

Preliminary Quiz – Gas Calculations

A sample of garbage is trapped inside of a bag and ferments producing 15L of Methane gas ( $\text{CH}_4$ ) at STP.

1. Calculate the moles of methane in the bag?

$$PV = nRT \quad \frac{PV}{RT} = n \quad \frac{1 \text{ atm} \cdot 15 \text{ L}}{0.0821 \cdot 273} = 0.66 \text{ mol}$$

2. Calculate the mass of the methane in the bag.

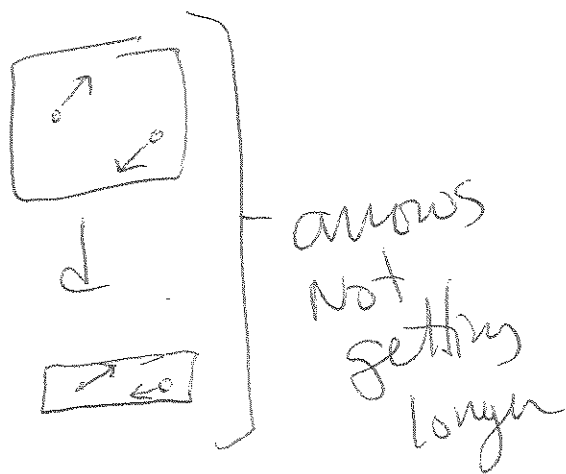
$$0.66 \frac{\text{mol}}{1} \cdot \frac{16 \text{ g}}{1 \text{ mol}} = 1.07 \text{ g}$$

3. The bag is placed in a trash compactor reducing its volume to 2.5L.

- a. What is the new pressure.

$$\frac{PV}{T} = \frac{PV}{T} \quad \text{or} \quad PV = nRT \quad \rightarrow \quad P = \frac{nRT}{V}$$

- b. Draw a model showing the transformation.



$$5.9 \text{ atm}$$

$$= \frac{0.66 \cdot 0.0821 \cdot 273}{2.5 \text{ L}}$$

$$P_1 V_1 = P_2 V_2 \quad T = \text{const}$$

$$\frac{P_1 V_1}{V_2} = P_2$$

$$\frac{1 \cdot 15}{2.5} = \boxed{6 \text{ atm}}$$