12.1 THE ARITHMETIC OF EQUATIONS

Section Review

Objectives

- Calculate the amount of reactants required or product formed in a nonchemical process
- Interpret balanced chemical equations in terms of interacting moles, representative particles, masses, and gas volume at STP

Vocabulary

- stoichiometry

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

The coefficients of a balanced chemical equation indicate

the relative number of ___1___ of reactants and products. All

stoichiometric calculations begin with a ___2___. Only ___3___

and ___4___ are conserved in every reaction; moles, volumes,

and representative particles may not be.

In solving stoichiometric problems, conversion factors

relating moles of reactants to ___5___ of products are used.

If you assume ___6___, the balanced equation also tells you

about the volumes of gases.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

_____ **7.** The coefficients in a balanced chemical equation can be used to form mole ratios relating reactants to products.

_____ **8.** The coefficients in a balanced chemical equation tell the relative volumes of reactants and products, expressed in any suitable unit of volume.

_____ **9.** To calculate the mass of a molecule in grams, you can use the molar mass and Avogadro's number.

_____ **10.** Because the mass of the reactants equals the mass of the products of a reaction, the number of moles will be conserved.

_____ **11.** If the ratio of molecules in the reaction $2A_2 + B_2 \rightarrow 2A_2B$ is 2:1:2, we can predict that 4 molecules of A_2 react with 2 molecules B_2 to produce 4 molecules of A_2B.

_____ **12.** One mole of any gas occupies a volume of 22.4 L.

Part C Matching

Match each description in Column B to the correct term in Column A.

	Column A		**Column B**
_____	**13.** stoichiometry	**a.**	Avogadro's number
_____	**14.** product	**b.**	the calculations of quantities in chemical reactions
_____	**15.** coefficient	**c.**	STP
_____	**16.** 6.02×10^{23}	**d.**	a substance formed in a chemical reaction
_____	**17.** 0°C, 101.3 kPa	**e.**	gives the relative number of molecules involved in a reaction

Part D Questions and Problems

Answer the following in the space provided. Show your work.

18. Interpret the following equation using moles, molecules, and volumes (assume STP). Compare the mass of the reactants to the mass of the product.

$$2N_2(g) + 3O_2(g) \rightarrow 2N_2O_3(g)$$
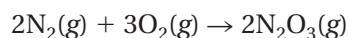
19. How many moles of chlorine gas will be required to react with sufficient iron to produce 14 moles of iron(III) chloride?

$$2Fe(s) + 3Cl_2(g) \rightarrow 2FeCl_3(g)$$