**Physical Science Study Guide for Chapter 8—Chemistry in Action**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—chemical change resulting from a collision between atoms and molecules
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—substances that undergo a chemical reaction
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—substances produced by the reaction
   3. Chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_—an expression that uses chemical symbols to represent a chemical reaction
   4. Law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of mass—there will always be the same amount of mass after a chemical reaction as before
2. Chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—study of the relationship between chemical reactions and the laws of thermodynamics
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions—reactions that give off heat; caused by the energy in chemical bonds being converted into heat
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions—reactions that absorb heat; caused by heat energy being converted into bonds

* \_\_\_\_\_\_\_\_\_\_\_\_ reactions—reactions that occur by themselves, without energy being added to it

1. Chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—having to do with the rate or speed of reactions
   1. Five factors for the rate of a chemical reaction
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy—the energy necessary to break old bonds and form new ones
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—increasing the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will normally speed up the reaction (think yeast causing bread to rise)
      3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—increasing concentration normally speeds up a reaction
      4. Surface area—the more finely something is ground the quicker it will react
      5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—a substance that speeds up the rate of a reaction without being affected itself
2. Types of Chemical Reactions
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions—two things combine to form one new substance
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reactions—a substance breaks down into more than one thing
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_ displacement reactions—one element in a compound is replaced by another element
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-displacement reactions—two compounds react to create two new compounds
3. Salts, Acids, and Bases
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_—any ionic compound that does not contain a hydrogen or hydroxide ion
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_—substances which produce hydrogen ions (H+) when dissolved in water
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—substances which produce hydroxide ions (OH-) when dissolved in water
   4. The pH scale—a system used to measure the relative strengths of acids and bases
      1. The number 7 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the scale
      2. Any number \_\_\_\_\_\_\_\_ than 7 is acidic--the lower the number the stronger the acid
      3. Any number \_\_\_\_\_\_\_\_ 7 is basic or alkaline--the higher the number the stronger the base
4. Chemistry and Electricity
   1. Redox Reactions
      1. Reduction reaction: atoms \_\_\_\_\_\_\_\_\_\_\_\_ electrons
      2. Oxidation reaction: atoms \_\_\_\_\_\_\_\_\_\_\_ electrons (LEO the lion says GER)
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—any reactions that are caused by an electric current
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—a solution that conducts electricity
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—a device designed to produce an electrochemical reaction
         1. The two probes in an electrochemical cell: \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—process of initiating a reaction by running a current through a solution
         3. Electroplating—an electrochemical reaction that forms a thin layer of \_\_\_\_\_\_\_\_\_\_\_\_ on an object
         4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells vs. voltaic cells—electrolytic cell produces a chemical reaction through electrolysis and a voltaic cell produces electricity by a chemical reaction within the cell
         5. Kinds of voltaic cells
            1. \_\_\_\_\_\_\_\_\_\_\_ cell—Leclanche cells or regular batteries; nonrechargeable
            2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells—cells that can be recharged like car batteries
            3. \_\_\_\_\_\_ cells—a cell in which the reactants are continually replenished from an outside source
5. Organic Chemistry—study of compounds containing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Carbon
      1. Carbon forms \_\_\_\_\_\_\_\_\_\_ covalent bonds
      2. Carbon forms compounds of many different \_\_\_\_\_\_\_\_\_\_\_\_\_\_
      3. Carbon may form \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_ bonds with many different elements
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—many substances contain compounds made of carbon and hydrogen
      1. \_\_\_\_\_\_\_\_\_\_\_\_—hydrocarbons with single bonds
      2. \_\_\_\_\_\_\_\_\_\_\_\_—double bonds
      3. \_\_\_\_\_\_\_\_\_\_\_\_—triple bonds
   3. Soaps—molecules with \_\_\_\_\_\_\_\_\_\_\_\_\_ bonds on one end and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the other
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—long chains of hydrocarbons that make up plastics
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-the chemistry of life
   1. Types of compounds in the body
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—provided most of the energy for the body; composed of hydrogen, carbon, oxygen
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—examples include glucose (what plants make through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) and sucrose (table sugar)
         2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—a long chain of sugar molecules
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         1. \_\_\_\_\_\_\_\_\_\_\_
            1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fats—usually solid at room temperature (e.g. animal fats); more unhealthy than unsaturated fats
            2. Unsaturated Fats—liquid at room temperature (oils); more healthy than saturated fats
         2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
            1. LDL
            2. \_\_\_\_\_\_\_\_\_\_\_ (this is the healthy type of cholesterol)
      3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—compounds that are used to build and maintain living cells; they make up about 50% of the body’s weight
         1. \_\_\_\_\_\_\_\_\_\_\_\_ acids—these are the building blocks of proteins
      4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—chemicals in our cells that contain the genetic material or blueprints for our bodies
         1. \_\_\_\_\_\_\_—found in every cell of our bodies and contains the information for every physical detail
         2. \_\_\_\_\_\_\_—these are “working copies” of the DNA; they are transcribed from the DNA and sent throughout the bodies on various working missions
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—the total process by which the body produces and uses energy from food
      1. Carbohydrates are converted into glucose
      2. Glucose is burned in the cells in a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      3. The heat from cellular respiration is used by the cell to produce \_\_\_\_\_\_
      4. ATP powers nearly all of the body’s reactions