**Semester 2 – Chemistry – Final Exam Review Assignment**

**Instructions**: Use your notes, the class website ([**www.nsdscience.weebly.com**](http://www.nsdscience.weebly.com)), and any other online resource to complete the following questions and prompts. Use complete sentences for all solutions and answers. Do NOT copy and paste material as your written answers. You may however copy/paste images and graphs to support your explanations and descriptions. Show all equations, and work (with units) for any math problem.

**Unit 1 – Atomic Structure & The Periodic Table**

1. All atoms are comprised of different combinations of the same three subatomic particles. What are the subatomic particles? Include their name, charge, location, and function/purpose.
2. Draw and label an Isotope Notation symbol for an element of your choice. Include the definition of Mass Number, Atomic Number, and Atomic Mass.
3. How are atoms different from ions? How does an atom become a positive ion? How does an atom become a negative ion? What are the technical terms for a positive ion and a negative ion?
4. Draw and Label a “square” from the periodic table (pick an element). Include the following: chemical symbol, chemical name, atomic mass, atomic number.
   1. For your chosen element, record the number of protons, neutrons, and electrons in your atom.

**Unit 2 – Chemical Bonding**

1. How do atoms form chemical bonds?
   1. Why do atoms for chemical bonds?
2. What is the difference between an ionic bond and a covalent bond?
   1. If you are given a chemical formula, how does one determine if a bond is ionic or covalent?
   2. What type of bond would the following pairs of atoms be involved in?
      1. Sodium & Chlorine
      2. Carbon & Oxygen
3. How does an atom become an ion?
   1. What is a synonym for a positive ion? What is a synonym for a negative ion?
   2. What is the octet rule?
   3. What is a valence electron?
4. Write and naming chemical formulas.
   1. Write the chemical formula of the ionic compound formed between: Sodium & Chlorine.
   2. Name the ionic compound formed between: Sodium & Chlorine.
   3. Write the chemical formula for the following covalent compound: Dihydrogen Monoxide
   4. Name the following covalent compound: B2O3

**Unit 3 – Chemical Reactions**

1. What is the difference between a physical change and a chemical change?
   1. Identify the following changes as physical or chemical. Include a reason why.
      1. Ripping a piece of paper in half.
      2. Burning a piece of paper.
2. What does the Law of Conservation of Mass state?
   1. Balance the following chemical reactions by adding/removing coefficients.
      1. \_\_\_\_ H2 + \_\_\_\_\_O2 🡪 \_\_\_\_\_ H2O
      2. \_\_\_\_\_N2O5 🡪 \_\_\_\_\_N2 + \_\_\_\_\_O2
3. What is meant by the term “reaction rate”?
   1. There are four ways to increase reaction rate, what are they?
   2. There are four ways to decrease reaction rate, what are they?
4. Types of reactions.
   1. What is the difference between an exothermic reaction and an endothermic reaction?
   2. Write the general formula for the following types of chemical reactions:
      1. Single Replacement
      2. Double Replacement
      3. Synthesis
      4. Decomposition
   3. Use your generic formulas to identify the type of reaction depicted below. Then balance the reaction.
      1. \_\_\_\_\_KClO3 🡪 \_\_\_\_\_KCl + \_\_\_\_\_O2 Reaction Type =
      2. \_\_\_\_\_NaCl + F2 🡪 \_\_\_\_\_NaF + \_\_\_\_\_Cl2 Reaction Type =
      3. \_\_\_\_\_P + \_\_\_\_\_O2 🡪 \_\_\_\_\_P2O5 Reaction Type =
      4. \_\_\_\_\_NaBr + \_\_\_\_\_CaF2 🡪 \_\_\_\_\_NaF + \_\_\_\_\_CaBr2 Reaction Type =

**Unit 4 – Nuclear Reactions & Radioactivity**

1. Define the terms Nuclear Fusion & Nuclear Fission.
   1. Draw & label a diagram depicting the processes of Nuclear Fission and Nuclear Fusion.
   2. Create a Venn diagram showing the similarities and differences between Fission and Fusion.
2. What is radioactivity?
   1. Describe the process of Alpha Decay/Radiation.
      1. Draw and label a diagram with your description.
      2. What changes to the nucleus occur during Alpha Decay?
      3. Draw the symbol for an alpha particle?
   2. Describe the process of Beta Decay/Radiation.
      1. Draw and label a diagram with your description.
      2. What changes to the nucleus occur during Beta Decay?
      3. Draw the symbol for a beta particle.
   3. Describe the process of Gamma Decay/Radiation.
      1. Draw and label a diagram with your description.
      2. What changes to the nucleus occur during Gamma Decay?
3. Draw a Venn diagram showing the similarities & differences between Chemical Reactions & Nuclear Reactions.
4. Use isotope notation to complete the following nuclear reactions.
   1. 21686Rn 🡪 42He + \_\_\_\_\_\_
   2. 255104Rf 🡪 251102No + \_\_\_\_\_\_
   3. Write a nuclear equation, using isotope notation, for the alpha decay of Uranium-235
   4. 12953I 🡪 0-1e + \_\_\_\_\_
   5. 5222Ti 🡪 0-1e + \_\_\_\_\_
   6. Write a nuclear equation, using isotope notation, for the beta decay of Titanium-22

**Semester 2 Vocabulary**: atomic mass, mass number, atomic number, electrons, protons, neutrons, isotope, ion, valence electron, nucleus, metal, non-metal, metalloid, group, period, atom, element, chemical bond, ionic bond, covalent bond, octet rule, subscript, coefficient, chemical formula, valence electron, compound, molecule, physical change, chemical change, chemical reaction, chemical equation, product, reactant, exothermic, endothermic, reaction rate, catalyst, inhibitor, alpha decay, beta decay, gamma decay, fission, fusion, half-life, radioactivity, transmutation.

**Final Exam Vocabulary Quizlet: https://quizlet.com/\_62f801**