

Question #58852, Chemistry, Other

Describe the preparation of 900 ml of 3 M HNO_3 from a commercial reagent that is 69% HNO_3 and has a specific gravity 1.42 solution.

Answer:

$$C_M = \frac{v}{V}$$

$$v = \frac{m}{M}$$

$M(\text{HNO}_3) = 63 \text{ g/mol}$

The amount of HNO_3 contained in 900 ml of 3 M HNO_3 solution is:

$$v = C_M \cdot V$$

$$v(\text{HNO}_3) = 3 \cdot 0.9 = 2.7 \text{ mol}$$

This amount of matter corresponds to the mass of 69% HNO_3 solution:

$$m = \frac{vM}{\%}$$

$$m(\text{HNO}_3)_{69\%} = \frac{2.7 \cdot 63}{0.69} = 246.5 \text{ g}$$

Taking into account the specific gravity of this solution, its volume is:

$$\rho = \frac{m}{V}$$

$$V = \frac{m}{\rho}$$

$$V(\text{HNO}_3)_{69\%} = \frac{246.5}{1.42} = 173.61 \text{ ml}$$