OCR
Oxford Cambridge and RSA

GCSE Chemistry A (Gateway Science)

J248/04 Chemistry A C4-C6 and C7 (Higher Tier)

Question Set 18

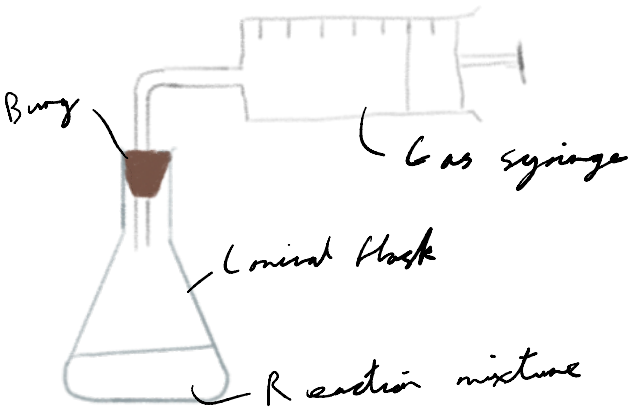
1 Zinc and dilute sulfuric acid react to make hydrogen.

$Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

A student measures the rate of this reaction by measuring the **loss in mass** of the reaction mixture.

She finds that the change in mass is very small and difficult to measure.

(a) Draw a labelled diagram to show a **better way** of measuring the rate of this reaction. **[3]**



(b) The reaction between zinc and dilute sulfuric acid is slow.

The student decides to try and find a catalyst for this reaction.

She tests four possible substances.

Each time she adds 0.5 g of the substance to 1.0 g of zinc and 25 cm^3 of dilute sulfuric acid.

Look at her table of results.

Substance added	Colour of substance at start	Colour of substance at end	Relative rate of reaction
no substance			1
calcium sulfate powder	white	white	1
copper powder	pink	pink	10
copper(II) sulfate powder	blue	pink	30
manganese(IV) oxide powder	black	black	1

(i) It is important to do the reaction with **only** zinc and dilute sulfuric acid and no substance added.

Explain why. To provide a point of reference for relative rates. & to show no other factor affects the rate of reaction **[1]**

(ii) It is important to do all of the reactions with the same concentration of acid.

Explain why. Concentration of acid also effects rate of reaction. **[1]**

(iii) Which of the substances could be a catalyst for the reaction between zinc and dilute sulfuric acid?

Copper powder

Explain your answer. This increases rate without changing the colour. **[2]**

(iv) There is **not** enough evidence to confirm which substance is a catalyst. **[1]**

Suggest an extra piece of experimental evidence that could be collected to confirm which substance is a catalyst.

Mass of substance before and after reaction - if the substance is a catalyst, there should be no change in mass

(v) The student does the experiment with copper, zinc and dilute sulfuric acid again.

This time she uses a lump of copper rather than copper powder.

Predict, with reasons, the relative rate of reaction. **[2]**

Assuming the same mass of copper is used, the copper lump will have a lower surface area than the powder. This will decrease the rate, as fewer copper particles are available to catalyse the reaction. per unit time

Total Marks for Question Set 18: 10