OCR
RECOGNISING ACHIEVEMENT

Cambridge Technicals in Laboratory Skills

Summer Work - Support

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TITRATION CALCULATIONS

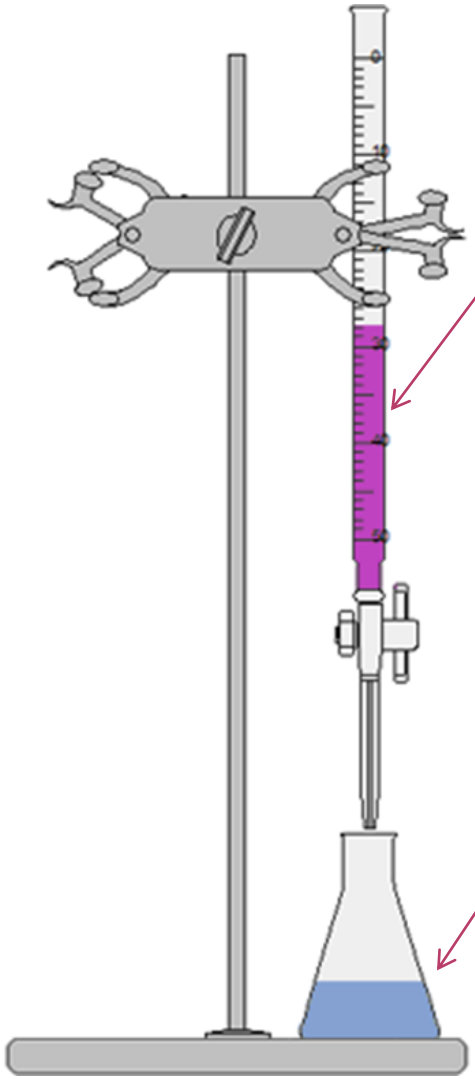
Learning Objective:

- Understand how to calculate concentration from reacting volumes

Learning Outcome:

- Use balanced symbol equations to calculate the concentration of an unknown reactant

FROM THE INDUCTION SESSION…

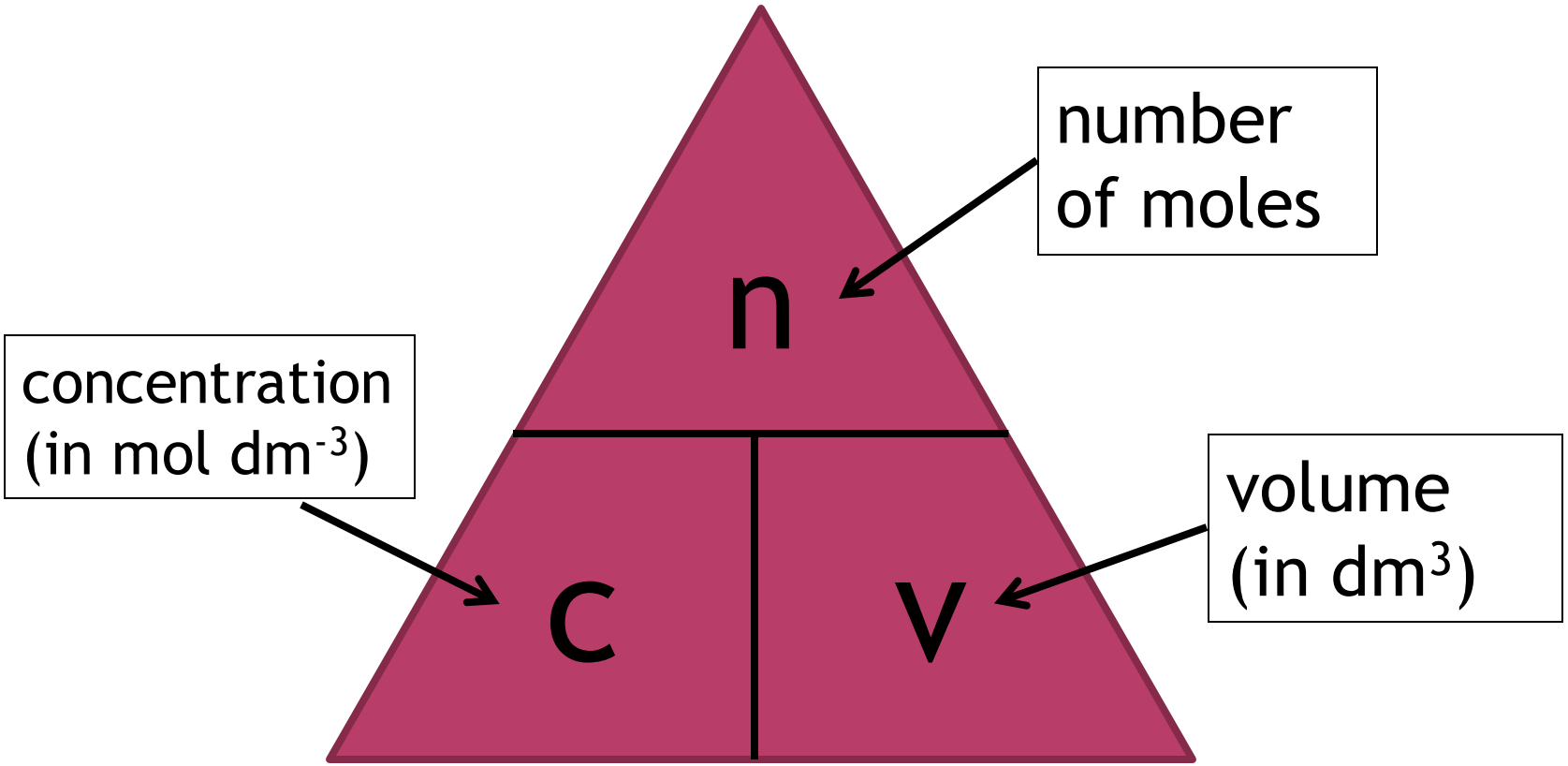


HCl
Concentration ?
Volume = your average titre

NaOH
Concentration = 0.1 mol dm^{-3}
Volume = 25 cm^3

CONCENTRATION = NO. OF MOLES / VOLUME

- Learn this formula triangle!



CONCENTRATION

- Concentration is a measure of how many particles are in a given volume.
- The concentration can be measured in moles per dm^3 (ie. moles per litre).
- So 1 mole of a substance in $1dm^3$ of solution has a concentration of 1 mole per dm^3 ($1mol/dm^3$).

1 litre
= 1000 cm^3
= 1 dm^3

USING THE TRIANGLE

- Example 1:

  What is the concentration of a solution with 2 moles of salt in 500cm^3?

  The question already tells us the number of moles and the volume, so use the formula:

$$c = \frac{n}{v} = \frac{2}{0.5} = 4 \text{ mol/dm}^3$$

convert the volume to dm^3 first by dividing by 1000.

USING THE TRIANGLE

- Example 2:

  How many moles of sodium chloride are in 250cm^3 of a 3 mol dm^{-3} solution of sodium chloride?

  The question tells us the volume and concentration, so use the formula:

  n = c x v = 3 x 0.25 = 0.75 moles

  convert the volume to dm^3 first by dividing by 1000.

TRY THIS….

"In a titration, 20 cm^3 of 1.0 mol dm^{-3} hydrochloric acid, HCl, reacted with 25 cm^3 of sodium hydroxide, NaOH. What was the concentration of the sodium hydroxide?"

- You will need to write a balanced symbol equation.
- Use the support sheet available to help you

COMMON FORMULA

- Hydrochloric acid = HCl
- Nitric acid = HNO_3
- Sulphuric acid = H_2SO_4
- Sodium hydroxide – NaOH
- Sodium sulphate = Na_2SO_4
- Sodium nitrate = $NaNO_3$
- Phosphoric acid = H_3PO_4
- Sodium phosphate = Na_3PO_4
- Potassium sulphate = K_2SO_4

SUMMER WORK TASKS

Complete Sections A and B on the Titrations Calculations worksheet

- You will need to write a balanced symbol equations (use the support sheet and this video to help with this if you are unsure: Balancing support video)

- Use the Titration calculation support sheet available to help you

Work must be submitted on your first lesson back in the Autumn term