinking

19. What distinguishes an atom of one element from atoms of all other elements? _____

_____

20. Why do isotopes of an element have different mass numbers? _____

_____