

Pre-AP Chemistry I/Chemistry I
Unit #9--Stoichiometry

Barium sulfate is made by the following reaction:



Moles to Moles

In the lab, the student was given 14.66 moles of sodium sulfate and was asked to determine how many moles of sodium nitrate could be produced if this reaction was mixed with barium nitrate.

$$\frac{14.66 \text{ mol Na}_2\text{SO}_4}{1} \left| \frac{2 \text{ mol NaNO}_3}{1 \text{ mol Na}_2\text{SO}_4} \right. = 29.320 \text{ mol NaNO}_3$$

Mass to Moles

Approximately 75 grams of barium nitrate was mixed with excess sodium sulfate. How many moles of barium sulfate are produced when the reaction goes to completion?

$$\frac{75.0 \text{ g Ba}(\text{NO}_3)_2}{261.335 \text{ g Ba}(\text{NO}_3)_2} \left| \frac{1 \text{ mol Ba}(\text{NO}_3)_2}{1} \right. \left| \frac{1 \text{ mol BaSO}_4}{1 \text{ mol Ba}(\text{NO}_3)_2} \right. = 0.287 \text{ mol BaSO}_4$$

Moles to Mass

How many grams of barium sulfate were produced when 3.55 moles of sodium sulfate was mixed with excess barium nitrate?

$$\frac{3.55 \text{ mol Na}_2\text{SO}_4}{1} \left| \frac{1 \text{ mol BaSO}_4}{1 \text{ mol Na}_2\text{SO}_4} \right. \left| \frac{233.389 \text{ g BaSO}_4}{1 \text{ mol BaSO}_4} \right. = 828.531 \text{ g BaSO}_4$$

Volume to Moles

Calculate moles of sodium nitrate produced if 35.98 liters of barium sulfate is also produced for the reaction.

$$\frac{35.98 \text{ L BaSO}_4}{22.4 \text{ L BaSO}_4} \left| \frac{1 \text{ mol BaSO}_4}{1} \right. \left| \frac{2 \text{ mol NaNO}_3}{1 \text{ mol BaSO}_4} \right. = 3.213 \text{ mol NaNO}_3$$

Moles to Volume

Calculate the liters of sodium nitrate produced if 35.98 moles of barium sulfate is also produced for the reaction.

$$\frac{35.98 \text{ mol BaSO}_4}{1 \text{ mol BaSO}_4} \times \frac{2 \text{ mol NaNO}_3}{1 \text{ mol BaSO}_4} \times \frac{22.4 \text{ L NaNO}_3}{1 \text{ mol NaNO}_3} = 1611.904 \text{ L NaNO}_3$$

Volume to Volume

Calculate liters of sodium nitrate produced if 35.98 liters of barium sulfate is also produced for the reaction.

$$\frac{35.98 \text{ L BaSO}_4}{22.4 \text{ L BaSO}_4} \times \frac{1 \text{ mol BaSO}_4}{1 \text{ mol BaSO}_4} \times \frac{2 \text{ mol NaNO}_3}{1 \text{ mol BaSO}_4} \times \frac{22.4 \text{ L NaNO}_3}{1 \text{ mol NaNO}_3} = 71.960 \text{ mol NaNO}_3$$

Mass to Mass

An experiment began with 75.0 grams of barium nitrate and an excess amount of sodium sulfate. Calculate the amount of barium sulfate produced by the reaction.

$$\frac{75.0 \text{ g Ba(NO}_3)_2}{261.335 \text{ g Ba(NO}_3)_2} \times \frac{1 \text{ mol Ba(NO}_3)_2}{1 \text{ mol Ba(NO}_3)_2} \times \frac{1 \text{ mol BaSO}_4}{1 \text{ mol Ba(NO}_3)_2} \times \frac{233.389 \text{ g BaSO}_4}{1 \text{ mol BaSO}_4} = 66.980 \text{ g BaSO}_4$$