

Name of the Student: _____

Max. Marks : 16 Marks

Time : 16 Minutes

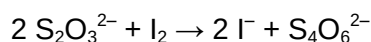
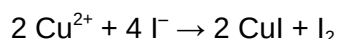
Q1.

A student does an experiment to determine the percentage of copper in an alloy.

The student

- reacts 985 mg of the alloy with concentrated nitric acid to form a solution (all of the copper in the alloy reacts to form aqueous copper(II) ions)
- pours the solution into a volumetric flask and makes the volume up to 250 cm³ with distilled water
- shakes the flask thoroughly
- transfers 25.0 cm³ of the solution into a conical flask and adds an excess of potassium iodide
- uses exactly 9.00 cm³ of 0.0800 mol dm⁻³ sodium thiosulfate (Na₂S₂O₃) solution to react with all the iodine produced.

The equations for the reactions are



- (a) Calculate the percentage of copper by mass in the alloy.

Give your answer to the appropriate number of significant figures.

% copper _____

(6)

- (b) Suggest **two** ways that the student could reduce the percentage uncertainty in the measurement of the volume of sodium thiosulfate solution, using the same apparatus as this experiment.

1 _____

2 _____

3 _____

(2)

- (c) State the role of iodine in the reaction with sodium thiosulfate.

(1)

- (d) Give the full electron configuration of a copper(II) ion.

(1)

- (e) Copper(I) iodide is a white solid.

Explain why copper(I) iodide is white.

(2)

- (f) Iodine vaporises easily.

Calculate the volume, in cm^3 , that 5.00 g of iodine vapour occupies at 185°C and 100 kPa

The gas constant $R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$

Give your answer to 3 significant figures.

Volume _____ cm³ (4)
(Total 16 marks)