TDP (General) 4th Semester Exam., 2019

CHEMISTRY

(General)

FOURTH PAPER

(Group—A)

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

Answer **two** questions from each Unit

UNIT—I

(Organic Chemistry)

(*Marks* : 20)

1. *(a)* Write the preparation of ethyl acetoacetate (EAA). Give the mechanism of the reaction involved.

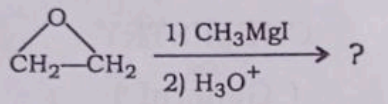
(b) Carry out the following transformations (any *two*) :

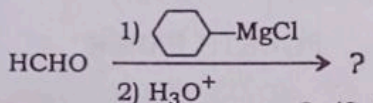
(i) Ethyl acetoacetate to Butanone

(ii) Diethyl malonate to Barbituric acid

(iii) Diethyl malonate to Adipic acid

(c) Predict the product(s) of the following reactions :

(i) 

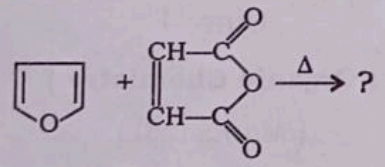
(ii) 

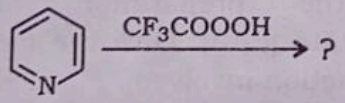
3+(2+2)+(1½+1½)=10

2. (a) Why does electrophilic substitution of pyridine occur at 3 and 5 position?

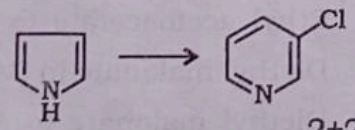
(b) Why is pyridine a stronger base than pyrrole?

(c) Suggest the product(s) of the following reactions and give plausible mechanism :

(i) 

(ii) 

(d) Carry out the following transformation with mechanism :



2+2+(2+2)+2=10

3. (a) What happens when D-glucose is treated with (i) HI, (ii) bromine water and (iii) HNO_3?

(b) Draw the Haworth projection formula of α-D-(+) glucopyranose and β-D-(+) glucopyranose.

(c) Outline the Gabriel phthalimide synthesis of alanine.

(d) Write the structure of glycine at pH = 1 and pH = 11.

(e) Define isoelectric point. 3+2+2+2+1=10

UNIT—II

(Physical Chemistry)

(*Marks* : 20)

4. (a) What is the effect of dilution on the specific and the equivalent conductance of a solution?

(b) Calculate the equivalent conductance at infinite dilution of CH_3COOH from the following data :

$\Lambda_{0\,HCl} = 426{\cdot}2$; $\Lambda_{0\,CH_3COONa} = 91$;

$\Lambda_{0\,NaCl} = 126{\cdot}5$

(c) What is liquid junction potential? How can it be eliminated?

(d) How will you define ionic mobility and ionic conductance? How are they related?

(e) What is common ion effect?

2+2+2+2+2=10

5. (a) Write Hardy-Schulze rule in connection with coagulation of colloids.

(b) What do you mean by isoelectric point of a colloidal solution?

(c) State Ostwald dilution law. Is it applicable for all types of electrolytes?

(d) Explain ionic product of water. What is the effect of temperature on it?

(e) Determine the pH of 0·2 (*M*) H_2SO_4 solution. 2+2+2+2+2=10

6. (a) Explain the mechanism of buffer action taking a suitable buffer solution.

(b) Why is KCl used to make a salt bridge?

(c) Write the Clausius-Mössotti equation and explain the terms involve in it.

(d) Differentiate between absorption and adsorption. 3+2+3+2=10

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TDP (General) 4th Semester Exam., 2018

CHEMISTRY

(General)

FOURTH PAPER

(Group—A)

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

Answer **two** questions from each Unit

UNIT—I

(Organic Chemistry)

(*Marks* : 20)

1. *(a)* What is epimer? How does it differ from an anomer?

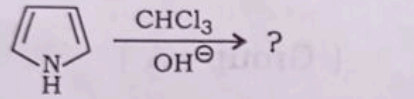
(b) Convert fructose to glucose.

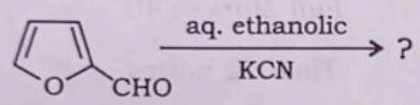
(c) Between α-D-glucopyranose and β-D-glucopyranose, which one is more stable and why?

(d) Outline the synthesis of Gly-Ala using Merrifield peptide synthesis.

(1+2)+2+2+3=10

2. (a) Suggest the product(s) of the following reactions and give plausible mechanism for each :

(i) 

(ii) 

(b) Arrange furan, pyrole and thiophene in increasing order of stability. Give reason.

(c) What is mutarotation? (3+3)+2+2=10

3. (a) How would you prepare ethyl aceto-acetate in the laboratory?

(b) Carry out the following conversions :

(i) Malonic ester to cinnamic acid

(ii) Ethyl acetoacetate to 2-methyl butanone

(c) Why is dry ether used in the preparation of Grignard reagent? 4+(2+2)+2=10

UNIT—II

(Physical Chemistry)

(*Marks* : 20)

4. (a) By giving example, define reversible and irreversible cells.

(b) Derive Henderson equation for the pH of a basic buffer mixture.

(c) What is salting out of soap?

(d) Calculate the solubility in grams per litre of $Al(OH)_3$ in water at 25 °C if $K_{sp} = 8{\cdot}5\times10^{-32}$. 3+3+2+2=10

5. (a) Discuss the behaviour of Langmuir isotherm at very high pressure and very low pressure.

(b) $MgCl_2$ is a better coagulant than KCl for As_2S_3 protective sol. Why?

(c) Write the differences between lyophilic and lyophobic colloids.

(d) What do you mean by chemisorption and physisorption? 3+2+2+3=10

6. *(a)* By giving example, define additive and constitutive properties.

(b) What do you mean by induced and orientation polarizations?

(c) The bond length of H—I bond is 1·60 Å and its dipole moment is 0·38 D. Calculate the percentage of ionic character of H—I bond.

(d) In case of salts of weak base and strong acid, show that

$$K_h = K_w / K_b$$

2½+2½+2½+2½=10

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TDP (General) 4th Semester Exam., 2017

CHEMISTRY
(General)

FOURTH PAPER (Group—A)

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

Write answer of each Unit in separate book

UNIT—I

(Organic Chemistry)

(*Marks* : 20)

Answer *any* **two** questions

1. *(a)* What are active methylene compounds?

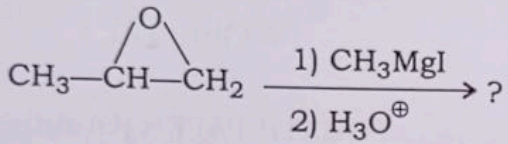
(b) Carry out the following conversions :

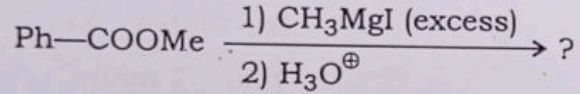
(i) Ethylacetoacetate to succinic acid

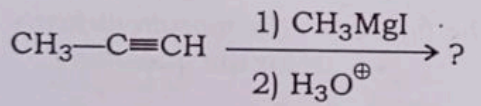
(ii) Diethylmalonate to adipic acid

(c) How would you prepare Grignard reagent in the laboratory?

(d) Predict the product(s) of the following reactions :

(i) 

(ii) 

(iii) 

1+(2+2)+2+(1+1+1)=10

2. (a) Glucose and fructose form same osazone when they are separately treated with excess phenylhydrazine ($C_6H_5NHNH_2$). Explain.

(b) Carry out the following conversion :

Glucose → Arabinose

(c) What is isoelectric point?

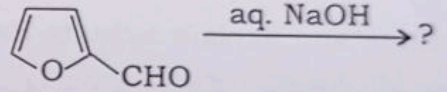
(d) How can N-terminal residue of a peptide be determined?

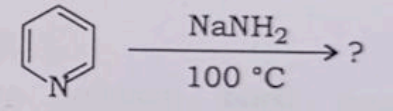
(e) Outline the Strecker synthesis of phenylalanine. 3+2+1+2+2=10

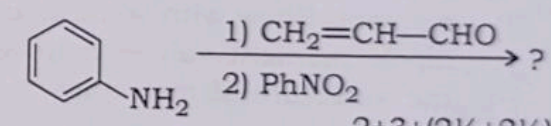
3. (a) Which one is more aromatic, furan or thiophene? Explain with reasoning.

(b) Starting from a 2,5-hexadione (1,4-diketone) and ammonia, how would you prepare 2,5-dimethyl pyrrole? Give mechanism.

(c) Suggest the product(s) of the following reactions and give plausible mechanism for each (any *two*) :

(i) 

(ii) 

(iii) 

2+3+(2½+2½)=10

UNIT—II

(Physical Chemistry)

(*Marks* : 20)

Answer *any* **two** questions

4. (a) State and explain Kohlrausch's law.

(b) Write down the Henderson equation for a mixture of weak acid and its salt.

(c) Calculate the pH of the solution containing 0·15 (*M*) acetic acid and 0·2 (*M*) sodium acetate [for CH_3COOH, $k_a = 1 \cdot 8 \times 10^{-5}$]. (2+2)+4+2=10

5. (a) Distinguish between physical adsorption and chemisorption.

(b) Derive Langmuir adsorption isotherm, mentioning the assumptions involved.

(c) State and explain Schultz-Hardy rule.

(d) Write a note on Gold number. 2+4+2+2=10

6. (a) Explain bond moment and dipole moment. Show with some examples, how dipole moment values help to elucidate the structure of molecules.

(b) Explain the term 'specific rotation'.

(c) The refractive index of CCl_4 for the sodium *D* line at 20 °C is 1·457 and its density is 1·595 gm/c.c. Calculate molar refraction. (1+3)+2+4=10

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