SOURCES OF ERROR

- Suggest a possible source of error [1] and discuss how it affects the **result** [1] obtained.
  - ➢ Student must discuss how the error affects the **RECORDED** result.
    (Eg. How it affects the time taken for magnesium to fully react with the acid and **NOT** how it affects the speed of reaction of the magnesium.)

- Suggest a possible source of error [1] and the improvement that could be made [1].

Speed of Reaction

Error 1: The reaction between magnesium and hcl is exothermic. The heat produced might raise the temperature of the solution leading to a shorter time recorded/faster speed of reaction.

Improvement: Use of constant temperature water bath to keep temperature constant.
thermostatically controlled

Error 2: Mass of magnesium ribbon might be different even if they are of the same length. If the mass of magnesium ribbon are lighter, there are lesser number of moles of magnesium present, leading to a shorter time/faster speed of reaction.

Improvement: Weigh each piece of magnesium to ensure that they are of the same mass before using it for the experiment.

Error 3: magnesium ribbon (E.g Magnesium) floats on the surface and not submerged in the acid during the reaction. It is difficult for it to be completely surrounded by the acid. This lead to a longer time recorded/slower speed of reaction.

Improvement: Use a glass rod to push to fully submerge the magnesium. **OR**
Use a magnetic stirrer to stir the solution continuously to ensure that the magnesium is submerged.

Energy Changes

Error 1: Heat produced by the reaction of magnesium and hcl is lost to the surrounding. Temperature recorded will be lower than expected.

Improvement: Place the beaker in a styrofoam cup to minimise heat lost to the surrounding.
OR
Turn off the fans in the lab before performing the experiment to minimise heat lost to the surrounding.

Titration

Error 1: Difficulty in reading the meniscus of potassium manganate (VII) due to it being a dark liquid. Result in inaccurate reading of the titre volume.

Improvement: Take reading of the burette using the top of the meniscus instead. **OR** Take multiple readings and find the average volume used.

General

Error 1: The measuring cylinder can only measure up to 0.1 cm^3 but not 0.05 cm^3. Thus, the measuring cylinder is not as accurate in measuring the volume used for this experiment.

Improvement: Use a burette to measure the volume used for this experiment instead.

LAST RESORT

Error 1: Human reaction time in starting and stopping stopwatch. Timing recorded is lower than higher expected.

Improvement: Take multiple readings and find the average volume used.

take multiple readings and find the average volume used.

CHEM PRACTICAL (COs)

READINGS

thermometer: 0.5 °C (1d.p)

burette: 0.05 cm3 (2d.p)

measuring cylinder: 0.5 cm3 (1d.p)

stopwatch: 0.01s (nearest sec)

ruler: 0.1cm (1d.p)

electronic balance: 0.01g (2d.p)

TITRATION TABLE

titration no.	rough	1	2	3
initial reading:	0.00	0.00	0.00	0.00
final reading:	23.60	24.50	24.15	24.40
volume of 'R' used:	23.60	24.50	24.15	24.40
best titration:		✓		✓

table in pencil, readings in pen plz!!!

SOURCES OF ERROR

speed of reaction:

① rxn btw HCl and Mg is exothermic → heat prod may raise the the temp of solution leading to a shorter time recorded / faster rxn.
improvement: use of thermostatically controlled water bath to keep oc constant

② mass of mg ribbon may be diff even if they are of the same length
lighter → less moles → shorter time recorded / faster rate of rxn
improvement: weigh each piece of mg to ensure that they are of same mass before using it for the experiment

③ magnesium ribbon doesn't fully submerge and floats on the surface. its difficult for it to be completely surrounded by the acid. ~~the~~ this leads to a longer recorded / slower speed of reaction
improvement: use a glass rod to push to fully submerge the magnesium

being a dark liquid. Result in inaccurate reading

Improvement: Take reading of the burette using the top of the meniscus instead. **OR** Take multiple readings and find the average volume used.

energy changes

④ heat produced by the of magnesium and hcl is lost to the surroundings. temp recorded will lower than expected.

improvement: place the beaker in a styrofoam cup to minimise heat to the surroundings

titration:

⑤ difficulty in reading the meniscus of potassium manganate (VII) due to it being a a dark liquid. results in inaccurate reading of the titre volume

improvement: take readings off the top of the meniscus instead.

general

⑥ measuring cylinder can only measure up to 0.1cm³ but not 0.05cm³. thus, the measuring cylinder isn't as accurate in measuring the volume used for this experiment

improvement: use a burette to measure the volume used for the experiment

QA: RECORDING ANSWERS [CATION]

① soluble in excess:

— ppt forms, dissolves in excess aqueous sodium hydroxide/ammonia to produce a colourless solution

② insoluble in excess

— ppt formed. insoluble in excess naoh/nh3

③ no ppt forms

no visible rxn is observed, solution remains —.

[ANION]

① chloride/iodide/sulfate

— ppt formed when acidified — nitrate is added

② carbonate

effervescence is observed. gas produced, a white ppt in limewater. → CO_2

③ nitrate

effervescence is observed. gas turns moist red litmus paper blue. → ammonia (NH_3)

PLANNING

procedure

- write in point form
- explains how your data is gonnabe collected
- how do you use the data obtained and relate it to the experiment's aim
- include diagrams when necessary

dont be stupid (or plz make sure your experiment works lol??
x pouring 20cm³ of solution into test tube — overflow
x measuring rate of reaction for instantaneous rxns (e.g ppt'n)

apparatus & chemicals

- apparatus must be commonly ~~practical~~ available in the lab.
- state volume / conc of any chemicals used
  common lab conc: 0.1 mol/dm³
  max volume of solution: 50 cm³
- state mass and/or dimensions
  max mass: 5g
  dimensions if needed: mg strips : zinc powder
  x amount: acts refers to no. of moles but still plz retrain :)

variables

diff kinds of control variables:
heating ÷ experiment: intensity of bunsen flame, mass of solid heated

titration: volumes / conc of solutions used

gas collection: mass of solid used, conc/vol of solution used

speed of rxn: vol / concs of solutions used

only change ONE variable when planning your experiment

EXPERIMENT SPECIFIC POINTERS

heating:
- ensure that solid sample has been heated for long enough till rxn is complete ⟹ blue, non-luminous flame for ≥ 3 mins
- ryunn transferring sample to another container, ensure that sample is cooled first → or else it'll CRACK bro!
- ft cool by weighing or gonna damage the pan thing!!

titration:
- write indicator name used 2-3 drops ① methyl orange ② screened methyl orange x universal indicator
- wash burette and pipette w/ respective solution, wash conical flask w/ water
- state w solution → burette and which → pipette
- state that titration replicates need to be until then ur ≥ 2 titrations within 0.10cm³ of each other (best titration)
- state colour change @ end point.