

Chemistry (Hons.) Paper-IV

Answer five questions, selecting at least one from each Group. Q.No. 1 is compulsory.

1. (a) Malonic acid readily decarboxylates on heating. Why ?
 (b) Ethyl acetoacetate shows keto enol tautomerism. Why ?
 (c) Glucose show mutarotation. Why ?
 (d) Zinc not copper liberates hydrogen from dilute acid. Why ?
 (e) Benzene undergoes electrophilic substitution. Why ?

Group-A

2. (a) Derive Ostwald's dilution law.
 (b) What are its limitations ?
 (c) Calculate the pH of M/100 acetic acid (K_a of acetic acid = 1.8×10^{-6})
3. (a) What do you mean by buffer solution ? Derive an expression for acid buffer solutions.
 (b) Explain the mechanism of buffer action.
 (c) What will be the pH of 25ml of M/10 acetic acid when 25ml of M/10 sodium acetate is added ?
4. Write short notes on the following :
 (a) Le Chatelier principle (b) Nernst equation (c) Clapeyron equation
5. (a) What do you mean by hydrolysis of salt ?
 (b) The aqueous solution of sodium acetate is alkaline. Why ?
 (c) Calculate the pH of M/10 NH_4Cl [pK_b of $\text{NH}_4\text{OH} = 4.71$]

Group-B

6. (a) Phenol is weaker acid than carboxylic acid. Why ?
 (b) How will you transform benzene to phenol ?
 (c) Name the product when phenol is treated with benzene diazonium chloride in the presence of alkali.
7. (a) Ethyl acetoacetate is called active methylene compound. Why?
 (b) What happens when ethyl acetate is treated with sodium ethoxide ?
 (c) How will you convert EAA to (i) propanone and (ii) butanoic acid ?
8. Write short notes on the following
 (a) Claisen rearrangement (b) Benzoin condensation
 (c) Gatterman synthesis
9. (a) What are the limitations of open chain structure of monosaccharides ?
 (b) Discuss the elementary idea of the ring structure of monosaccharides.
 (c) Draw ring structure of α - and β -glucose.
10. (a) How will you synthesise tartaric acid from glyoxal and fumaric acid ?
 (b) Is tartaric acid optically active ? Explain.
 (c) What happens when tartaric acid is treated with periodic acid ?