**Unit 2B Study Guide**

**Test is on Tuesday, September 13th!**

**The Atom**



***Answer all questions on a separate page in your science notebook!***

1. What is an atom? A molecule?
   * An atom is the smallest type of particle and cannot be broken down any further. A molecule is 2 or more atoms chemically combined.
2. You should be able to identify all of the scientists discussed in class and how they specifically contributed to the atomic theory.
   * **Democritus** – first thought of the atom, believed there was one final particle that makes up all matter and cannot be broken down.
   * Aristotle – did not believe in the atom.
   * **Dalton** – Created the first atomic theory
     + All matter is made of atoms
     + Every element has a different atom
     + Different atoms can join to make different substances (compounds)
   * **JJ Thompson** – Discovered the electron cloud through the cathode ray tube experiment. He is known for the “plum pudding” or “chocolate chip cookie” model that says the atom is a positive blob with tiny negative particle stuck in it.
   * **Ernest Rutherford** – Discovered the nucleus and proton through the gold foil experiment. He is known for the “solar system model” where the negative particles circulate around a positive nucleus.
   * **James Chadwick** – Discovered the neutron.
   * **Bohr** – Believed electrons stay in rings around the nucleus. Electrons can jump to a new ring but can never stay between them.
   * **Schrodinger and Heisenberg** – This is the current model. Protons and Neutrons make up the center nucleus and electrons are in a cloud around the nucleus. It cannot be determines precisely where the electrons are found at any given moment.
3. Who are the two scientists that developed the periodic table?  How did each arrange it?  How is the current table arranged?
   * Mendeleev – Created the first periodic table and ordered the elements by atomic mass.
   * Moseley – Created the current periodic table and elements are ordered by atomic number.
4. What are the main things listed in each box on the periodic table?  What does each item stand for?
   * Atomic number-This number tells the number of protons in the nucleus
   * Element Symbol
   * Element Name
   * Atomic mass-This tells the number of protons and neutrons found in the nucleus
5. What are groups and periods?  How do they relate to an elements properties?
   * Groups are the columns found on The Periodic Table. Columns are called groups or families, and as family members, they have similar properties.  These elements have the same number of valence electrons in their outermost shell.
   * A row of elements on The Periodic Table is also considered a "Period". All of the elements in a period have the same number of atomic orbitals. Physical and chemical properties of elements follow a repeating, or periodic, pattern as you move across the period. They do not share properties, but properties change as one goes from left to right.
6. What is the charge, placement and mass of the proton, neutron and electron?
   * Protons are positively charged and located in the nucleus, they weigh 1 amu (atomic mass unit) which is equivalent to 1.7x10^-24 grams.
   * Neutrons are also located in the nucleus with an almost equivalent weight of a proton (1 amu). This is why most of the mass of an atom can be found in the nucleus.
   * Electrons are located outside the nucleus in the electron cloud, there mass is so small it is considered 0 amu.
7. How do you determine the number of protons in an atom?  Electrons? Neutrons?
   * The number of protons is determined by the atomic number of the element.
   * The electrons are equal to the protons in a stable atom.
   * Atomic Mass – Atomic Number = Number of Neutrons.
8. Be able to draw the “fried egg model”/Bohr model of any atom (1-18 for Bohr model).
   * Fried Egg Model – it looks like a fried egg, the protons and neutrons for in the “yolk” nucleus and the electrons surround it in the egg white.
   * Bohr (Requires for advanced classes only)
     + Nucleus in the center filled with protons and neutrons
     + Electron rings surround the nucleus.
       - 2 electrons fit on the first ring, 8 on the second and 8 on the third.
       - Shells fill from the inside out and a new shell does not open until the previous is full.
9. What makes an atom of one element different from another element?
   * You have a new element
10. How do you know if an atom is an isotope? Ion?
    * An isotope is an atom that has a different number of neutrons than the atom in its most common form. For instance, the most common form of carbon is carbon-12 with 6 protons and 6 neutrons. However, carbon-14 also exists with 6 protons and 8 neutrons.
    * An ion is a charged atom that has gained or lost an electron.
11. What are the four forces of the atom and how do they help hold the atom together?
    * Gravitational Force
      + Attractive force between all objects in the universe
      + Gravity depends upon mass of and distance between objects…
      + This force is not very strong in the atom
    * Electromagnetic Force
      + Opposites attract; likes repel
      + Protons & electrons
      + Electrons and Nucleus
    * Strong Force
      + Holds protons and neutrons together to make the nucleus
      + Greater than electromagnetic force between protons (since the protons would repel each other)
    * Weak Force –
      + Deals more with radioactive decay and nuclear fusion