

Relative Molecular Mass of Butane

Teacher Notes

Curriculum Link: The mole concept

Time Required: 40 mins

Remarks

1. Allow time for the liquefied butane gas to be fully evaporated into the syringe.
2. Tie the plunger to the barrel with a length of string to prevent the plunger from falling down when butane gas forces the plunger out. Alternatively, one can use a metal stopper as shown in the diagram.
3. The release of gas needs practice. All joints should be air-tight. It is necessary for the experiment to be repeated a number of times in order to achieve concordant readings.

Sample Results

Room temperature = 22° C

Initial mass of gas cylinder and rubber tubing = 137.18 g

Final mass of gas cylinder and rubber tubing = 137.07 g

Mass of butane gas = 0.11 g

Volume of butane gas = 50 cm³

$$\begin{aligned}\text{Molar mass of butane} &= 0.11 \times \left(\frac{24000}{50} \right) \text{ g mol}^{-1} \\ &= 53 \text{ g mol}^{-1}\end{aligned}$$

Note: Alternatively, molar mass can also be calculated from the Ideal Gas

$$\text{Equation, } PV = \frac{m}{M}RT.$$