H- Chemistry

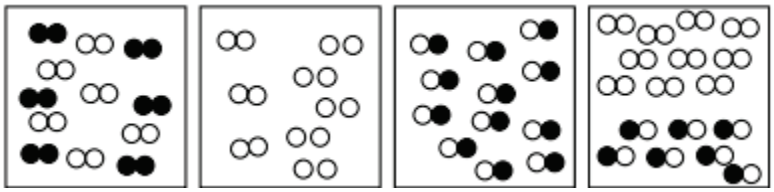
Name _____
Period ___ Date ___/___/___

Review for 2nd quarter Interim Exam

The 2nd quarter interim exam is a cumulative exam of all the material we covered since the beginning of the year (quarters 1 and 2). The exam will take place on Thursday January 22nd, 2015 and Friday January 23rd, 2015..
Attached you will find a list of all concepts you should know and the skills you should be able to perform in order to succeed in your 2nd quarter interim exam.

Your assignment is to make a table with two columns. On one column you will list the concept you need to know or list the skill you need to accomplish. On the second column you will show that you master the concept or skill by explaining the concept in your own words. Demonstrate your knowledge of the concept by drawing animation, or an example of the skill - a question with a solution, a drawing etc.

Example:

I know the meaning of the metric prefixes, mega-, kilo-, centi-, milli-, micro-, nono- and others.	Mega = 10^6, kilo = 10^3, centi = 10^{-2} etc.
I can convert one measurement into another	Example: 0.532 cg = _____ g 0.532 cg x $0.532cg \times \frac{1\ g}{100\ cg} = 5.32 \times 10^{-3}\ g$
I know how matter is classified	* - Pure matter is classified as pure substance or a mixture. * - Pure substances are homogeneous and could be separated based on the ability to be decomposed by chemical means. * - An element could not be broken down by physical or chemical means and is made out of one kind of atom while a compound can be separated by chemical means (but not by physical means) and is made out of two or more different atoms. * - Mixtures could be separated by physical means and could be homogeneous or heterogeneous based on its composition. 

This Assignment should be **typed or neatly written** and is due on Monday January 5th 2015.

H- Chemistry

1 • Matter and Measurement (Units 1 & 2)

M A T H S K I L L S

I have these various scientific / mathematical skills:

Metric System

☐ You know the metric system.

☐ You know the meaning of the metric prefixes, mega-, kilo-, centi-, milli-, micro-, nono- and others.

☐ You can convert one measurement into another (e.g., 0.532 cg = _____ mg).

☐ You can convert squared or cubed units (e.g., knowing that 2.54 cm = 1 inch, 38.5 in^2 = _____ cm^2).

Dimensional Analysis

☐ When you convert one unit to another, you can show your work using dimensional analysis or unit analysis.

Scientific Notation

☐ You can translate regular numbers into scientific notation and numbers written in scientific notation into normal notation.

☐ You know how to calculate with numbers written in scientific notation.

☐ You know how to set-up in your calculator numbers written in scientific notation

Making Measurements

☐ You can use a ruler or other measuring device to make a measurement to the correct number of significant figures, i.e. include all of the digits in the measurement that are a significant part of the measurement.

☐ You can correctly determine the precision of a measuring tool from a given measurement.

☐ You always include a unit on a measurement.

☐ You know the distinction between a measurement and a defined (exact, standard) number (e.g., 12 things in a dozen, pi).

☐ You can explain the difference between accuracy and precision.

Significant Figures

☐ You can determine the number of significant figures in a given measurement (i.e., you know whether a “0” in a measurement is significant or not.)

☐ You can determine the precision in a calculation involving measurements when the measurements are written with the correct number of significant figures.

1 • Matter and Measurement (Units 1 & 2)

STUDY LIST
MATTER AND ENERGY

1. Matter

Make sure:

- ☐ You know what the three states of matter are.
- ☐ You know the characteristics (volume, shape distance and attraction forces between particles and, response to changes in pressure and temperature)
- ☐ You know the different state changes and can classify them as exothermic or endothermic
- ☐ You know the classification of matter.
- ☐ You know to determine the class of matter from a particle diagram.
- ☐ You know to determine the class of matter from a formula
- ☐ You know the difference between homogeneous and heterogeneous mixtures.
- ☐ You know how to separate the components of a mixture.
- ☐ You know the differences between chemical and physical properties.
- ☐ You know the differences between intensive and extensive physical properties.
- ☐ You know the differences between chemical and physical properties.
- ☐ You know the signs that indicate a chemical change occurred.
- ☐ You know the definitions and examples of the Law of Conservation of Mass, the Law of definite proportions, and the Law of Multiple Proportions.

2. Energy:

Make sure:

- ☐ You know the definitions of kinetic, potential (gravitational and chemical), and nuclear
- ☐ You know the difference between heat and temperature.
- ☐ You know the different temperature scales and how to convert between them.
- ☐ You know the definition of the Law of Conservation of Energy.

2 • Atomic Concepts (Units 3 & 4)

STUDY LIST

The Development of the Atomic Theory:

Make sure you can:

- ☐ State the five "major scientists" (starting with Democritus), their experiments, what they added to the atomic theory, and the name of their model.
- ☐ Define the three theories that Dalton explained in terms of atoms:
  - Law of Conservation of Matter
  - Law of Definite/Constant Proportions
  - Law of Multiple Proportions
- ☐ Sketch a cathode ray tube as demonstrated in class and state how J.J. Thomson's experiments led to the idea that atoms have positive and negative parts, the negative parts are all the same, and the negative parts (called electrons) have a certain charge/mass ratio.

- ☐ Define cathode rays.
- ☐ Sketch the set-up used by Ernest Rutherford (the gold-foil experiment), show what he observed, and explain how these observations led to the idea that most of the mass of the atom is concentrated into a tiny, amazingly massive, positively-charged nucleus.
- ☐ State the base to Bohr's model.

Parts of the Atom:

Make sure you can:

- ☐ State the three particles that make up an atom, their symbol, their charge, their mass, and their location.
- ☐ Determine the number of protons, neutrons, and electrons in any atom or ion.
- ☐ Explain what isotopes are.
- ☐ Represent the nucleus with isotopic notation, such as: $^{220}_{86}\text{Rn}$
- ☐ Recognize when two nuclei are isotopes of each other.

Atomic Mass Calculations:

Make sure you can:

- ☐ Calculate the average atomic mass of an element using the percent abundance and mass of each isotope.
- ☐ Calculate the percent abundance of isotopes given the average atomic mass (found on Periodic table) and isotopic masses of an element.

Nuclear Chemistry:

Make sure you can:

- ☐ List the four types of particles and rays that are emitted during nuclear radiation.
- ☐ State why alpha particles were the perfect tool for Ernest Rutherford to study the structure of atoms.
- ☐ State the characteristics (what are they, their mass, charge, penetration power, and how are they blocked) of each one of the particles and rays that are emitted during nuclear radiation.
- ☐ Know how to write nuclear decay - from reference table N, and transmutation equations.
- ☐ Know to recognize fission and fusion reactions and to compare and contrast them.
- ☐ Know the different uses of radioisotopes.
- ☐ Know what is a half-life.
- ☐ Know to perform calculations related to half-life (calculate amount remaining (look to the future), calculate amount starting (look at the past), calculate half-life, calculated elapsed time (age of a radioisotope).

Electrons in Atom

Make sure you:

- ☐ Know to describe the electromagnetic spectrum, continuous visible spectrum, and bright line spectrum.
- ☐ Know to define wavelength, frequency, amplitude of a wave.
- ☐ Know to perform calculations to determine, wavelength, frequency, or energy of a wave.

- ☐ Know why is electron described as having duel characteristics.
- ☐ Know the difference between ground state and excited state of an atom.
- ☐ Know to describe how a bright line spectrum is generated and what does each line in the spectrum represent.
- ☐ Know the definitions of Aufbau principle, Hund's rule, Pauli exclusion principle, and the Heisenberg uncertainty .
- ☐ Know the order of electrons filling in energy levels and sublevel.
- ☐ Know how to write extended electron configuration for an atom in the ground state, Short-hand electron configuration (using noble gases), and draw orbital notation.
- ☐ Know what are valence electrons and to determine their number in an atom.
- ☐ Know how to draw Lewis-dot diagram for an atom.

3 • The Periodic Table (Unit 5)

S T U D Y L I S T

The Elements & Periodicity:

I can:

- ☐ List the common families of the periodic table and recognize to which family any element belongs.
- ☐ Recognize metals, non-metals, and metalloids (semi-metals) on the periodic table.
- ☐ Know the location of the different blocks in the Periodic Table.
- ☐ Know which are the representative elements, the transition elements, and the inner-transition elements.
- ☐ State and define the terms conductivity, malleability, and ductility.
- ☐ Explain how Dmitri Mendeleev put together the periodic table and why we give him credit for the table even though others were working along the same lines.
- ☐ Know the order of elements in the old P.T. and in the modern P.T.
- ☐ Define the Modern Periodic Law.
- ☐ Define: Atomic radius, Ionic radius, ionization energy 1^{st} and successive, electron affinity, and electronegativity.
- ☐ Know the trends in the properties listed in the above section and know to **explain** what is the cause for each one of the trends.
- ☐ Know to analyze a list of successive ionization energies for an element and use them to predict the group an element belongs to.
- ☐ Know the trends in metallic/nonmetallic characteristic, and in chemical reactivity.
- ☐ Know what are allotropes. Give examples.

4 • Chemical Bonding (Units 6 & 7)

S T U D Y L I S T

Ionic Compounds

I can:

- ☐ Define an ionic bond.
- ☐ State whether a compound is an **ionic compound** or a **molecular compound**.
- ☐ Write the **formula** of an **ionic compound** given the two ions or its name. Know when to use **parentheses**.*
- ☐ **Name** an ionic compound given the formula. *
- ☐ Determine the **charge** on an ion from information in an ionic formula. *
- ☐ List the characteristics of an ionic compound and use them to identify a compound as ionic.
- ☐ Draw Lewis-dot diagram of an ionic compound.
- ☐ Explain what is lattice energy, determine which compound has higher lattice energy, stronger ionic bond, has higher melting point.

Metallic Bond

I can:

- ☐ Define a metallic bond.
- ☐ Describe the metallic bond model.
- ☐ Describe how metallic bond explains the properties of metals.
- ☐ Know what are alloys and why are they used.

Nonmetal Compounds aka Molecular Compounds

I can:

- ☐ Define a covalent bond.
- ☐ Describe the difference between single, double, and triple covalent bonds.
- ☐ Write the **formula** of a **binary nonmetal compound** (**molecular compound**) given its name.*
- ☐ **Name** a binary nonmetal compound (molecular compound) given its formula. *
- ☐ List the characteristics of a molecular compound and use them to identify a compound as molecular.
- ☐ Draw Lewis-dot diagrams for a molecular compound and a polyatomic ion.
- ☐ Recognize the need for resonance forms to describe Lewis-dot diagram of a substance
- ☐ Use electronegativity difference to determine the type of bond and the polarity of a bond.
- ☐ Determine the shape of a molecule.
- ☐ Determine polarity of molecules. *
- ☐ Describe hybridization of orbitals.
- ☐ Determine the different types of intermolecular forces of attraction (IMF's) and explain how they affect properties of substances and the states of matter. *

We will cover all the starred concepts upon our return to school.