Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Inorganic 2

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

Mark Schemes

Q1.

(a) (i) absorbs (certain frequencies of) (white) light / photons
not absorbs white / u.v. light
1

d electrons excited / promoted
or d electrons move between levels / orbitals
d electrons can be implied elsewhere in answer
1

the colour observed is the light not absorbed / light reflected / light transmitted
allow blue light transmitted
penalise emission of light in M3
1

(ii) ΔE is the energy gained by the (excited) electrons (of Cu^{2+})
allow:
- *energy difference between orbitals / sub-shells*
- *energy of photon / light absorbed*
- *change in energy of the electrons energy lost by excited electrons*
- *energy of photon / light emitted*

1

h (Planck's) constant
1

v frequency of light (absorbed by $Cu^{2+}(aq)$)
do not allow wavelength
If energy lost / photon lost / light emitted in M1 do not penalised light emitted
1

(iii) $[Cu(H_2O)_6]^{2+} + 4Cl^- \rightarrow [CuCl_4]^{2-} + 6H_2O$
note that $[CuCl_4^-]^{2-}$ is incorrect
penalise charges shown separately on the ligand and overall
penalise HCl
1

tetrahedral
1

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Cl^- / Cl / chlorine too big (to fit more than 4 round Cu)

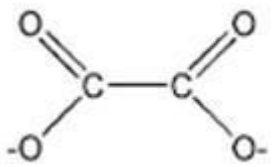
allow

water smaller than Cl^-

explanation that change in shape is due to change in co-ordination number

1

(b)



allow:

- *ion drawn with any bond angles*
- *ion in square brackets with overall / 2- charge shown outside the brackets*
- *ion with delocalised O=C–O bonds in carboxylate group(s)*

1

lone pair(s) on O^- / O

allow position of lone pair(s) shown on O in the diagram even if the diagram is incorrect.

1

(c) (i) $[Cu(H_2O)_6]^{2+} + 2C_2O_4^{2-} \rightarrow [Cu(C_2O_4)_2(H_2O)_2]^{2-} + 4H_2O$

product correct

1

equation balanced

1

6

note can only score M3 and M4 if M1 awarded or if complex in equation has 2 waters and 2 ethanedioates

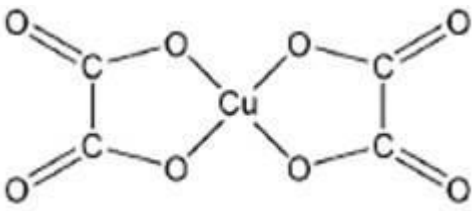
1

octahedral

If this condition is satisfied the complex can have the wrong charge(s) to allow access to M3 and M4 but not M1

1

(ii)



ignore charges

diagram must show both ethanedioates with correct bonding

ignore water

1

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90°

allow 180°

mark bond angle independently but penalise if angle incorrectly labelled / indicated on diagram

1

[17]

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