ZNOTES // A-LEVEL SERIES

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Updated to 2019-21 Syllabus

CIE AS-LEVEL CHEMISTRY 9701

SUMMARIZED NOTES ON THE SYLLABUS

PRACTICAL NOTES

1. ERRORS

$$Estimated\ Error = {}^{1}/_{2}\ Smallest\ Division$$

$$\%\ Uncertainty = \frac{Estimated\ Error}{Reading}$$

2. TITRATIONS

- Accuracy of Burette $= 0.05cm^3$
- Always write burette reading to $2\ DP$
- A titre will have no error even though readings have errors if the errors in reading are identical and in the same direction so they will cancel out.
- Two best titres must be within $0.1cm^3$ of each other
- If first two titres within $0.1cm^3$ then no need for the 3rd titre

Use of a Burette	
Advantage	**Disadvantage**
• Lower % error • More accurately calibrated	• Takes longer to add the reagent

3. TEMPERATURE

- Record to nearest 0.5^oC when thermometer calibrated in 1^oC intervals
- Record to nearest 0.1^oC when thermometer calibrated in 0.2^oC intervals

4. CONVERSIONS

$$1000cm^3 = 1dm^3 = 0.001m^3$$
$$0^oC = 273^oK$$
$$1cm^3\ of\ water = 1g$$

5. GRAPHS AND TABLES

- When finding gradient, always use a triangle with hypotenuse greater than half of the line
- Label axis with quantity and unit
- Plot graph with a fine cross or encircle dots
- For each heading in a table, write the quantity measured with the unit separated with a solidus
- Keep significant figures consistent in values in a table
- Make **only one** table of result for each question

6. PRACTICAL SKILLS

6.1 Measuring a Quantity

Temperature	Use a thermocouple
Volume	Use burette If $25cm^3$ use pipette
Mass	Use electronic scale

- Repeat and average values

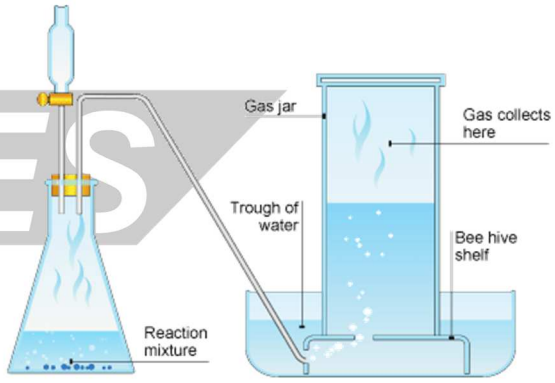
6.2 When Pouring or Adding Substances

- Use a deeper or larger container to hold the substances
- When to use an intermediate apparatus to transfer:
  - If liquid, don't; since some may remain in intermediate
  - If solid, make sure all substance has been transferred

6.3 Thermal Experiments

- Insulate container to stop thermal conduction
- Use a lid to seal container to stop thermal convection
- When heating a hydrated salt, heat to constant mass
- **Sources of errors in measuring temperature:**
  - Heat loss (to the surroundings)
  - Thermometer graduated at $1°C$ intervals
  - Drying of cup/thermometer
  - Initial temps of both solutions should be taken

6.4 How to Collect CO_2



- Water vapour condenses in the water trough

7. SALT ANALYSIS

- If acid added to a salt and produces effervescence, carbonate ion present and write "effervescence produced turns limewater milky"

8. MODIFICATIONS

- How do repeats improve the reliability of errors?
  - Shows consistent results
  - Proves/shows values or trend is similar
  - Eliminates anomalous results
- How can you make sure a reagent is in excess?
  - If solid in excess, then solid remains at the bottom
  - If liquid (e.g. acid in excess), then all of the solid dissolves

Problem	Solution
CO_2 dissolved in a solution	Heat solution to drive off CO_2
Heat loss	• Extra/thicker lagging • Use a lid • Use a vacuum flask
Measurement of volume	Use a burette/pipette
Identification of colour change	Use of colorimeter
Temperature fluctuations	• Use of a thermostatic water bath • Switch off the air conditioning
Measurement of temperature	• Use a thermometer with a smaller scale division • Use an electronic thermometer to avoid parallax error
Uncertainty in graph intersection/ line of best fit	Repeat/extra readings
Water present in hydrated salt crystals	Heat to constant mass

8.1 Comparing Accuracy of Two Procedures

- If one procedure has a greater temperature change then, that is more accurate because percentage error decreased