Name: _____ **Date:** _____

Yielding Results: Advanced Stoichiometry for 10th Grade Chemists

Calculate theoretical limits and investigate reagent scarcity to refine industrial synthesis skills and laboratory precision.

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1. A metallurgical engineer reacts 150.0 g of iron(III) oxide (Fe_2O_3) with excess carbon monoxide to produce iron and carbon dioxide. If the process yields an 85.0% recovery, what is the actual mass of iron produced?

A. 104.9 g
B. 89.2 g
C. 123.4 g
D. 75.8 g

2. In the combustion of a hydrocarbon, the limiting reactant is always determined by the substance with the lowest initial mass.

A. True
B. False

3. When balancing the decomposition of potassium chlorate ($KClO_3$) into potassium chloride and oxygen gas, the stoichiometric coefficient for oxygen gas is _____.

A. 1
B. 2
C. 3
D. 4

4. An unknown gas has a density of 1.783 g/L at STP. Which of the following is most likely the identity of the gas?

A. Neon (Ne)
B. Argon (Ar)
C. Fluorine (F_2)
D. Oxygen (O_2)

5. A sample contains 40.0% carbon, 6.7% hydrogen, and 53.3% oxygen by mass. The empirical formula for this compound is _____.

A. CHO
B. $C_2H_4O_2$
C. CH_3O
D. CH_2O

6. The percent yield of a chemical reaction can never exceed 100% if the product is pure and all measurements are accurate.

Name: _____ Date: _____

A. True
B. False

7. In the synthesis of aspirin, 2.0 g of salicylic acid ($C_7H_6O_3$) reacts with excess acetic anhydride. If the actual yield of aspirin ($C_9H_8O_4$) is 1.5 g, what is the percent yield?

A. 75.0%
B. 62.5%
C. 57.5%
D. 51.3%

8. According to Avogadro's Hypothesis, equal volumes of gases at the same temperature and pressure contain an equal number of _____.

A. Protons
B. Grams
C. Molecules
D. Isotopes

9. If 10.0 g of Magnesium is reacted with 10.0 g of Oxygen gas to form MgO, which reactant is limiting and how much MgO is produced?

A. O_2 is limiting; 12.6 g MgO
B. Mg is limiting; 16.6 g MgO
C. Mg is limiting; 33.2 g MgO
D. O_2 is limiting; 25.1 g MgO

10. The molar mass of a diatomic element is exactly twice the atomic mass listed on the periodic table for that element.

A. True
B. False