Physical Science Chapter 6 Study Guide

* Atomic Theory of Matter
  + Every element consists of tiny particles called atoms
  + All atoms of a particular element have the same properties
  + Different elements have different properties because their atoms are different
  + Atoms of different elements can combine in specific ways to form compounds
  + Chemical processes are the result of the rearrangement, combination, or separation of atoms
* Abbreviation given to each element –chemical symbol—Know the bold print chemical symbols
* Parts of an atom
  + Nucleus—dense central core composed of protons and neutrons
  + Electrons surround the nucleus
  + Protons and neutrons are made up of small particles called quarks
  + Protons have positive charge and electrons have a negative charge
* Isotopes—atoms that are of the same element but have different number of neutrons
* Electron shells—regions around the nucleus that represent the energy level of electrons
* Ions—atoms with a charge
  + Cation—atom with positive charge
  + Anion—atom with negative charge
* Mass number—total number of protons and neutrons in an atom (measured in atomic mass units (u); an atom with 10 protons and 9 neutrons would have an atomic mass of 19 u.)
* Quantum theory—energy is not released in a smooth flow but rather in distinct little “packets” called quantums
* Heisenberg uncertainty principle—it is impossible to measure the speed and location of an electron at the same time
* Orbitals—the regions where an electron generally moves
* Quantum numbers—numbers with represent the overall motion of an electron
* Pauli exclusion principle—no two electrons can have the same four quantum numbers
* Nuclear radiation—an atom’s nucleus that undergoes change give this off
* Radioactive decay—the process of one kind of atom changing into another kind of atom
* Half-life—the decay rate of a radioactive substance
* Types of radioactive decay
  + Alpha decay—a nucleus emits a clump of two protons and two neutrons
  + Beta decay—a nucleus changes a neutron into a proton and ejects an electron
  + Gamma decay—a nucleus emits high-energy electromagnetic rays
* Nuclear fission—the process of an atom’s nucleus splitting apart, releasing Great amounts of energy
* Chain reaction—the domino effect of one nucleus splitting and setting off another, that on setting off another, etc.
* Nuclear reactor—a type of controlled reaction used to harness useful energy
* Nuclear fusion—the process of combining two nuclei to form a heavier nucleus and thereby releasing energy
* Valence shell—the outer shell of an atom; the number of electrons in this shell largely determines the properties of an atom
* Octet rule—most atoms want 8 electrons in their valence shells
* The periodic table
  + The rows are called periods
  + The columns are called groups
  + The elements are divided into three main groups: metals, semimetals, nonmetals
  + The first column or group is called the alkali metals and is very reactive
  + Mercury is the only metal that is liquid at room temperature
  + Oxygen makes of a majority of the mass of the human body