

Answer on Question #50052, Chemistry, Other

Task:

Compute the relative rate of diffusion of chlorine (Cl_2) to hydrogen (H_2).

Answer:

To solve this task a Graham's law must be applied.

$$\text{Rate}_{\text{diffusion}} \propto \frac{1}{\sqrt{MM}}$$

According to it:

$$\frac{\text{Rate}(\text{Cl}_2)^2}{M(\text{Cl}_2)} = \frac{\text{Rate}(\text{H}_2)^2}{M(\text{H}_2)}$$

$$M(\text{Cl}_2) = 71 \text{ g/mol}$$

$$M(\text{H}_2) = 2 \text{ g/mol}$$

$$\text{Rate ratio} = \sqrt{\frac{M(\text{H}_2)}{M(\text{Cl}_2)}} = \sqrt{\frac{2}{71}} = 0.168$$