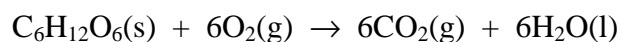


- The balanced equation for the complete oxidation of glucose to carbon dioxide and water is given below.



Calculate the mass of carbon dioxide produced by the complete oxidation of 1.00 g of glucose.

Marks
3

The molar mass of glucose is:

$$(6 \times 12.01 (\text{C})) + (12 \times 1.008 (\text{H})) + (6 \times 16.00 (\text{O})) = 180.156$$

$$1.0 \text{ g of glucose corresponds to } \frac{\text{mass}}{\text{molar mass}} = \frac{1.00}{180.156} = 0.00555 \text{ mol}$$

From the chemical equation, oxidation of 1 mol of glucose leads 6 mol of CO₂. Hence the number of moles of CO₂ produced is 6 × 0.00555 = 0.0333 mol.

$$\text{The molar mass of CO}_2 \text{ is } (12.01 (\text{C})) + (2 \times 16.00 (\text{O})) = 44.01$$

Therefore, the number of mass of CO₂ produced is:

$$\text{mass} = \text{number of moles} \times \text{molar mass} = 0.0333 \times 44.01 = 1.47 \text{ g}$$

Answer: **1.47 g**

Calculate the volume of this mass of carbon dioxide at 0.50 atm pressure and 37 °C.

The ideal gas law gives PV = nRT, hence:

$$V = \frac{nRT}{P} = \frac{(0.0333) \times (0.08206) \times (273+37)}{(0.50)} = 1.69 \text{ L}$$

Answer: **1.69 L**