

stoichiometry on gases

1. A volume of gas A is given and the volume of gas B is sought.
 - a. The volumes of both gases are measured under the same conditions of temperature and pressure
 - b. The volumes of the two gases are measured under different conditions. Use Gay-Lussac's Law of combining volumes to find the volume of gas B under the condition given for Gas A. Use correction factors to correct this volume of gas B so that it conforms to the final conditions given in the problem.
2. A mass of substance A is given and the volume of gas B is sought.
 - a. Find the number of moles of A.
 - b. Use this number of moles of A to find the number of moles of B. The mole relationship of B to A is given by the chemical equation.
 - c. Find the volume of gas B by substituting in $PV = nRT$; n is the number of moles found in step B; P and T are the conditions under which the volume of B is measured.
3. A volume of gas A is given and the mass of substance B is sought.
 - a. Determine the number of moles of A by using $PV = nRT$
 - b. Use this number of moles of A to find the number of moles of B. The mole relationship of B to A is given by the chemical equation.
 - c. Find the mass of B from the number of moles of B determined in step B. One mole of B is the molecular weight of B in grams.

1. 0.400 g sample of sodium azide, NaN_3 is heated and decomposes
 $2\text{NaN}_3 \rightarrow 2\text{Na} + 3\text{N}_2$ what volume of $\text{N}_2(\text{g})$ measured @ 25°C and 0.980 atm is obtained?

TYPE 2:

STEP 1: Find the number of moles of A

MM

$$\text{Na}: 1 \times 23 = 23$$

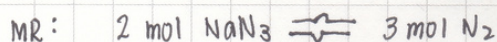
$$\text{N}: 3 \times 14 = 42$$

$$65 \text{ g/mol}$$

$$n_{\text{NaN}_3} = 0.400 \text{ g NaN}_3 \times \frac{1 \text{ mol NaN}_3}{65 \text{ g NaN}_3}$$

$$= 0.00615 \text{ mol NaN}_3$$

STEP 2: Find the mole number of B, using mole relationship



$$n_{\text{N}_2}: 0.00615 \text{ mol NaN}_3 \times \frac{3 \text{ mol N}_2}{2 \text{ mol NaN}_3} = 0.00923 \text{ mol N}_2$$

STEP 3: Use $PV = nRT$ to find volume

$$V_{\text{N}_2} = \frac{n_{\text{N}_2} RT}{P} = \frac{(0.00923 \text{ mol})(0.0821 \text{ atm} \cdot \text{L} \cdot \text{mol}^{-1} \cdot \text{K}^{-1})(298.15 \text{ K})}{0.980 \text{ atm}}$$

$$= 0.231 \text{ L N}_2(\text{g})$$