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 2dp
- 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 3rd titre

Use of a Burette	
Advantage	**Disadvantage**
• Lower % error • More accurately calibrated	• Takes longer to add the FA 2

3 TEMPERATURE

- Record to nearest 0.5°C when thermometer calibrated in 1°C intervals
- Record to nearest 0.1°C when thermometer calibrated in 0.2°C intervals

4 CONVERSIONS

100cm = 10dm = 1m

0°C = 273°K

1cm^3 of water = 1g

5 GRAPHS AND TABLES

- When finding gradient, always use triangle with hypotenuse greater than half of the line
- Label axis with quantity and unit
- Plot graph with 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

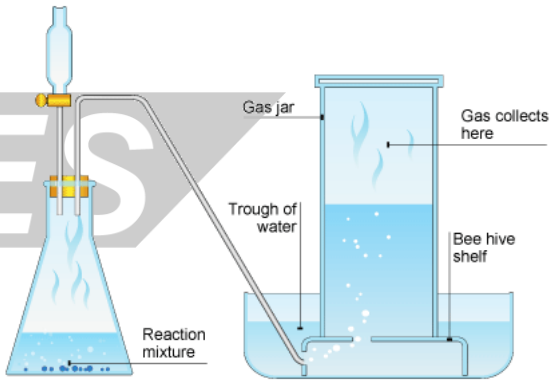
6.2 When Pouring or Adding Substances

- 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 vapor condenses in 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 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 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 color change	Use of colorimeter
Temperature fluctuations	• Use of thermostatic water bath • Switch off 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