Stoichiometry Problems

Type: Mole/Mass Problems

1. In a reaction between the elements aluminum and chlorine, aluminum chloride is produced. Write the complete, balanced equation: ______Al + ______Cl2 → ______AlCl3

   a. 2 moles of Al will react with ______mole(s) of Cl2 to produce ______mole(s) of aluminum chloride.

   b. How many grams of aluminum chloride will be produced if 2.5 moles of Al react?

   c. How many moles of Cl2 must react to produce 12.3 g of aluminum chloride?

   d. How many grams of aluminum will react with 3.4 moles of chlorine?

   e. If 17 grams of aluminum react, how many moles of aluminum chloride will be produced?

2. The ammonia (NH3) used to make fertilizers for lawns and gardens is made by reacting nitrogen and hydrogen according to the following reaction: ______N2 + ______H2 → ______NH3

   a. Determine the mass in grams of NH3 formed from 1.34 moles of nitrogen.

   b. What is the mass in grams of hydrogen required to react with 1.34 moles of nitrogen?

   c. How many moles of nitrogen are required to produce 11.7 moles of ammonia?

   d. How many moles of nitrogen are required to produce 11.7 grams of ammonia?

   e. How many grams of hydrogen are required to form 3.5 moles of NH3?
Type: Mass/Mass Problems

1. Nitrogen and hydrogen react to form ammonia gas. Write the complete, balanced equation:
   \( \text{N} + \text{H}_2 \rightarrow \text{NH}_3 \)
   
a. If 56.0 grams of nitrogen are used up by the reaction, how many grams of ammonia will be produced?
   
b. How many grams of hydrogen must react if the reaction needs to produce 63.5 grams of ammonia?

2. Aluminum metal reacts with zinc chloride. Write the complete, balanced equation:
   \( \text{Al} + \text{ZnCl}_2 \rightarrow \text{AlCl}_3 + \text{Zn} \)
   
a. A mass of 45.0 grams of aluminum will react with how many grams of zinc chloride?
   
b. What mass of aluminum chloride will be produced if 22.6 grams of zinc chloride are used up in the reaction?

3. Write the equation for the reaction between potassium iodide and bromine gas:
   \( \text{KI} + \text{Br}_2 \rightarrow \text{KBr} + \text{I}_2 \)
   
a. Find the number of grams of iodine that will be formed with 300.0 g of bromine react.

4. Balance the reaction between sodium and oxygen gas:
   \( \text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O} \)
   
a. Find the number of grams of sodium that must react to produce 42.0 grams of sodium oxide.

5. Balance the reaction between zinc chloride and ammonium phosphate:
   \( \text{ZnCl}_2 + (\text{NH}_4)_3\text{PO}_4 \rightarrow \text{Zn}_3(\text{PO}_4)_2 + \text{NH}_4\text{Cl} \)
   
a. Find how many grams of zinc phosphate will be produced by the reaction of 5.00 grams of ammonium phosphate.