**Unit 4 Study Guide**

**Nuclear Chemistry and Bonding**

Nuclear Chemistry

1. What is radiation?
2. Radioactive Decay
   1. List and define the 3 types of radioactive decay.
   2. Order them from least to most harmful.
   3. What can stop each type?
3. Fission and Fusion
   1. Describe fission.
   2. Describe fusion.
   3. Which occurs in stars?
   4. Which occurs in nuclear reactors?
   5. Where are all the elements from Helium to Iron created and how?
   6. How are all natural elements heavier than Iron created?
4. Nuclear reactors
   1. How do they work?
   2. Compare and contrast pressurized water reactors and boiling water reactors.
   3. What type of reactor was at Fukushima Dai-Ichi Nuclear plant?
   4. What happened to the reactor after the earthquake and tsunami?
5. Half-Life
   1. Plutonium-238 has a half-life of 87.7 years and is a powerful alpha particle emitter. If the original amount of plutonium-238 on hand is 5000 kg, how much remains after 526.2 years?
   2. Radium-226 was used in paint to create glow in the dark watch hands so that people could see the time in the dark, it glows blue. It has a half-life of 1601 years and gives off alpha, beta, and gamma rays. If 100g of radium-226 is mixed in with a gallon of paint, how much will be left after 6404 years?

Bonding

1. Ionic Bonds
   1. What is an ionic bond?
   2. Describe the properties of compounds created from ionic bonds.
   3. Show the transfer of electrons between elements when creating an ionic bond. Don’t forget to write the formula for the compound created.
      1. K and S
      2. Sr and F
      3. Mg and P
2. Covalent Bonds
   1. What is a covalent bond?
   2. Describe the properties of compounds created from covalent bonds.
   3. Show the sharing of electrons in creating a covalent bond by drawing Lewis structures.
      1. NF3
      2. CBr4
      3. SiO2