Worksheet goal: Practice writing and balancing chemical reactions and begin using the balanced equations in stoichiometry calculations.

1. Balance the following chemical equations:
   a. \( \text{NH}_3 + \text{O}_2 \rightarrow \text{NO}_2 + \text{H}_2\text{O} \)
   b. \( \text{Al(NO}_3)_3 + \text{Na}_2\text{S} \rightarrow \text{Al}_2\text{S}_3 + \text{NaNO}_3 \)
   c. \( \text{K} + \text{H}_2\text{O} \rightarrow \text{KOH} + \text{H}_2 \)

2. Write balanced chemical equations for the following:
   a. the reaction of elemental potassium with water, given that elemental sodium reacts with water to form sodium hydroxide and elemental hydrogen.
   b. the reaction of elemental sodium with elemental sulfur, given that elemental rubidium reacts with elemental sulfur to form \( \text{Rb}_2\text{S} \).

3. Identify the following reactions as either combination, decomposition, or combustion and balance them:
   a. \( \text{CH}_4(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l) \)
   b. \( \text{CaO}(s) + \text{CO}_2(g) \rightarrow \text{CaCO}_3(s) \)
   c. \( \text{PbCO}_3(s) \rightarrow \text{PbO}(s) + \text{CO}_2(g) \)
d. \[ \text{Mg}(s) + \text{O}_2(g) \rightarrow \text{MgO}(s) \]

e. \[ \text{C}_4\text{H}_{10}(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l) \]

4. A certain element has three isotopes. The isotopic masses (amu) and abundances are: 159.37 (30.60%), 162.79 (15.79%), and 163.92 (53.61%). What is the average atomic mass (amu) of the element?

5. How many carbon atoms are present in a sample of C\(_3\)H\(_8\)O consisting of 200 molecules?

6. How many grams of oxygen are in 65 g of C\(_2\)H\(_2\)O\(_2\)?

7. How many sulfur dioxide molecules are there in 1.80 mol of sulfur dioxide?

8. What is the empirical formula of a compound that contains 27.0% S, 13.4% O, and 59.6% Cl?