

## APES “CHEMISTRY REVIEW” NOTES: MATTER & ENERGY

### I. Matter

A. SUBSTANCE—(ELEMENTS & COMPOUNDS) matter with a definite composition.....

C    H<sub>2</sub>O    NaCl    NH<sub>3</sub>

B. Properties of Matter—characteristics; can be physical or chemical

conductivity	melting point	malleability
density	boiling point	ductility
solubility	refractive index	odor

1) PHYSICAL PROPERTY—characteristic that can be observed and measured without changing the chemical composition of the substance

- Intensive property—does not depend on the amount of matter
- Extensive property—depends on the amount of matter

2) CHEMICAL PROPERTY—ability to form new substances as a result of chemical reactions (rxns.)

C. States of Matter

1) SOLID—matter with a definite, fixed shape and volume

2) LIQUID

- matter with variable shape and fixed volume
- exhibits flow
- takes the shape of its container

3) GAS

- matter with variable shape and volume
- exhibits flow
- takes the shape and volume of its container
- GAS is used to describe a substance that is normally stable as a gas at room temperature (“oxygen gas”)
- VAPOR is used to describe a substance when it found as a gas even though the normal state is not (“water vapor”)

4) PLASMA

- low-density ionized gases

D. PHYSICAL CHANGES

1) alterations that do not change the substance’s identity and composition

2) e.g.: paper that is shredded is still paper; sugar dissolved in water is still sugar

3) key words: boil, freeze, melt, condense, dissolve, crush, break, cut...

E. MIXTURES

1) a physical blend of two or more substances

(gas-gas, liquid-gas, gas-liquid, liquid-liquid, solid-liquid, solid-solid)

2) can be HETEROGENEOUS or HOMOGENEOUS

- HETEROGENEOUS  
not uniform; has different “phases”  
e.g.: granite, Italian salad dressing
- HOMOGENEOUS  
called a SOLUTION  
uniform; has one “phase”  
e.g.: salt water, air

3) phase—area of uniform composition and properties

4) can be separated by physical means: evaporation, filtration, distillation, etc.

## F. Elements and Compounds

### 1) ELEMENT

- simplest form of matter retaining the properties of that matter
- e.g. : Ag Pb O W

### 2) COMPOUND

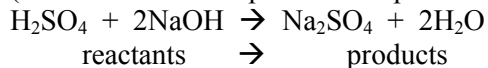
- more than one element in a type of matter
- can only be separated by chemical methods
- e.g. NaHCO<sub>3</sub> CO H<sub>2</sub>CO CaCO<sub>3</sub>

## G. CHEMICAL CHANGES

- 1) alterations that changes substance's identity and composition to something new
- 2) e.g.: burning firewood, rotting of fruit
- 3) key words: rust, decompose, corrode, burn, ferment, grow, decay...

## H. CHEMICAL RXNS.—the changing of substance(s) into new ones

- REACTANTS—starting substances in a rxn.
- PRODUCTS—new substances formed in a rxn.  
("Reactants react to produce the products.")



- clues that a chemical rxn. has occurred:

energy is given off (gets hotter)	production of a solid (precipitate; ppt.)
energy is absorbed (gets colder)	production of a gas
color change	usually not easily reversible
odor change	

## I. ENERGY CHANGES IN RXNS.

- 1) Exothermic—giving off heat (-ΔH)
- 2) Endothermic—absorbing heat (+ H)