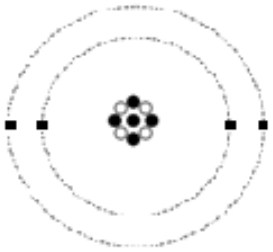
Name _____ Date_____ Period_____

Milestone Review part 4 Chemistry—Atomic and Nuclear Theory and the Periodic Table

1. List the three subatomic particles; tell where they are found and what charge they have.

Particle	location	charge

2. Label the parts of the beryllium (Be) atom to the right ----------→



3. What is an isotope?
4. How are the elements arranged in the periodic table?
5. _____ electrons determine how an atom will react.
6. What does the atomic number tell you?
7. How do you find the number of neutrons an atom of an element would have?
8. What are valence electrons and how do you find out how many valence electrons an element has?

9. Give the number of protons, neutrons and electrons in the following isotopes:

	# of protons	#of neutrons	# of electrons
a. Mg-24	_____	_____	_____
b. Mg-26	_____	_____	_____
c. N-15	_____	_____	_____
d. O-18	_____	_____	_____
e. Si-30	_____	_____	_____
f. S-34	_____	_____	_____

10. Complete the table. There is enough information given for each element to determine all missing numbers

Symbol	**Atomic Number**	**Mass Number**	**Number of Protons**	**Number of Electrons**	**Number of Neutrons**
^{23}Na					
K		40		19	
F					10
	20	41		18	
	50			50	72
^{131}I					
		109	47	46	
	1	2		1	
^{36}S					

11. What is radioactivity?
12. What is half-life?
13. If we start with 400 atoms of a radioactive substance, how many would remain after one half-life?_____ after two half-lives? _____ after three half-lives? _____ after four half-lives _____?
14. A paleontologist discovered fossil remains of ancestral mammal, and in order to have basis of comparison to other ancestral mammals, he needed the age of the fossil. The carbon-14 analysis indicates that only half of the original amount is present. How old is this fossil?
15. The half-life of hydrogen-3 is 12.3 years. Given 100 g of hydrogen-3, how many grams will be left after 5 half-lives?
16. A patient is administered 20 mg of iodine-131. How much of this isotope will remain in the body after 40 days if the half-life for iodine-131 is 8 days?
17. The mass of cobalt-60 in a sample is found to have decreased from 0.8 g to 0.2 g in a period of 10.5 years. From this info, calculate the half-life of cobalt-60
18. The three most common states of matter are _____, _____ & _____.
19. The kinetic theory states that the higher the temperature, the (***faster / slower***) the particles that make up a substance move.
20. As a sample of matter is cooled, its particles move more (***slowly / quickly***).
21. The particles that make up a solid move _____ than do the particles that makes up a gas.
22. Matter that has a definite volume but no definite shape is a _____.
23. Matter that has a definite volume and a definite shape is a _____.
24. If you move a substance from one container to another and its volume changes, the substance is a _____.

25. In the above picture, which substance is a liquid?
26. In the above picture, which substance is a solid?
27. In the above picture, which substance is a gas?
28. In the above picture, which substance are the forces of attraction among the particles so weak that they can be ignored under ordinary conditions?

Melting and Boiling Points of Some Substances

Substance	Melting Point	Boiling Point
Hydrogen	−259.3°C	−252.9°C
Nitrogen	−210.0°C	−195.8°C
Acetic Acid	16.6°C	117.9°C
Gold	1064.2°C	2856°C

29. Based on the information in the table above, the melting point of acetic acid is_____.
30. Based on the information in the table above, the freezing point of nitrogen is _____.
31. Based on the information in the table above, which substances would be a gas at 0ºC?

32. A solution is a _____ mixture of two or more components.
33. The _____ is the component in the greatest amount.
34. The _____ is the component in the least amount
35. In a mixture, the _____ dissolves in the _____.
36. If you dissolve sugar in water, which is the solvent and which is the solute? Water = _____ Sugar = _____
37. Soft drinks consist of a mixture of water, sugar, and flavoring, with carbon dioxide gas bubbled through it. Which of these ingredients would be considered the solvent?
38. Dry air is primarily made up of nitrogen (78.09%) and oxygen (20.95%). Which of these is the solvent and which is the solute? Nitrogen = _____ Oxygen = _____

Classification of Matter—Know definition of Matter; Be able to give examples of and tell difference between: Mixtures and substances (non-mixtures); Homogenous and heterogeneous mixtures; Elements vs. Compounds.

Label as Mixture or Pure Substance		
Salt Water _____ Chicken Soup _____ Water _____ Salt _____ Silver _____ Chex mix _____	1. Pure substance 2. Mixture 3. Heterogeneous Mixture 4. Matter 5. Element 6. Homogeneous Mixture 7. Compound	a. Made up of two types of matter that can be physically separated. b. Two samples might not be the same. c. Two samples will have the same makeup. d. Has only one kind of atom in the sample. e. Contains two kinds of atoms that *cannot* be physically separated. f. Cannot be separated by physical means. g. A classification of anything that has mass and takes up space.
Label as Homogenous or Heterogeneous		
Sugar Water ____ Vegetable Soup ____ Chex Mix _____ Jello w/ fruit _____ Milk _____ Plain Jello _____		

Write the metric prefixes in order from largest to smallest:

Convert the Following	Identify Physical or Chemical Change
3.2 kilometers = _____ meter	Sugar dissolved in water _____
0.23 centimeters = _____ millimeters	Wood burning _____
0.12 liter = _____ milliliters	Digestion _____
2500 millileters = _____ liters	Water Boiling _____
4500 grams = _____ kilograms	Two liquids bubble when mixed _____
9 kilograms =_____ grams	Cooking food _____
54 megaliters = _____ centiliters	Melting butter _____

Circle the acids and underline the bases

$H_2(PO_4)$	HF	$Ca(OH)_2$
$Ca(OH)_2$	NaOH	HNO_3

Circle the indicators of physical changes
Underline the indicators of a chemical change

Melts	Produces gas	Changes in color
Changes Smell	Ripped	Cutting
Boils	Turns cloudy	Changes taste
Breaks	Dissolves	freezing

1. Proton 2. Neutron 3. Electron 4. Nucleus 5. Atom	a. Particles with no charge that exists in the nucleus of most atoms. b. Center of the atom, contains most of the atom's mass. c. Positively charged particle in the nucleus of the atom. d. The smallest part of an element or molecule. e. Negative particles in the nucleus of the atom. f. Negatively charged particle that exists in the space around the nucleus.	1. Atomic Number 2. Molecule 3. Compound 4. Mass Number 5. Isotope	a. Total number of protons and neutrons in the nucleus of an atom. b. Number of protons in an atom; also the way the elements are numbered. c. An atom with a different number of neutrons d. Two or more elements combined. e. Two or more atoms that are combined f. Number of electrons in an atom.

Solution (So); Colloid (C); Suspension (Sp)

Milk in water _____ Doesn't settle; scatters light _____

Vinegar in water _____ Doesn't scatter light or settle _____

Sand in water _____ Settles and scatters light _____

Oil and water _____ Fog _____ Milk _____

The temperature at which a solid turns to liquid is called:

The temperature at which a liquid turns to a gas is called:

The temperature at which a gas turns to liquid:

The temperature at which a liquid turns to a solid:

When a solid turns straight to a gas is called:

At what temperature does water melt?

At what temperature does water boil?

Endothermic or Exothermic

1. If it gets cold _____
2. If it gets hot _____
3. Condensation: _____
4. Vaporization: _____
5. If it absorbs heat_____
6. If it releases heat_____
7. Melting _____
8. Freezing _____

Give the group/family name for the following groups on periodic table

Group 1: _____

Group 2: _____

Group 13: _____

Group 14: _____

Group 15: _____

Group 16: _____

Group 17: _____

Group 18: _____

Reading Chemical Equations

$Li_2O + MgCl_2 \rightarrow 2\ LiCl + MgO$

Write the second reactant: _____

Write the first product:_____

How many Lithium atoms are on the product side? _____

What is coefficient for lithium chloride? _____

Type of reaction: _____

$2\ C_3H_7OH + 9\ O_2 \rightarrow 6\ CO_2 + 8\ H_2O$

Write the first product: _____

How many carbons on the reactant side? _____

How many hydrogens on the product side? _____

What is the coefficient for carbon dioxide? _____

Type of reaction: _____