

*****SHOW ALL WORK TO RECEIVE CREDIT*****

Atomic Masses: B 10.8, Na 23.0, O 16.0, Al 27.0, Cl 35.5

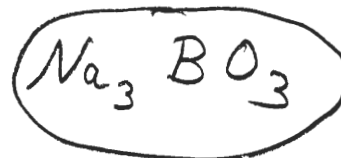
1. (5 Pts) What is the empirical formula for the substance with this analysis: Na 54.0%, B 8.50 %, and O 37.5%.

Using 100 grams.

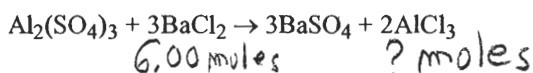
$$\text{Na: } \frac{54.0 \text{ g}}{23.0 \text{ g/mol}} = 2.35 \div 0.787 = 3$$

$$\text{B: } \frac{8.50 \text{ g}}{10.8 \text{ g/mol}} = 0.787 \div 0.787 = 1$$

$$\text{O: } \frac{37.5 \text{ g}}{16.0 \text{ g/mol}} = 2.35 \div 0.787 = 3$$

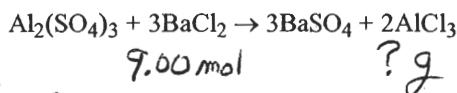


2. (5 Pts) How many moles of aluminum chloride can one obtain from 6.00 moles of barium chloride?



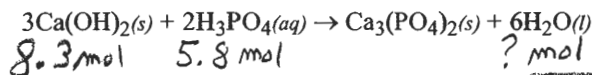
$$\frac{6.00 \text{ mol BaCl}_2}{3 \text{ mol BaCl}_2} \times \frac{2 \text{ mol AlCl}_3}{1 \text{ mol BaCl}_2} = 4.00 \text{ mol AlCl}_3$$

3. (6 Pts) How many grams of aluminum chloride can one obtain from 9.00 moles of barium chloride?



$$\frac{9.00 \text{ mol BaCl}_2}{3 \text{ mol BaCl}_2} \times \frac{2 \text{ mol AlCl}_3}{1 \text{ mol BaCl}_2} \times 133.5 \text{ g/mol AlCl}_3 = 801 \text{ g AlCl}_3$$

4. (9 Pts) In the reaction below, 8.3 moles of calcium hydroxide were reacted with 5.8 moles of phosphoric acid. How many moles of water will be formed?



Based on Ca(OH)₂ :

$$\frac{8.3 \text{ mol Ca}(\text{OH})_2}{3 \text{ mol Ca}(\text{OH})_2} \times \frac{6 \text{ mol H}_2\text{O}}{1 \text{ mol Ca}(\text{OH})_2} = 16.6 \text{ mol H}_2\text{O}$$

Based on H₃PO₄ :

$$\frac{5.8 \text{ mol H}_3\text{PO}_4}{2 \text{ mol H}_3\text{PO}_4} \times \frac{6 \text{ mol H}_2\text{O}}{1 \text{ mol H}_3\text{PO}_4} = 17.4 \text{ mol H}_2\text{O}$$

17 mol H₂O
Based on limiting reactant

*****SHOW ALL WORK TO RECEIVE CREDIT*****

Atomic Masses: B 10.8, Na 23.0, O 16.0, Al 27.0, Cl 35.5

1. (5 Pts) A compound is found to consist of 34.9% sodium, 16.4% boron and 48.6% oxygen. Determine its simplest (empirical) formula. Using 100 g

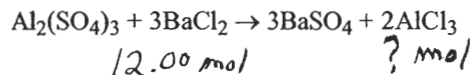
$$\text{Na: } \frac{34.9 \text{ g}}{23.0 \text{ g/mol}} = 1.52 \div 1.52 = 1$$

$$\text{B: } \frac{16.4 \text{ g}}{10.8 \text{ g/mol}} = 1.52 \div 1.52 = 1$$

$$\text{O: } \frac{48.6 \text{ g}}{16.0 \text{ g/mol}} = 3.04 \div 1.52 = 2$$

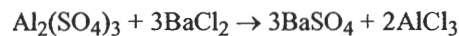


2. (5 Pts) How many moles of aluminum chloride can one obtain from 12.00 moles of barium chloride?



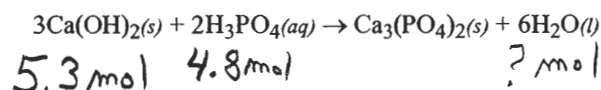
$$\frac{12.00 \text{ mol } \cancel{\text{BaCl}_2}}{3 \text{ mol } \cancel{\text{BaCl}_2}} \times \frac{2 \text{ mol AlCl}_3}{1 \text{ mol } \cancel{\text{Al}_2(\text{SO}_4)_3}} = 8.000 \text{ mol AlCl}_3$$

3. (6 Pts) How many grams of aluminum chloride can one obtain from 6.00 moles of barium chloride?



$$\frac{6.00 \text{ mol } \cancel{\text{BaCl}_2}}{3 \text{ mol } \cancel{\text{BaCl}_2}} \times \frac{2 \text{ mol } \cancel{\text{AlCl}_3}}{1 \text{ mol } \cancel{\text{Al}_2(\text{SO}_4)_3}} \times \frac{133.5 \text{ g AlCl}_3}{1 \text{ mol AlCl}_3} = 534 \text{ g AlCl}_3$$

4. (9 Pts) In the reaction below, 5.3 moles of calcium hydroxide were reacted with 4.8 moles of phosphoric acid. How many moles of water will be formed?

Based on
 $\text{Ca}(\text{OH})_2$

$$\frac{5.3 \text{ mol } \cancel{\text{Ca}(\text{OH})_2}}{3 \text{ mol } \cancel{\text{Ca}(\text{OH})_2}} \times \frac{6 \text{ mol H}_2\text{O}}{1 \text{ mol } \cancel{\text{Ca}_3(\text{PO}_4)_2}} = 10.6 \text{ mol H}_2\text{O}$$

Based on
Limiting
ReactantBased on
 H_3PO_4

$$\frac{4.8 \text{ mol } \cancel{\text{H}_3\text{PO}_4}}{2 \text{ mol } \cancel{\text{H}_3\text{PO}_4}} \times \frac{6 \text{ mol H}_2\text{O}}{1 \text{ mol } \cancel{\text{Ca}_3(\text{PO}_4)_2}} = 14.4 \text{ mol H}_2\text{O}$$