Oxford Cambridge and RSA

A level Chemistry A

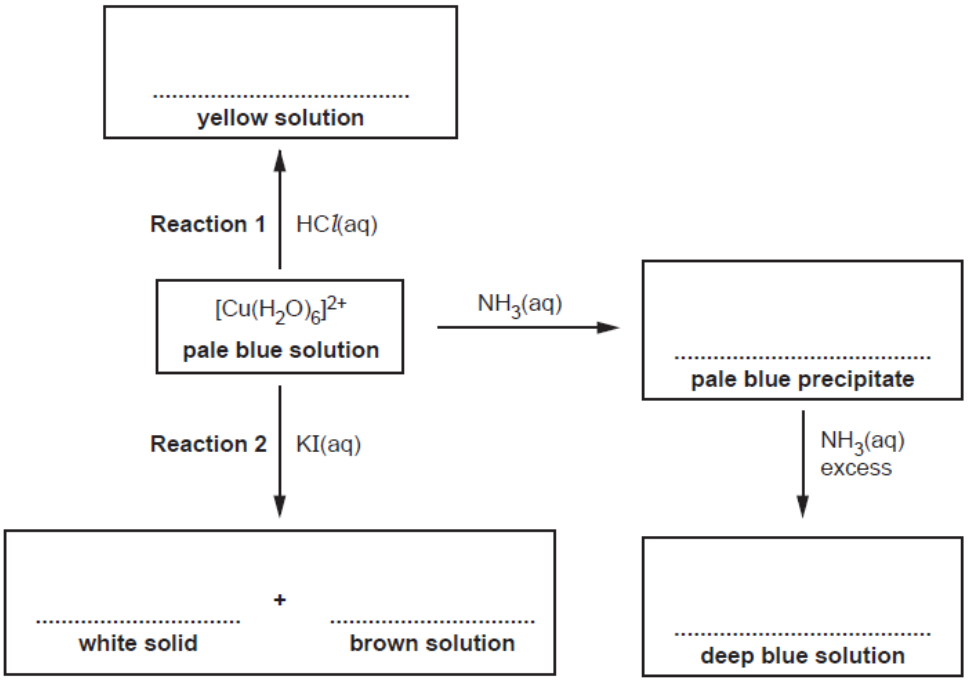
H432/01 Periodic table, elements and physical chemistry

Question Set 8

1. (a) (i) This question is about reactions of ions and compounds of transition elements.

The flowchart shows reactions of the complex ion $[Cu(H_2O)_6]^{2+}$.

In the boxes, write down the formulae of the species responsible for the observations.



[5]

(ii) Name the type of reaction for **Reaction 1** and **Reaction 2**.

Reaction 1

.....

Reaction 2

.....

[2]

(b)* A hydrated nickel(II) complex, **A**, is heated in a crucible to remove the water of crystallisation.

The anhydrous complex **B** is formed. The results are shown below.

Mass of crucible + hydrated complex A	= 59.554 g
Mass of crucible + anhydrous complex B	= 58.690 g
Mass of crucible	= 51.257 g

The anhydrous complex **B** is analysed and found to have a molar mass of 309.7 g mol^{-1} andto contain the following percentage composition by mass:

Ni, 18.95%; C, 23.25%; N, 27.12%; H, 7.75%; Cl, 22.93%.

The anhydrous complex **B** contains a cation **C** comprising Ni, C, N and H only.

Cation **C** is six-coordinate, contains three molecules of the bidentate ligand **D**, and exists asoptical isomers.

Determine the formula of **A**, **B**, **C** and **D** and show the 3D structures for the optical isomersof **C**.

Show **all** your working. **[6]**

Total Marks for Question Set 8: 13