

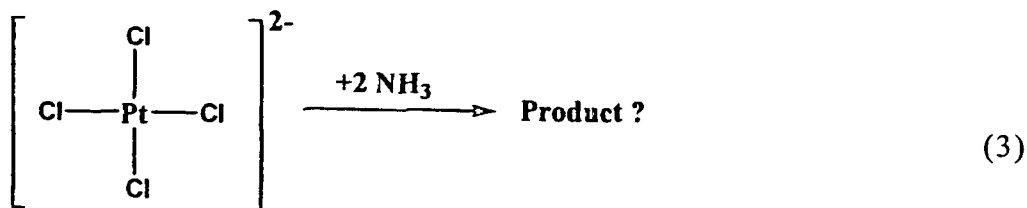
P.T.O.

Electron Affinity of F(g) (ΔH_{EA}) = -328 KJ/mol

Enthalpy of formation of $\text{MgF}_2(\text{s})$ (ΔH_f) = -1124 KJ/mol (4)

- (b) Differentiate between thermodynamic stability and kinetic stability of coordination compounds giving suitable examples. (3.5)
- (c) Write down the Born-Landé equation for the lattice energy of an ionic compound and define the terms in it. (3)
- (d) What is the name of the intermolecular force caused by instantaneous dipoles in the molecules? Write its importance. (2)
2. (a) Calculate the limiting radius ratio of an ionic compound (ratio of radius of cation to that of anion) when the cation is in contact with anions and the coordination number of cation is 8. (3)
- (b) Using Bent's rule, predict whether Cl-C-Cl angle is greater or smaller than tetrahedral angle (i.e. 109.5°) in CH_2Cl_2 . Justify your answer. (3)
- (c) Explain why H_2O is bent whereas CO_2 is linear using the concept of hybridisation? (3)
- (d) What mechanism will you suggest for the reduction of $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$ by $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$? Can you apply the same mechanism for the reduction of $[\text{Co}(\text{NH}_3)_6]^{3+}$ by $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$? Justify your answer. (3.5)
3. (a) Draw the MO diagram of NO, determine the bond order and predict its magnetic property (whether diamagnetic or paramagnetic). (4.5)
- (b) Predict the shapes of the following molecules:
- XeOF_4 , ClF_3 , ICl_4^- or IO_4^- . (4)
- (c) Calculate the CFSE in terms of Δ and P (pairing energy) for d^6 octahedral low spin complex and d^5 tetrahedral complex. (4)

4. (a) What is trans-effect ? Predict the product in the following reaction :

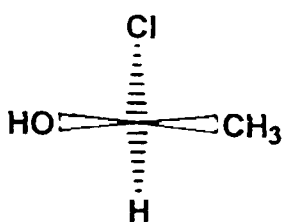


- (b) What is Jahn-Teller effect ? Describe the conditions which lead to strong distortion in octahedral complexes. (4)
- (c) Which out of HF or HCl will have higher boiling point ? Justify your answer. (2)
- (d) Draw crystal field splitting diagram for octahedral complexes $[\text{CoCl}_6]^{4-}$ and $[\text{Co}(\text{CN})_6]^{3-}$. (3.5)

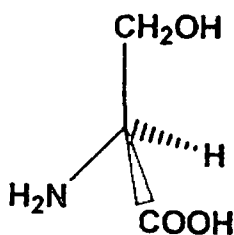
SECTION B

(Attempt three questions in all.)

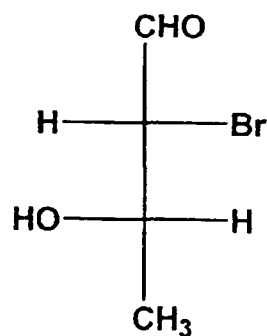
1. (a) Using sequence rules, assign R/S notations to the stereocentres in the following configurations : (4)



(i)



(ii)

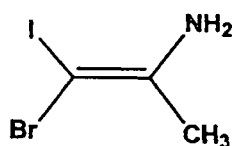


(iii)

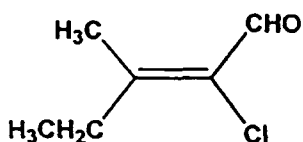
- (b) Draw the Newman projections for anti, gauche, eclipsed and fully eclipsed conformations of 1,2-dibromoethane and indicate which will be more stable and why ? (4)

- (c) Explain why the chair conformation of cyclohexane is more stable than the boat conformation with the help of Newman projections of the two conformations. (4.5)

2. (a) Assign E and Z notations to the following olefins and write the steps :



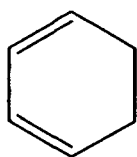
(i)



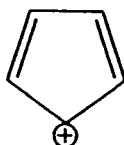
(ii)

(3)

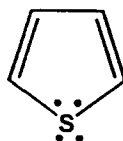
- (b) Which of the following cyclic organic compounds are aromatic and why ?



(i)



(ii)



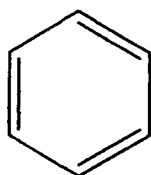
(iii)

(3)

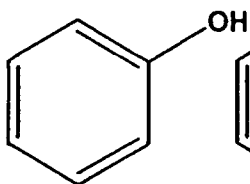
- (c) Arrange the following carbocations in the increasing order of stability, give reason :

Methyl carbocation (C^+H_3), isopropyl carbocation $(\text{CH}_3)_2\text{C}^+\text{H}$, I-butyl carbocation $(\text{CH}_3)_3\text{C}^+$. (3)

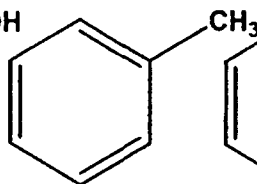
- (d) Giving reasons, arrange the following compounds in increasing order of reactivity toward *electrophilic substitution reaction*:



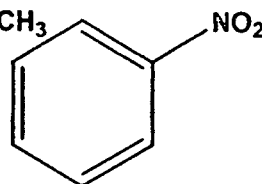
(i)



(ii)



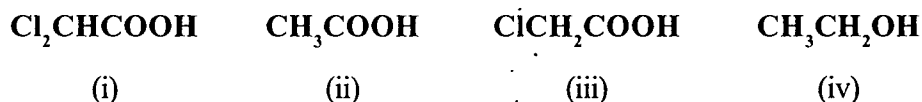
(iii)



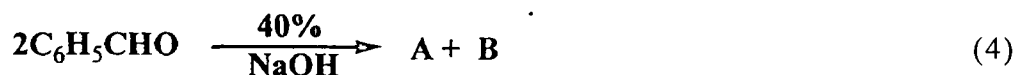
(iv)

(3.5)

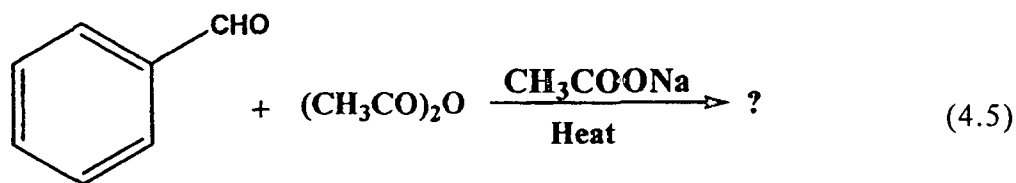
3. (a) Arrange the following compounds in decreasing order of acidic strength. Give reasons for your arrangement. (4)



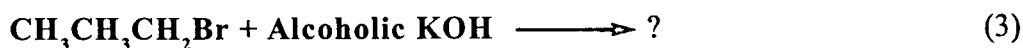
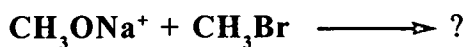
- (b) Write the products, name of the reaction and outline the mechanism of following reaction :



- (c) What happens when methyl magnesium bromide reacts with methanal (HCHO) followed by hydrolysis ? Explain. (3)
- (d) Explain Saytzeff rule with suitable examples. (1.5)
4. (a) Complete the following reaction and indicate the name reaction involved and write the mechanism of the reaction



- (b) Write the product and classify the following reactions as addition, elimination or substitution reaction.



- (c) Write the monomeric units present in natural rubber (polymer) and draw its structure. (2)
- (d) What do you understand by ring opening polymerisation ? Explain with suitable example. (3)