

**ZNOTES // A-LEVEL SERIES**

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Updated to 2019-21 Syllabus

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# CIE AS-LEVEL CHEMISTRY 9701

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SUMMARIZED NOTES ON THE SYLLABUS

## PRACTICAL NOTES

### 1. ERRORS

$$\text{Estimated Error} = \frac{1}{2} \text{Smallest Division}$$

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

### 2. TITRATIONS

- Accuracy of Burette =  $0.05\text{cm}^3$
- 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  $0.1\text{cm}^3$  of each other
- If first two titres within  $0.1\text{cm}^3$  then no need for the 3<sup>rd</sup> titre

Use of a Burette	
Advantage	Disadvantage
<ul style="list-style-type: none"> <li>• Lower % error</li> <li>• More accurately calibrated</li> </ul>	<ul style="list-style-type: none"> <li>• Takes longer to add the reagent</li> </ul>

### 3. TEMPERATURE

- Record to nearest  $0.5^\circ\text{C}$  when thermometer calibrated in  $1^\circ\text{C}$  intervals
- Record to nearest  $0.1^\circ\text{C}$  when thermometer calibrated in  $0.2^\circ\text{C}$  intervals

### 4. CONVERSIONS

$$1000\text{cm}^3 = 1\text{dm}^3 = 0.001\text{m}^3$$

$$0^\circ\text{C} = 273^\circ\text{K}$$

$$1\text{cm}^3 \text{ of water} = 1\text{g}$$

### 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 $25\text{cm}^3$ use pipette
Mass	Use electronic scale

- Repeat and average values

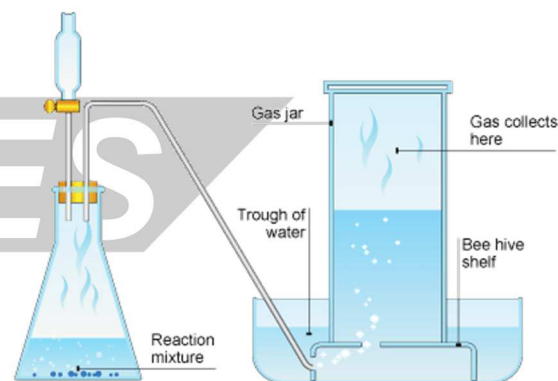
### 6.2 When Pouring or Adding Substances

- 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  $1^\circ\text{C}$  intervals
  - Drying of cup/thermometer
  - Initial temps of both solutions should be taken

### 6.4 How to Collect $\text{CO}_2$



- 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 <sub>2</sub> dissolved in a solution	Heat solution to drive off CO <sub>2</sub>
Heat loss	<ul style="list-style-type: none"> <li>• Extra/thicker lagging</li> <li>• Use a lid</li> <li>• Use a vacuum flask</li> </ul>
Measurement of volume	Use a burette/pipette
Identification of colour change	Use of colorimeter
Temperature fluctuations	<ul style="list-style-type: none"> <li>• Use of a thermostatic water bath</li> <li>• Switch off the air conditioning</li> </ul>
Measurement of temperature	<ul style="list-style-type: none"> <li>• Use a thermometer with a smaller scale division</li> <li>• Use an electronic thermometer to avoid parallax error</li> </ul>
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

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