

## Unit 2

Chapter 3 Suggested End of Chapter Problems: 3.1, 3.7, 3.11, 3.15, 3.17, 3.19, 3.21, 3.23, 3.25, 3.27, 3.29, 3.35, 3.38, 3.39, 3.43, 3.45, 3.49, 3.57, 3.59, 3.67, 3.71, 3.73, 3.75, 3.79, 3.81, 3.85, 3.87, 3.98, 3.103, 3.105, 3.107, 3.109, 3.120

Chapter 4 Suggested End of Chapter Problems: 4.1, 4.3, 4.5, 4.9, 4.11, 4.13, 4.27, 4.31, 4.33, 4.35, 4.39, 4.43, 4.44, 4.45, 4.49, 4.51, 4.53, 4.57, 4.59, 4.61, 4.63, 4.65, 4.69, 4.71, 4.73, 4.86, 4.93, 4.95, 4.99, 4.103, 4.105

The mole

Molecular mass

Molar mass

Atomic mass units

Avogadro's number

Dimensional analysis: MW to mol, MW to g, amu to g, g or mols of element to number of atoms, converting units, average mass to MW to determine element, computing molecular weight of compound, average atomic mass from % composition and masses, determining % composition from mass and average atomic mass, empirical vs. molecular formula, determining grams of product from grams of one starting material in chemical reactions

Combination reactions

Combustion reactions

Acid-base reactions

Balancing chemical equations

Stoichiometry

Mass spectrometry and molecular mass

Writing chemical reactions and predicting products from reactants

Limiting reactants

Percent yield

Actual vs. theoretical yield

Classifying chemical reactions (neutralization/acid-base, double-displacement/metathesis, gas-forming, precipitation, decomposition, combination, single displacement, combustion, disproportionation, formation of peroxides, formation of superoxides, hydrolysis, condensation)

Aqueous solution (aq) and electrolytes: water as a solvent

Non-electrolytes

Strong electrolytes: ionize 100% in solution

Strong acids and strong bases

Concentration units: molarity, dilution, ppm, ppb

Acid-base neutralization and standardization of solutions and stoichiometry

Net ionic equations and spectator ions

Water is amphiprotic (acts as an acid or a base)

Titrations: Equivalence point, end point

Precipitation Reactions & Solubility Rules (Table 4.5)

Saturated solution

Ion exchange

Balancing chemical reactions: non-redox vs. redox, half reactions, oxidation, reduction

Determining oxidation number / oxidation state

## Chapter 3 Chemical Reactions and Earth's Composition

### 3.1

**Chemical equation:** a description of the identities and quantities of **reactants** (substances consumed during a chemical reaction) and **products** (substances formed)

**Combination reaction:** a reaction in which two or more substances combine to form one product

### 3.2

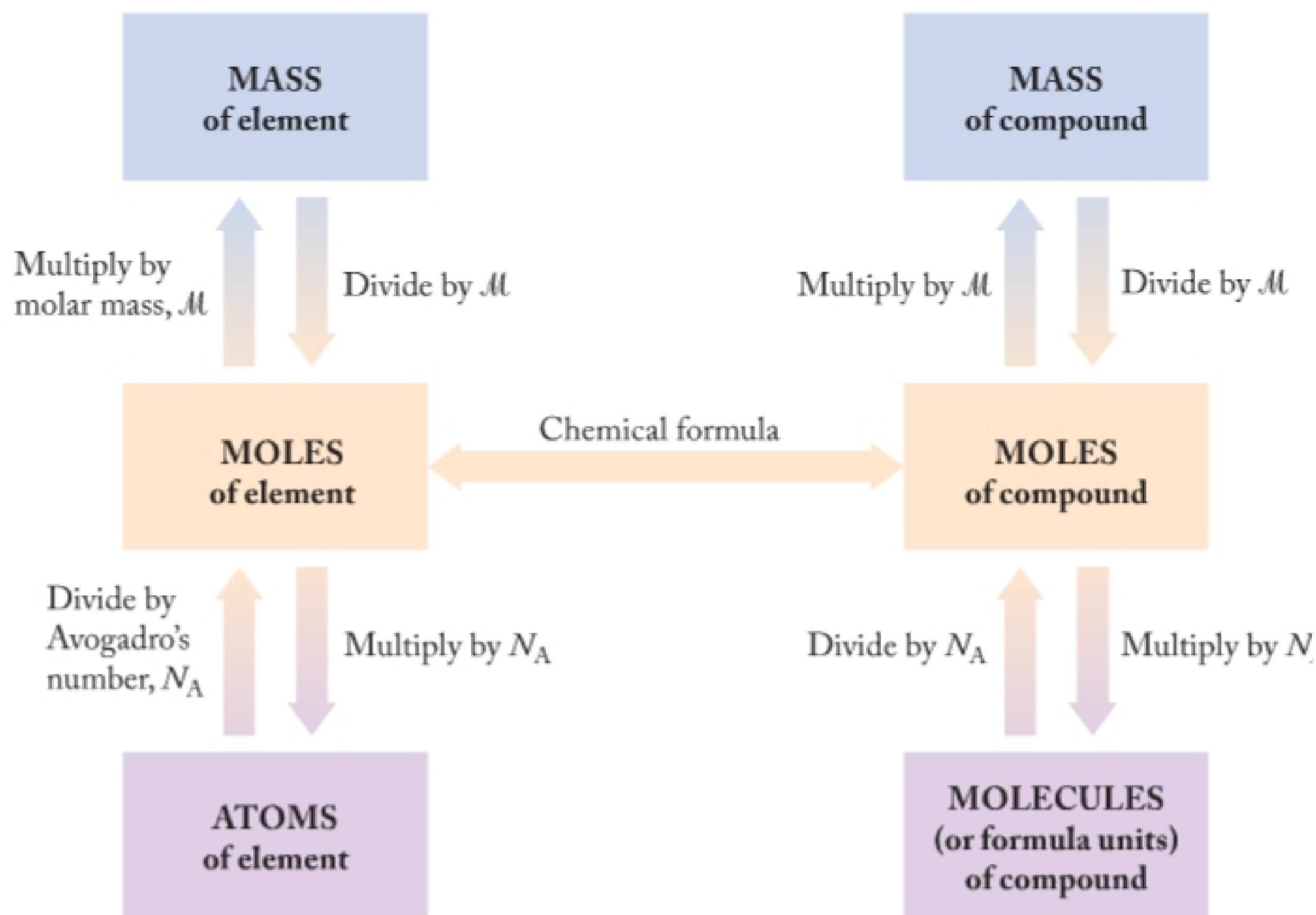
**Mole (mol):** an amount of material (atoms, ions, or molecules) that contains Avogadro's number ( $N_A = 6.022 \times 10^{23}$ ) of particles

**Avogadro's number:** the number of carbon atoms in exactly 12 grams of the carbon-12 isotope;  $N_A = 6.022 \times 10^{23}$ ; it is the number of particles in one mole

**Molar Mass:** the mass of one mole of a substance. The molar mass of an element in grams per mole is numerically equal to that element's average atomic mass in atomic mass units (amu)

**Molecular mass:** the mass of one molecule of a molecular compound

**Formula mass:** the mass in atomic mass units of one formula unit of an ionic compound



\*How many moles are there in 10.0 g of Al?

$$10.0\text{g} (1 \text{ mol}/26.98 \text{ g}) = 0.371 \text{ mol}$$

\*How many atoms are there in 10.0 g of Al?

$$10.0\text{g} (1 \text{ mol}/26.98 \text{ g})(6.022 \times 10^{23} \text{ atoms}/1 \text{ mol}) = 2.23 \times 10^{23} \text{ atoms}$$

Calculate the **molar mass** (also known as **formula weight**) of a compound,  $\text{SiO}_2$ .

$$1 \text{ mol of Si} = 28.09 \text{ g} \times 1 = 28.09 \text{ g}$$

$$2 \text{ mol of O} = 16.00 \text{ g} \times 2 = 32.00 \text{ g}$$

$$\text{Mass of 1 mol of SiO}_2 = 60.09 \text{ g}$$