V/CHEM (v)

2016

(5th Semester)

CHEMISTRY

FIFTH PAPER (CHEM–351)

(Organic Chemistry—II)

Full Marks : 55

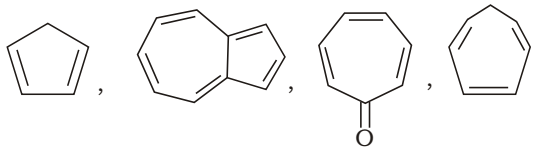
Time : 2½ hours

(PART : B—DESCRIPTIVE)

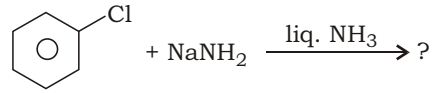
(*Marks* : 35)

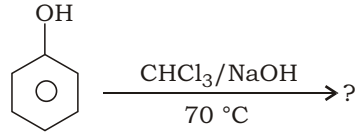
The figures in the margin indicate full marks for the questions

1. *(a)* What is Hückel rule? Which of the following species satisfy Hückel rule? Explain briefly. 1+2=3



(b) Complete the following reactions with suitable mechanism : 2×2=4

(i) 

(ii) 

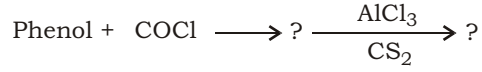
OR

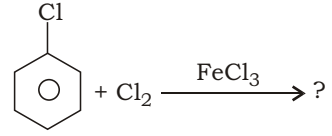
2. *(a)* "*o*-nitrophenol has much lower boiling point than its *m*- and *p*-isomers." Explain. 1

(b) Arrange the following in their increasing order of acidity. Explain. 2

phenol, *p*-chlorophenol, *p*-cresol

(c) Complete the following reactions with suitable mechanism : 2×2=4

(i) 

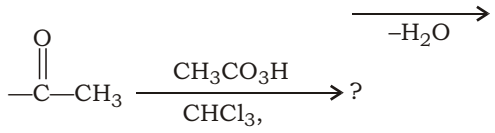
(ii) 

3. *(a)* Give one chemical test to distinguish between aldehydes and ketones. 1

(b) Explain keto-enol tautomerism by using suitable example. 2

(c) Write the product(s) of the following reactions with suitable mechanism : 2×2=4

(i) $CHO + (CH_3CO)_2O \xrightarrow{CH_3COONa} ?$

(ii) 

OR

4. *(a)* How will you obtain CH_3COCH_3 from CH_3COCl? Give chemical equation. 2

(b) Arrange the following in their increasing order of acidity. Explain. 2

p-NO_2-benzoic acid, *p*-methylbenzoic acid, *o*-hydroxy benzoic acid, benzoic acid

(c) Complete the following reactions with suitable mechanism : 1½×2=3

(i) $CH_3CH{=}CH_2 \xrightarrow[2)\ Zn/dil.\ AcOH]{1)\ O_3} ?$

(ii) $CH_3COOH + C_2H_5OH \xrightarrow{H^+} ?$

5. *(a)* Explain Hofmann's method for the separation of a mixture of 1°, 2° and 3°-amines. 3

(b) Arrange the following in their decreasing order of basicity. Explain. 2½

NH_3, $(CH_3)_2NH$, CH_3NH_2, $(CH_3)_3N$

(c) What are active methylene compounds? Give an example. 1½

OR

6. *(a)* Complete the following reactions : 1×2=2

(i) $\phi{-}NH_2 + \phi COCl \xrightarrow{NaOH} ?$

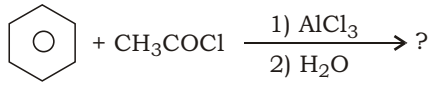
(ii) $R{-}NH_2 + CHCl_3 + 3KOH \longrightarrow ?$

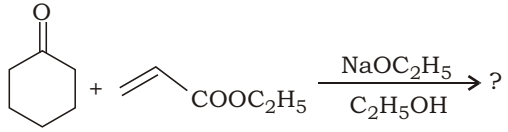
(b) Carry out the following conversion : 2½×2=5

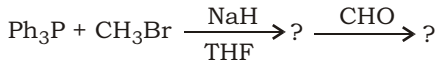
(i) $CH_3COCH_2COOC_2H_5 \longrightarrow CH_3COCH_2CH_3$
(Ethylacetoacetate) (Butan-2-one)

(ii) $CH_2(COOC_2H_5)_2 \longrightarrow CH_3CH_2COOH$
(Diethylmalonate) (Propanoic acid)

7. *(a)* Complete the following reactions with suitable mechanism (any *two*) : 2½×2=5

(i) 

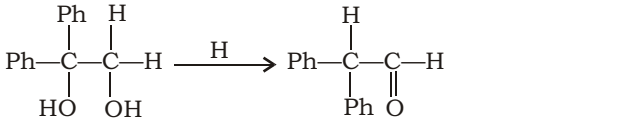
(ii) 

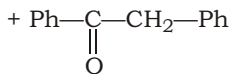
(iii) 

(b) Explain the $A_{AC}2$ mechanism for the hydrolysis of an ester. 2

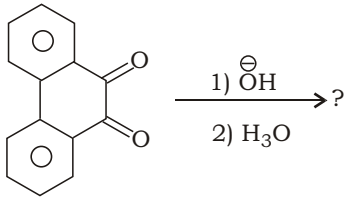
OR

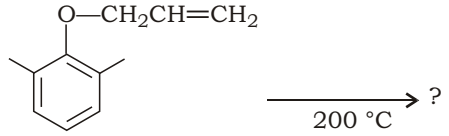
8. *(a)* Which is the major product and why? 2

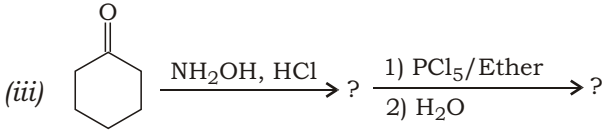




(b) Complete the following reactions with suitable mechanism (any *two*) : 2½×2=5

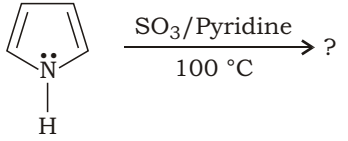
(i) 

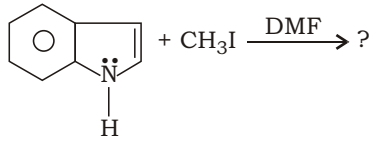
(ii) 

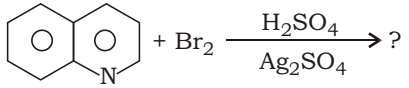
(iii) 

9. *(a)* Draw the resonance molecular orbital picture of pyrrole. 2

(b) Complete the following reactions with suitable mechanism (any *two*) : 2½×2=5

(i) 

(ii) 

(iii) 

OR

10. *(a)* How will you prepare quinoline by Skraup method? Give chemical equation. 3

(b) Electrophilic substitution of indole takes place primarily at C-3 rather than C-2. Explain. 2

(c) Complete the following reaction (mechanism not required) : 2

$$\text{-NHNH}_2 + \text{CH}_3\text{COCOOH} \longrightarrow A \xrightarrow[\text{ZnCl}_2]{} B$$

$$\xrightarrow{,\ -\text{CO}_2} C \xrightarrow{,\ \text{ZnCl}_2} D$$

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Subject Code : V/CHEM (v)

Booklet No. A

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Paper .....

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(Arts / Science / Commerce / .....) Exam., **2016**

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Regn. No. .....

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Paper .....

Descriptive Type
Booklet No. B .....

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2016

(5th Semester)

CHEMISTRY

FIFTH PAPER (Chem–351)

(Organic Chemistry—II)

(PART : A—OBJECTIVE)

(*Marks* : 20)

The figures in the margin indicate full marks for the questions

SECTION—I

(*Marks* : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×5=5

1. Side chain halogenation takes place by

(a) electrophilic substitution mechanism ( )

(b) nucleophilic substitution mechanism ( )

(c) free radical mechanism ( )

(d) electrophilic addition mechanism ( )

2. Relative reactivity order of the following carboxylic acid derivatives is

(a) acid chloride > anhydride > ester > amide ( )

(b) acid chloride > amide > ester > anhydride ( )

(c) amide > ester > anhydride > acid chloride ( )

(d) anhydride > ester > amide > acid chloride ( )

3. Schiff's bases are formed when aniline reacts with

(a) aromatic ketones ( )

(b) aromatic aldehydes ( )

(c) aryl halide ( )

(d) aryl alcohols ( )

4. The product obtained in Mannich reaction is

(a) -hydroxy carbonyl compounds ( )

(b) -amino carbonyl compounds ( )

(c) -hydroxy carbonyl compounds ( )

(d) 1°-amine ( )

5. Electrophilic substitution of furan takes place primarily at

(a) C-2 ( )

(b) C-3 ( )

(c) C-4 ( )

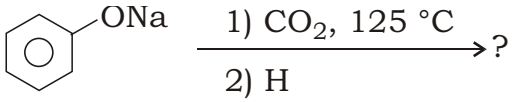
(d) 0-1 ( )

SECTION—II

(*Marks* : 15)

Answer the following questions in not more than *6* sentences each : 3×5=15

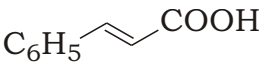
1. Complete the reaction with suitable mechanism :



2. "Aldehydes are more reactive than ketones towards nucleophile." Explain.

3. What will happen when 1°, 2° and 3°-amines react with nitrous acid? Write chemical equation.

4. How will you obtain



from C_6H_5CHO? Give the mechanism.

5. Compare the basicity of—

(a) pyrrole and pyridine;

(b) pyridine and piperidine.

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V/CHEM (vi)

2016

(5th Semester)

CHEMISTRY

SIXTH PAPER (CHEM–352)

(Inorganic Chemistry—II)

Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

The figures in the margin indicate full marks for the questions

1. *(a)* What is meant by hexagonal close packing of spheres? 1

(b) Define lattice energy. Explain why the lattice energy of NaF is less exothermic than that of MgF_2. 1+2=3

(c) How does the solubility of an ionic solid depend upon its lattice energy? 2

(d) The radii of B^{3+} and O^{2-} ions are 0·23 Å and 1·40 Å respectively. Predict the most probable type of geometry exhibited by boron oxide. 1

OR

2. *(a)* When a mole of crystalline LiF is prepared from 1 mole lithium and 0·5 mole of fluorine gas, 605 kJ of energy is liberated. The enthalpy of sublimation of Li metal is 159·5 kJ mol^{-1}. The enthalpy of dissociation of fluorine gas into atoms is 158 kJ mol^{-1}, the ionisation energy of Li is 520 kJ mol^{-1} and the electron affinity of fluorine is 328 kJ mol^{-1}. Calculate the lattice energy of LiF (use appropriate sign for the different energy terms). 3

(b) Point out the differences between Schottky and Frenkel defects. 2

(c) Write a brief note on *p*-type semiconductor. 2

3. *(a)* Write the pictorial representation of atomic orbitals formed by the combinations of (assuming *x*-axis as the molecular axis)—

(i) two p_x orbitals

(ii) two p_y orbitals 1½+1½=3

(b) What do you mean by van der Waals forces? 1

(c) Draw the molecular orbital energy-level diagram of N_2 molecule and calculate the bond order. 2+1=3

OR

4. *(a)* Write the molecular orbital configurations of NO, NO^+, NO^{2+} and NO^- species and explain their magnetic properties. 2

(b) Mention the differences between bonding and antibonding molecular orbitals. 2

(c) What is meant by dipole-dipole interactions? 3

5. *(a)* Explain the bonding and structure of IF_5. 2

(b) Complete the following reactions : 1+1=2

(i) $CaC_2 + H_2O \rightarrow ?$

(ii) $H_2S_2O_8 + H_2O \xrightarrow{\text{dil. } H_2SO_4} ?$

(c) Write a short note on methanides. 2

(d) How is boron carbide prepared? 1

OR

6. *(a)* Write the structure of P_4O_8 and $H_4P_2O_7$. ½+½=1

(b) Discuss the oxidising property of HNO_2. 2

(c) Mention one method of preparation of XeF_4. 1

(d) Describe the physical method of separation of noble gases from liquid air. 3

7. *(a)* Define a base in terms of solvent system concept and give one example each of substance which behaves as a base in water, liquid ammonia and liquid sulphur dioxide. 1+1½=2½

(b) Explain the behaviour of CH_3COOH in water, liq. NH_3 and liq. HF based on the solvent system concept. 1½

(c) Give appropriate reasons why calcium and magnesium mainly occur in nature as their carbonates while mercury and silver exist as their sulphides. 1½

(d) What are the important characteristics of polar solvents? 1½

OR

8. *(a)* Give an example of—

(i) precipitation reactions shown by ammono bases in liq. NH_3;

(ii) complex formation reactions shown by ammono base in liq. NH_3. 1+1=2

(b) Write two advantages of liquid ammonia as a solvent. 1

(c) Define the following : 2

(i) Plane of symmetry

(ii) Centre of symmetry

(d) Evaluate the symmetry elements and symmetry point group of H_2O. 2

9. *(a)* Discuss the bonding in $[Fe(CN)_6]^{3-}$ on the basis of valence-bond theory. 2

(b) Describe how the *d*-orbitals split in an octahedral field. 3

(c) Explain why Sc^{3+} and Zn^{2+} ions are colourless. 2

OR

10. *(a)* Discuss the stability of the transition metal complexes. 2

(b) Explain why Δ_0 for $[Co^{2+}(H_2O)_6]^{2+}$ is $9300\ cm^{-1}$ while Δ_0 for $[Co^{3+}(H_2O)_6]^{3+}$ is $18200\ cm^{-1}$. 2

(c) Define crystal field stabilisation energy. Calculate CFSE for $[Fe(CN)_6]^{4-}$ ion; given that the mean pairing energy (*P*) and Δ_0 are $14100\ cm^{-1}$ and $33000\ cm^{-1}$ respectively. 1+2=3

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Subject Code : V/CHEM (vi)

Booklet No. A

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2016

(5th Semester)

CHEMISTRY

SIXTH PAPER (CHEM–352)

(Inorganic Chemistry—II)

(PART : A—OBJECTIVE)

(*Marks* : 20)

The figures in the margin indicate full marks for the questions

SECTION—I

(*Marks* : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×5=5

1. The coordination numbers of spheres in body-centred cubic, hexagonal close packed and cubic close packed lattices are, respectively

(a) 8, 8, 12 ( )

(b) 8, 12, 12 ( )

(c) 8, 12, 8 ( )

(d) 12, 12, 8 ( )

2. In case of metallic bonds, molecular orbital theory is also called

(a) energy theory ( )

(b) valence-bond theory ( )

(c) band theory ( )

(d) metallic theory ( )

3. The stability of +3 oxidation state among the following groups, 13 elements decrease as

(a) $Al^{3} > Ga^{3} > In^{3} > Tl^{3}$ ( )

(b) $Tl^{3} > In^{3} > Ga^{3} > Al^{3}$ ( )

(c) $Al^{3} > In^{3} > Ga^{3} > Tl^{3}$ ( )

(d) $Tl^{3} > Ga^{3} > In^{3} > Al^{3}$ ( )

4. In the following equilibrium

$$HX \quad Y^{\ominus} \rightleftharpoons HY \quad X^{\ominus}$$

the Bronsted-Lowry bases are

(a) $Y^{\ominus}$ and HY ( )

(b) HX and HY ( )

(c) HX and $X^{\ominus}$ ( )

(d) $Y^{\ominus}$ and $X^{\ominus}$ ( )

5. The general electronic configuration of *d*-block elements can be represented as

(a) $nd^{10}ns^{2}$ ( )

(b) $nd^{10}ns^{0\ 2}$ ( )

(c) $(n\ \ 1)d^{1\ 10}ns^{0\ 2}$ ( )

(d) $(n\ \ 1)d^{1\ 10}ns^{1\ 2}$ ( )

SECTION—II

(*Marks* : 15)

Answer the following questions : 3×5=15

1. What are the consequences of metal excess defects?

2. On the basis of molecular orbital theory, explain why hydrogen forms diatomic molecule while helium remains monoatomic.

3. Comment on the ionic/covalent character of alkaline earth metal hydrides.

4. Explain why tetrahalides of carbon do not behave as Lewis acids while tetrahalides of the other elements of group 14 are Lewis acids.

5. Give reasons why transition metals are not as good reducing agents as the metals of *s*-block.

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V/CHEM (vii)

2016

(5th Semester)

CHEMISTRY

SEVENTH PAPER (CHEM–353)

(Physical Chemistry—II)

Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

The figures in the margin indicate full marks for the questions

1. *(a)* Define the following : 2

(i) Most probable velocity

(ii) Mean free path

(b) Give an account of Maxwell's distribution of molecular velocities. 3

(c) Calculate the temperature at which the hydrogen molecules will have an average speed of 176400 cm s^{-1}. 2

OR

2. *(a)* State and explain the law of equipartition of energy. 3

(b) What is meant by degree of freedom of a molecule? 1

(c) Calculate various degrees of freedom for *(a)* H_2O, *(b)* CO_2 and *(c)* C_2H_2. 3

3. *(a)* Describe Nernst heat theorem. 3

(b) What is residual entropy? 1

(c) Derive Gibbs-Duhem equation and give its significance. 3

OR

4. *(a)* What do you understand by partial molar quantities? Write the expression for partial molar quantity of a component in a mixture. 3

(b) Define chemical potential. 1

(c) Derive an expression for the variation of chemical potential with temperature. 3

5. *(a)* What is viscometer? Describe Ostwald's viscometer method for the determination of viscosity of liquid. 1+2=3

(b) What is parachor? 1

(c) The parachors of ethane and propane are 110·5 and 150·8 respectively. What values of parachor do you expect for hexane? 3

OR

6. (a) What is enzyme catalysis? Describe some characteristics of enzyme catalysis. 1+2=3

(b) What are liquid crystals? 1

(c) Discuss the Lindemann's theory for unimolecular reaction. 3

7. (a) What is meant by space lattice and unit cell? 1+1=2

(b) Describe investigation of internal structure of a solid by X-ray diffraction (Bragg's method). 3

(c) Calculate the Miller indices of a crystal plane which cut through the crystal axis at (2*a*, 3*b*, *c*) and (6*a*, 3*b*, 3*c*). 2

OR

8. (a) Define the following : 1×3=3

(i) Centre of symmetry

(ii) Plane of symmetry

(iii) Axis of symmetry

(b) The second-order reflection for X-rays from (100) planes of NaCl occurs at 29·3°. If the wavelength used is 1·54 A, calculate the distance between two successive planes in NaCl. 2

(c) Define Miller indices and law of rational indices. 2

9. (a) Define the terms specific conductance and equivalent conductance of a solution. 2

(b) What is Ostwald dilution law? 2

(c) If the molar conductivities at infinite dilution of NaCl, HCl and CH_3COONa are 126·4, 426·1 and 91·0 ohm ^{1} cm^{2} mol ^{1} respectively, then what will be that of acetic acid? 3

OR

10. (a) State and explain Kohlrausch law. 2

(b) Discuss asymmetry effect. 2

(c) During the electrolysis of a solution of potassium chloride between platinum electrodes, 0·0137 g of the chloride was lost from the anodic compartment and 0·0857 g of silver was deposited in a silver coulometer connected in series with the cell. Determine the transport number of K and Cl ions. 3

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Subject Code : V/CHEM (vii)

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2016

(5th Semester)

CHEMISTRY

SEVENTH PAPER (CHEM–353)

(Physical Chemistry—II)

(PART : A—OBJECTIVE)

(*Marks* : 20)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks* : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×5=5

1. The numbers of translational, rotational, vibrational degrees of freedom respectively for CO_2 molecules are

(a) 3, 3, 3 ( )

(b) 3, 2, 4 ( )

(c) 1, 2, 3 ( )

(d) 2, 2, 3 ( )

2. The SI unit of equivalent conductance is

(a) $S\,m^{2}$ ( )

(b) $S\,m^{-1}$ ( )

(c) $S^{-1}\,m^{-1}$ ( )

(d) $S^{2}\,m^{-1}$ ( )

3. Upon dilution equivalent conduction of a solution

(a) remains unchanged ( )

(b) decreases ( )

(c) increases then decreases ( )

(d) increases ( )

4. Nernst heat theorem is applicable to

(a) pure solids only ( )

(b) pure gases only ( )

(c) solids and liquids ( )

(d) pure liquids only ( )

5. The number of molecular collisions occurring per unit time per unit volume of the gas is

(a) collision frequency ( )

(b) mean free path ( )

(c) collision diameter ( )

(d) collision number ( )

SECTION—B

(*Marks* : 15)

Answer the following questions : 3×5=15

1. Describe briefly the effect of temperature on Maxwell's distribution of molecular velocities.

2. Calculate the root-mean-square velocity, average velocity and most probable velocity of SO_2 at 427 °C.

3. The first-order reflection from 100, 110, 111 planes of a given cubic crystal were found to occur at angles 5·9°, 8·4° and 5·2° respectively. Determine the type of cubic lattice to which the crystal belongs.

4. What is meant by transport number of an ion? Show that the sum of transport numbers of cation and anion is unity.

5. Describe the Wien effect.

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V/CHEM (viii) (A)

2016

(5th Semester)

CHEMISTRY

EIGHTH (A) PAPER [CHEM–354 (A)]

(Analytical Chemistry)

Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

1. *(a)* State the law of distribution of solutes between two immiscible solvents. What are its limitations? 3+1=4

(b) Distinguish between distribution coefficient and distribution ratio. 3

(c) Give the sequence of extraction process. 3

OR

2. *(a)* Justify the statement that in the process of extraction, the extracting solvent should be used in parts instead of using the whole liquid in one lot. 3

(b) Write short notes on uses of the following compounds in extraction methods : 2+2=4

(i) Oxine

(ii) Dithiocarbamates

(c) Calculate the mg of iron (III) left unextracted from 100 ml of a solution having 200 mg of Fe^{3} and is 6 *M* in HCl after three extractions with 25 ml of ethyl ether. The value of *D* for this extraction is 150. 3

3. *(a)* What is overvoltage? What factors affect the overvoltage? 2

(b) Describe the acid-base titration involving—

(i) strong acid with a strong base;

(ii) weak acid with a strong base. 2½+2½=5

(c) Describe the basic principle of coulometry and explain coulometric titrations giving suitable examples. 3

OR

4. *(a)* Define the following : 3

Half-wave potential, diffusion current and residual current

(b) What are the advantages of DME over a solid micro-electrode? 3

(c) What is meant by voltametry? Give two reasons for using a supporting electrolyte in voltametry. 4

5. *(a)* What is DTA? What is the theoretical basis of DTA? 1+3=4

(b) Describe the basic principle of TG and DTA. 4

(c) What are the advantages of TG 750 over other balances? 2

OR

6. *(a)* What are the differences between DTA and DTC? 3

(b) How is DTA used in the measurement of specific heat of reaction? 3

(c) Describe the quantitative analysis using DTA technique. 4

7. *(a)* The force constant for the band in HF is about 9×10^5 dynes/cm. Calculate the vibrational absorption peak for HF. 3

(b) A sample was excited by the 4358 Å line of mercury. A Raman line was observed at 4447 Å. Calculate the Raman shift in cm ^{1}. 3

(c) Diagram the fundamental modes of vibration of CO_2 and predict which modes will be infrared active and which will be Raman active. 4

OR

8. *(a)* Compare the atomic absorption and flame emission instrument as to—

(i) excitation source;

(ii) sample cell;

(iii) parameter

which is measured for quantitative measurements. 4

(b) What are the advantages in atomic absorption of a heated graphite atomizer over a flame atomizer? 3

(c) Why is internal standard procedure seldom used in atomic absorption determinations? 3

9. *(a)* Describe the basic theory of analysis of milk. 5

(b) What is meant by saponification value? How is it determined? 5

OR

10. *(a)* Write a short note on iodine-bromine value. 3

(b) What is meant by RM value? How is it used to characterize fats and oils? 4

(c) Differentiate between animal and vegetable oils. 3

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Subject Code :

V/ CHEM (viii) (A)

Booklet No. A

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DEGREE 5th Semester
(Arts / Science / Commerce / .....) Exam., **2016**

Subject .....
Paper .....

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2016

(5th Semester)

CHEMISTRY

EIGHTH (A) PAPER [CHEM–354 (A)]

(Analytical Chemistry)

(PART : A—OBJECTIVE)

(*Marks* : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks* : 10)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×10=10

1. When the distribution coefficient K_D is small, the solvent extraction technique used is

(a) continuous extraction ( )

(b) batch extraction ( )

(c) Soxhlet extraction ( )

(d) Craig extraction ( )

2. Which of the following will not be extractable with 18-crown-6?

(a) K ( )

(b) Na ( )

(c) Cs ( )

(d) Sr ( )

3. In polarogaphy, which of the following parameters is plotted against each other?

(a) Potential vs. Conductance ( )

(b) Potential vs. Current ( )

(c) Current vs. Time ( )

(d) Conductance vs. Time ( )

4. Conductometric titrations are best suited to

(a) redox titrations ( )

(b) complexometric titrations ( )

(c) acid-base titrations ( )

(d) argentometric titrations ( )

5. Differential scanning calorimetry is a technique useful in determining

(a) glass transition temperature ( )

(b) melting point ( )

(c) heat capacity ( )

(d) All of the above ( )

6. In thermogravimetric (TG) curve, the horizontal rows (plateaus) indicate the regions where there is

(a) weight loss ( )

(b) weight gain ( )

(c) no weight change ( )

(d) constant weight change ( )

7. IR spectroscopy has been used for the characterization of

(a) gaseous samples only ( )

(b) liquid samples only ( )

(c) solid samples only ( )

(d) gaseous, liquid and solid samples ( )

8. The highest energy transition among the following is

(a) $n \rightarrow \pi^*$ ( )

(b) $\pi \rightarrow \pi^*$ ( )

(c) $n \rightarrow \pi^*$ ( )

(d) $\sigma \rightarrow \sigma^*$ ( )

9. Fresh cow milk is

(a) exactly neutral ( )

(b) slightly alkaline ( )

(c) slightly acidic ( )

(d) sometimes acidic and sometimes alkaline ( )

10. Iodine value indicates

(a) number of saturated bond ( )

(b) number of unsaturated bond ( )

(c) number of ester group ( )

(d) number of carboxylic acid group ( )

SECTION—B

(*Marks* : 15)

Answer the following questions : 3×5=15

1. Write a short note on ion-exchange resin.

2. The distribution coefficient of I_2 between CCl_4 and H_2O is 85. Calculate the concentration of I_2 remaining after extracting 50 ml of an aqueous $1{\cdot}00\times10^{-3}$ *M* solution of I_2 with *(a)* 50 ml CCl_4, *(b)* two 25 ml portions of CCl_4 and *(c)* five 10 ml portions of CCl_4.

3. Write short notes on the following :

(a) Decomposition potential

(b) The counter or back potential

4. What are the factors which affect thermogravimetric curves?

5. A solution containing 6·23 ppm $KMnO_4$ had a transmittance of 0·195 in a 1·00 cm cell at 520 nm. Calculate the molar absorptivity of $KMnO_4$ at 520 nm.

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V/CHEM (viii) (B)

2016

(5th Semester)

CHEMISTRY

EIGHTH (B) PAPER [CHEM–354 (B)]

(Industrial Chemistry)

Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

1. *(a)* What is liquefied petroleum gas? How is it obtained? 3

(b) With suitable illustration, describe the cleaning action of soap. 4

(c) What are called detergents? Write any one method of preparation. 3

OR

2. *(a)* Describe the steps involved in the preparation of porcelain. 3

(b) State some differences between basic refractories and acidic refractories. 3

(c) State the differences between crystalline ceramics and noncrystalline ceramics. 2

(d) What is called ceramography? 2

3. *(a)* What are microbial enzymes? Discuss their applications. 1+2=3

(b) What is called fermentation? Briefly explain the process of fermentation of carbohydrates. 1+3=4

(c) What is recombination? Discuss its function for the production of desirable trait. 1+2=3

OR

4. *(a)* What are the functions of lipids in the body? 2

(b) What is food preservation? Discuss one method of food preservation. 1+2=3

(c) Describe the process of conduction and convection as a mean of heat transfer. 3

(d) How does refrigeration help preservation of fruits and vegetables? 2

5. (a) Describe the process of synthesis of trinitrotoluene (TNT). 3

(b) What is gunpowder? Write its composition. 1+1=2

(c) Write a note on 'treatment of tannery effluents'. 2

(d) Discuss the use and origin of dynamite. 3

OR

6. (a) What is water pollution? Explain how water becomes polluted by use of fertilizers and pesticides. 1+2=3

(b) Distinguish between hard water and soft water. Discuss one method of softening of hard water. 2+2=4

(c) What is called biochemical oxygen demand? Explain how it is used to determine the amount of organic compounds in water. 1+2=3

7. (a) Discuss the composition and origin of coal. 2+2=4

(b) Describe the steps involved for gasification of coal. 3

(c) What is synthetic petrol? Describe one method of its preparation. 3

OR

8. (a) Discuss the importance of cracking for the commercial production of gasoline. 2

(b) What is octane number? How is it related to the quality of fuel? 1+2=3

(c) Differentiate between producer gas and water gas. 2

(d) Briefly explain the process of refining of petroleum. 3

9. (a) Describe the preparation of polyamide. 3

(b) What is PVC? Write two uses. 1+2=3

(c) Distinguish between condensation polymers and addition polymers. Give one example each. 2+1=3

(d) What is known as isoprene? 1

OR

10. *(a)* What are the important roles of textile designers? 3

(b) Discuss some basic processes of fabric painting in textile industry. 4

(c) Compare the characteristic features between polymer industry and textile industry. 3

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Subject Code :

V/ CHEM (viii) (B)

Booklet No. A

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2016

(5th Semester)

CHEMISTRY

EIGHTH (B) PAPER [CHEM–354 (B)]

(Industrial Chemistry)

(PART : A—OBJECTIVE)

(*Marks* : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks* : 10)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×10=10

1. The major component of fireclay among the following is

(a) SiO_2 ( )

(b) Al_2O_3 ( )

(c) MgO ( )

(d) CaO ( )

2. COD is commonly expressed in

(a) kg/L ( )

(b) g/L ( )

(c) mg/L ( )

(d) None of the above ( )

3. In natural gas, which one among the following occupies the highest percentage?

(a) N_2 ( )

(b) CH_4 ( )

(c) CO_2 ( )

(d) O_2 ( )

4. Amino acid is the building unit of

(a) carbohydrates ( )

(b) proteins ( )

(c) vitamins ( )

(d) lipids ( )

5. The carbon content of anthracite is in the range

(a) 50%–60% ( )

(b) 37%–50% ( )

(c) 25·2%–36·7% ( )

(d) 92·1%–98% ( )

6. The science of fermentation is known as

(a) Fermiology ( )

(b) Cytology ( )

(c) Fetology ( )

(d) Zymology ( )

7. The pH range of optimum activity for enzyme is within a narrow range usually between

(a) 1–3 ( )

(b) 3–4 ( )

(c) 5–9 ( )

(d) 10–13 ( )

8. The chemical used to prevent damage of skin by bacterial growth before tanning is

(a) di-thiocarbamates ( )

(b) trichloromethane ( )

(c) sodium carbonate ( )

(d) tri-nitrophenol ( )

9. The enzyme that catalyses the conversion of glucose to alcohol is

(a) invertase ( )

(b) zymase ( )

(c) amylase ( )

(d) protease ( )

10. Polyethylene belongs to

(a) addition polymer ( )

(b) condensation polymer ( )

(c) copolymer ( )

(d) None of the above ( )

SECTION—B

(*Marks* : 15)

Answer the following questions : 3×5=15

1. What are bio-fertilizers? Point out some of their advantages over chemical fertilizers.

2. Differentiate between micronutrients and macro-nutrients. Give examples.

3. What is called mutation? How is it utilized for genetic improvement?

4. Write a short note on rocket propellants.

5. What is water gas? Give its two uses.

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