Name _____ Period _____ Date _____

# Physical Science – 2nd Semester – Final Exam Study Guide – (2012-2013)

## 1. Physical Science Basics

a. What tool(s) would you want to use to find the:
   i. Mass of an object? _____ Basic SI Unit? _____
   ii. Volume of an object? _____ Basic SI Unit? _____
   iii. Length of an object? _____ Basic SI Unit? _____
   iv. Density of an object? _____ Basic SI Unit? _____

b. What is the formula for calculating density? _____
   i. What is the density of a cube that is 15 g and has a volume of 3 $cm^3$? _____
   ii. Compare the density of solid $H_2O$ to liquid $H_2O$, and explain what observable effect this has.
   _____
   _____

## 2. Chemistry Basics

a. Element (def.) _____
b. Atom (def.) _____
c. Compound (def.) _____
d. Molecule (def.) _____

## 3. Model of the Atom: Evolution of the Atomic Theory

Atoms are so small that many scientists throughout history have created _____ to describe them.
Why have atomic theories changed over time? _____

| *Scientist* | *Year* | *Major Discovery/ Contribution* | *Name of atomic model* |
|---|---|---|---|
| John Dalton | | | |
| J.J. Thomson | | | |
| Niels Bohr | | | |
| Ernest Rutherford | | | |

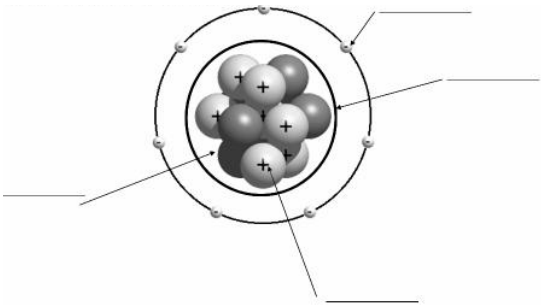
## 4. Periodic Table

a. The current periodic table is arranged by increasing _____.
b. **Reading the Periodic Table**
   i. An element's _____ can be predicted from its location in the periodic table.
   ii. The atomic number represents the number of _____.
   iii. The atomic mass represents the number of _____.
   iv. The atomic symbol represents _____.
   v. The group/family number represents _____.
   vi. The row/period number represents _____.
   vii. This group contains the most elements: _____.

c. **Matching** *Word Bank*: *Metalloid, transition element, metal, non-metal, group 18- noble gases, group, group 1*

| | |
|---|---|
| The most stable elements are found here. They are colorless tasteless gases that glow when an electrical current passes through them. | |
| Elements that share some properties with metals, and some with non-metals. | |
| Column of elements in the periodic table that have similar physical or chemical properties. | |
| The most reactive elements in the periodic table, and are soft enough to be cut with a knife. | |
| An element that has a shiny luster, is a good conductor of heat and electricity, is malleable and ductile. | |
| Elements in groups 3-12 | |
| Element that is usually a gas or brittle, solid at room temperature, and does not conduct heat and electricity well. | |

## 5. Parts of an Atom



| Subatomic Particle | Charge | Location in the atom |
|---|---|---|
| Proton | | |
| Electron | | |
| Neutron | | |
| Nucleus | | |
| The atom shows to the left has _____ valence electrons.<br>This atom has _____ electrons that would be involved in bonding. | | |

Krypton is located in group 18. It has _____ valence electrons, which is the most that any element can have. Krypton's atomic number is 36 and its atomic mass is 84. It has ____ protons, ___ neutrons, and ____ electrons.

## 6. Properties of Atoms Gaining or Losing Electrons

a. An atom that has gained or lost an electron is called a(n) _____
b. Group (# and name) _____ loses electrons most easily.
c. Group (# and name) _____ gains electrons most easily.
   i. Elements in group 17 want to bond with elements in group _____
   ii. Elements in group 16 want to bond with elements in group _____
d. The charge becomes positive when what has happened? _____
   i. What do we call a positively charged ion? _____
e. The charge becomes negative when what has happened? _____
   i. What do we call a negatively charged ion? _____
f. An ionic bond is an attraction between what charges? _____

## 7. DNA

a. ***True / False***. All things, *living* and *non-living* are made up of atoms.
b. Macromolecule (def.) _____
c. List the 5 elements that make up the DNA macromolecule:
   1). _____; 2). _____; 3). _____; 4). _____; 5). _____

## 8. Chemical Bonding

a. Ionic bond
   i. ***Metal / non-metal*** and ***metal / non-metal*** bonded together
   ii. ***Protons / neutrons / electrons*** are ***shared / transferred***
   iii. Draw how Aluminum and Oxygen would ionically bond (using arrows). →
b. Covalent bond
   i. ***Metal / non-metal*** and ***metal / non-metal*** bonded together
   ii. ***Protons / neutrons / electrons*** are ***shared / transferred***
   iii. Draw the structural and Lewis structure for Carbon tetrachloride. →
c. Classify the following compounds as ionic or covalent, then name them accordingly:
   i. KCl _____ _____
   ii. $CO_2$ _____ _____
   iii. $CaF_2$ _____ _____
   iv. $P_2O_5$ _____ _____

## 9. Naming Chemical Formulas

a. $H_2O$ is the molecular formula for _____. The 2 means _____; no number after the O indicates _____.
b. The molecular formula for oxygen gas is _____.
   i. Oxygen is a *diatomic molecule* because _____.
c. $C_6H_{12}O_6$ is the chemical formula for _____.
d. The chemical formula for methane is _____.

## 10. Physical and Chemical Properties and Changes

a. Identify the following as either being a physical property or a chemical property:
   i. Flammability _____
   ii. Melting point _____
   iii. Color _____
b. Name a property that would ***describe*** salt. _____; Name a property that would ***identify*** salt. _____
c. A ***chemical / physical*** change occurs when bonds are broken.
d. A ***chemical / physical*** change occurs when no new substance is formed.
e. Physical change (def.) _____
   i. Name 3 examples of a physical change:
      1. _____ 2. _____ 3. _____
f. Chemical change (def.) _____
   i. Name examples of a chemical change:
      1. _____ 2. _____ 3. _____
   ii. Name 3 signs that a chemical change has occurred:
      1. _____ 2. _____ 3. _____
g. Balancing Chemical Equations
   i. ____ $H_2$ + ____ $O_2$ → _____ $H_2O$
   ii. How does the Law of Conservation of Mass apply to the equation you balanced above?
      _____

h. What forms of energy could be transferred in a chemical reaction? _____ _____ _____

i. A change that **<u>gives off</u>** energy is called _____ Ex. _____

ii. A change that **<u>absorbs</u>** energy is called _____ Ex. _____

iii. ***True / False***. Every chemical reaction involves a change in energy.

## 11. Mixtures

a. Heterogeneous (def.) _____

i. Name an example of a heterogeneous mixture: _____

b. Homogeneous (def.) _____

i. Name an example of a homogeneous mixture: _____

c. Separating Mixtures: Name & give a brief description of the 5 physical methods to separate mixtures:

1. Magnetism _____
2. Filtration _____
3. Dissolving _____
4. Evaporation _____
5. Chromatography _____

d. Solutions

i. Solute (def.) _____

ii. Solvent (def.) _____

iii. Solubility (def.) _____

iv. In Kool-Aid, identify the solute _____ and the solvent _____

v. ***True / False***. Typically there is more solute than solvent in a solution.

vi. ***True / False***. Solutes and solvents can be solids, liquids, or gases.

vii. ***True / False***. When a salt dissolves in water, each of its particles is surrounded by water molecules. This is why the freezing point of salt water is lower than the freezing point of fresh water.

## 12. Acids and Bases

a. **Acidic** solutions→ pH levels from _____ to _____; Taste _____; Ex. _____

i. What can a substance do if it has a warning of "corrosive"?

_____

b. **Basic** solutions→ pH levels from _____ to _____; Taste _____; Ex. _____

## 13. Phase Changes

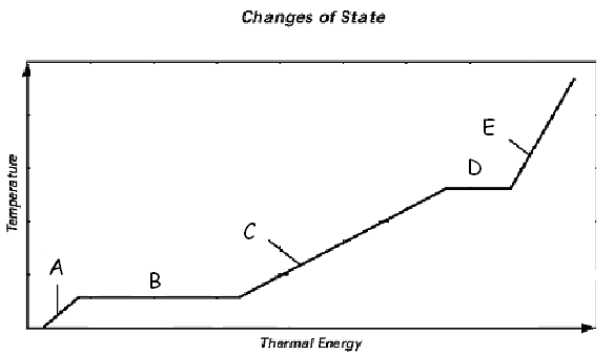
a. The three main states of matter are: _____ _____ _____

b. Draw the molecular arrangement of each:

| | | |
|---|---|---|
| | | |

c. Label the **Phase Change Diagram.** Use arrows where necessary (phase transitions).

| | |
|---|---|
| Solid | Liquid |
| Gas | Solid and Liquid |
| Liquid and Gas | Freezing |
| Melting | Evaporating |
| Condensing | |




d. The average kinetic energy of the particles of a substance going through a phase transition can be described as (circle all that apply): ***increasing / decreasing / staying the same***.

e. Compare the amount of kinetic energy (motion) of the particles in a **solid** to a **gas**.

_____

## 14. Types of Energy

a. Energy (def.) _____

b. What does it mean if something has **potential energy**? _____

   i. Example: _____

c. When does an object possess **kinetic energy**? _____

   i. Example: _____

d. Chemical PE (def.) _____

   i. Example: _____

## 15. Energy Transformations

a. The law of conservation of energy states that when one form of energy is converted into another,

   _____

   i. ***True / False***. Most forms of energy cannot be converted into other forms.

b. Natural gas (_____ energy) heats (_____ energy) water.

c. Batteries (_____ energy) are used to turn on a flashlight (_____ energy).

d. You rub your hands together (_____ energy) on a cold day and friction is created to produce heat (_____ energy).

e. A microwave (_____ energy) in a house turns on because of energy produced in a nuclear power plant from an atom's nucleus (_____ energy)?

f. A light bulb [visible light] (_____ energy) turns on because of turning on the light switch (_____ energy)?

g. Fossil fuels (_____ energy) are burned, which is called combustion, and heat (_____ energy) is released.

h. A spinning turbine (_____ energy) produces usable energy to power homes (_____ energy).

## 16. Sources of Energy

a. Identify the following as being renewable or non-renewable:

   i. Biomass _____
   ii. Coal _____
   iii. Petroleum _____
   iv. Wind _____
   v. Solar _____
   vi. Nuclear _____
   vii. Hydroelectric _____
   viii. Geothermal _____

b. What part of the water cycle would not be possible without solar energy? _____

c. Nuclear Energy

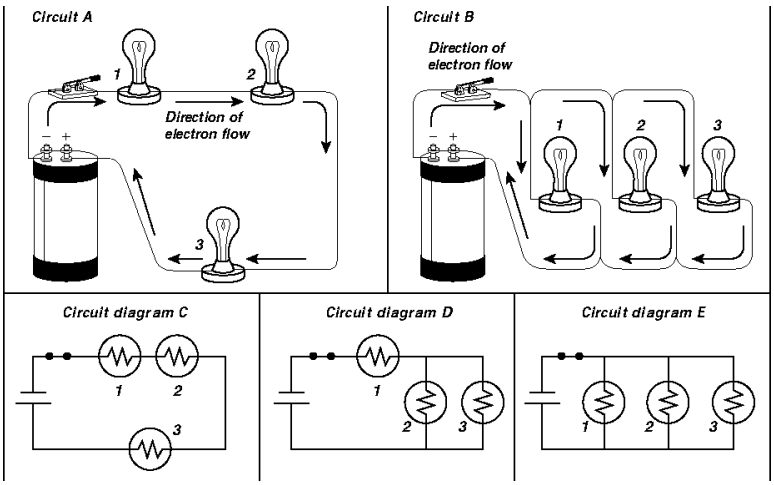
   i. Energy stored in _____
   ii. Nuclear Fission (def.) _____
   iii. Nuclear Fusion (def.) _____
   iv. ***True / False***. Fusion releases 3-4 times more energy than fission.
   v. ***True / False***. Only nuclear energy is produced in a nuclear reaction, not light or heat.

## 17. Heat Transfer

a. Conduction (def.) _____
   i. Example: _____
b. Convection (def.) _____
   i. Example: _____
c. Radiation (def.) _____
   i. Example: _____
d. Temperature (def.) _____
   i. The scale to measure the amount of KE in the atoms of a substance: _____
e. Heat (def.) _____
   i. Heat move from a _____ object to a _____ object.
f. Insulator (def.) _____
   i. Example: _____
g. Conductor (def.) _____
   i. Example: _____

## 18. Electricity

a. Static Electricity (def.) _____
b. Static Discharge (def.) _____
c. A _____turns a circuit on and off by opening or closing.
d. _____ circuits have one path, while _____ circuits have more than one path.
e. Circuits A & C are _____
f. Circuits B & E are_____
g. Electric currents always flow from the: _____
h. In a ***series*** circuit: finish the saying "when one light bulb goes out… _____"
i. In a series circuit: Adding another bulb will _____




j. ***True / False.*** In a parallel circuit, the current from each bulb has its own path.
k. An electric current will always follow the path _____.

## 19. Magnetism

a. Magnetism (def.) _____
b. Magnetism in a ***physical / chemical*** property.
c. Poles that attract are _____; Poles that repel are _____
d. The region around the magnet is known as the _____ _____. The closer these lines are together, _____.
e. ***True / False***. A magnet is capable of producing an electric current.