

JEE(Advanced) – 2018 TEST PAPER - 2 WITH SOLUTION

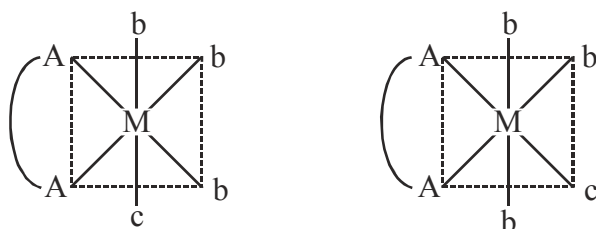
(Exam Date: 20-05-2018)

PART-1 : CHEMISTRY

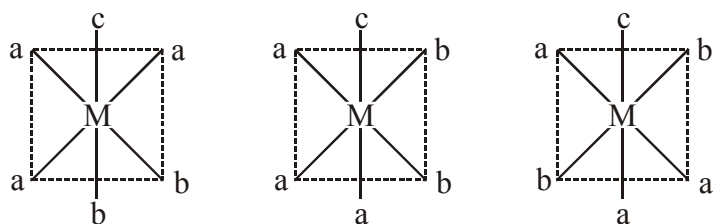
1. The correct option(s) regarding the complex $[\text{Co}(\text{en})(\text{NH}_3)_3(\text{H}_2\text{O})]^{3+}$:-
(en = $\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$) is (are)
- (A) It has two geometrical isomers
 - (B) It will have three geometrical isomers if bidentate 'en' is replaced by two cyanide ligands
 - (C) It is paramagnetic
 - (D) It absorbs light at longer wavelength as compared to $[\text{Co}(\text{en})(\text{NH}_3)_4]^{3+}$

Ans. (A,B,D)

Sol. (A) $[\text{Co}(\text{en})(\text{NH}_3)_3(\text{H}_2\text{O})]^{3+}$ complex is type of $[\text{M}(\text{AA})\text{b}_3\text{c}]$ have two G.I.



(B) If (en) is replaced by two cyanide ligand, complex will be type of $[\text{M}\text{a}_3\text{b}_2\text{c}]$ and have 3 G.I.

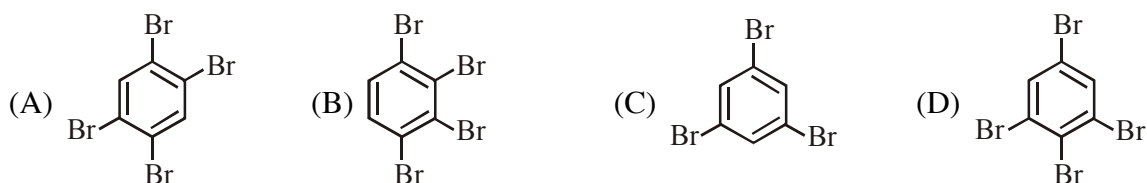
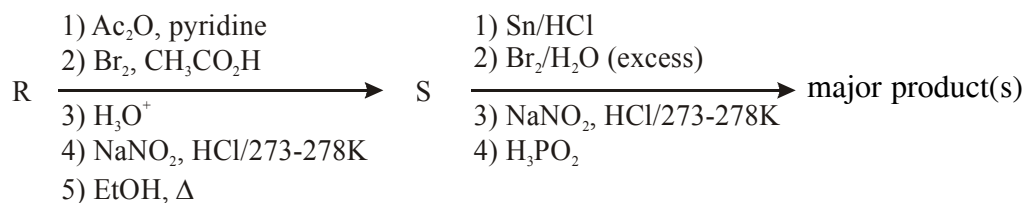


- (C) $[\text{Co}(\text{en})(\text{NH}_3)_3(\text{H}_2\text{O})]^{3+}$ have d^6 configuration (t_{2g}^6) on central metal with SFL therefore it is diamagnetic in nature.
- (D) Complex $[\text{Co}(\text{en})(\text{NH}_3)_3(\text{H}_2\text{O})]^{3+}$ have lesser CFSE (Δ_o) value than $[\text{Co}(\text{en})(\text{NH}_3)_4]^{3+}$ therefore complex $[\text{Co}(\text{en})(\text{NH}_3)_3(\text{H}_2\text{O})]^{3+}$ absorbs longer wavelength for d-d transition.
2. The correct option(s) to distinguish nitrate salts of Mn^{2+} and Cu^{2+} taken separately is (are) :-
- (A) Mn^{2+} shows the characteristic green colour in the flame test
 - (B) Only Cu^{2+} shows the formation of precipitate by passing H_2S in acidic medium
 - (C) Only Mn^{2+} shows the formation of precipitate by passing H_2S in faintly basic medium
 - (D) Cu^{2+}/Cu has higher reduction potential than Mn^{2+}/Mn (measured under similar conditions)

Ans. (B,D)

- Sol.** (A) Cu^{+2} and Mn^{+2} both gives green colour in flame test and cannot distinguished.
 (B) Cu^{+2} belongs to group-II of cationic radical will gives ppt. of CuS in acidic medium.
 (C) Cu^{+2} and Mn^{+2} both form ppt. in basic medium.
 (D) $\text{Cu}^{+2}/\text{Cu} = +0.34 \text{ V}$ (SRP)
 $\text{Mn}^{+2}/\text{Mn} = - 1.18 \text{ V}$ (SRP)

3. Aniline reacts with mixed acid (conc. HNO_3 and conc. H_2SO_4) at 288 K to give P (51%), Q (47%) and R (2%). The major product(s) the following reaction sequence is (are) :-



Ans. (D)

