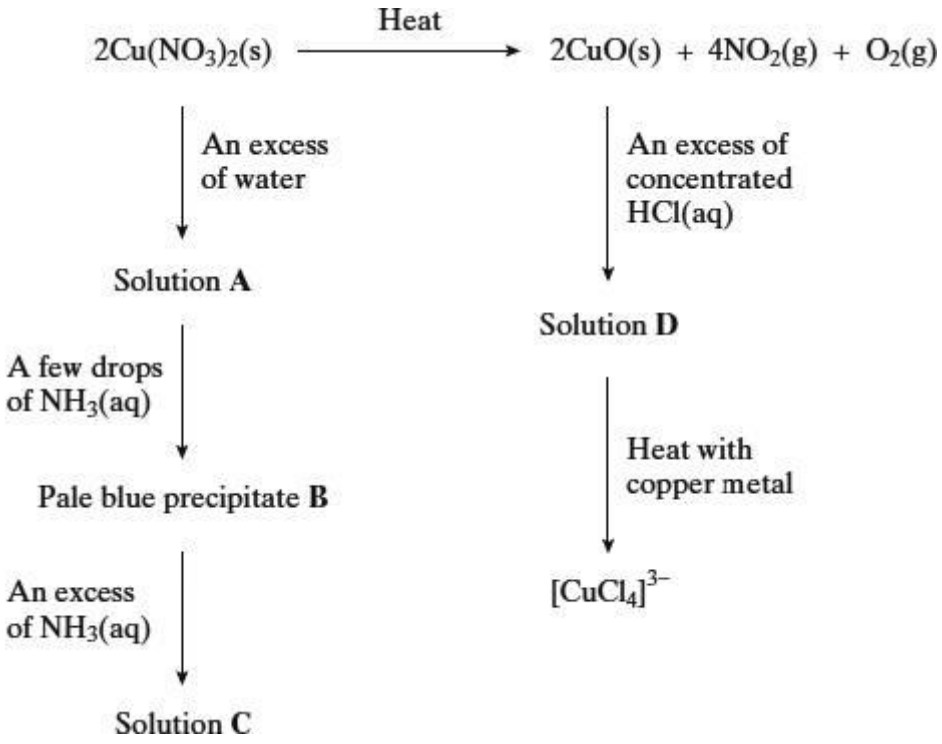
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

Consider the reaction scheme below and answer the questions which follow.



(a) A redox reaction occurs when $Cu(NO_3)_2$ is decomposed by heat. Deduce the oxidation state of nitrogen in $Cu(NO_3)_2$ and in NO_2 and identify the product formed by oxidation in this decomposition.

Oxidation state of nitrogen in $Cu(NO_3)_2$ _____

Oxidation state of nitrogen in NO_2 _____

Oxidation product _____

_____

(3)

(b) Identify and state the shape of the copper-containing species present in solution **A**.

Copper-containing species _____

Shape _____

(2)

(c) (i) Identify the pale blue precipitate **B** and write an equation, or equations, to show how **B** is

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formed from the copper-containing species in solution **A**.

*Identity of precipitate **B*** _____

Equation(s) _____

_____

(ii) In what way does the NH_3 behave as a Brønsted–Lowry base?

_____

(3)

(d) (i) Identify the copper-containing species present in solution **C**. State the colour of this copper-containing species and write an equation for its formation from precipitate **B**.

Identity _____

Colour _____

Equation _____

_____

(ii) In what way does the NH_3 behave as a Lewis base?

_____

(4)

(e) Identify the copper-containing species present in solution **D**. State the colour and shape of this copper-containing species.

Identity _____

Colour _____

Shape _____

_____

(3)

(f) The oxidation state of copper in $[CuCl_4]^{3-}$ is +1.

(i) Give the electron arrangement of a Cu^+ ion.

_____

(ii) Deduce the role of copper metal in the formation of $[CuCl_4]^{3-}$ from the copper-containing species in solution **D**.

_____

(2)

(Total 17 marks)

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