

CHE 301

Reg. No. ....

CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2012

**CHEMISTRY**

PAPER III: GENERAL CHEMISTRY

Duration: 3 hours

Max marks: 80

**PART A**

1. Answer any **TEN** of the following:

2x10=20

- a) Alkaline earth metals have relatively higher ionization energy than alkali metals – why?
- b) Boron trifluoride is a Lewis acid. Give reason.
- c) Write the structure of XeF<sub>4</sub> and mention the type of hybridization involved.
- d) Write the structure of nitrous acid and metaphosphoric acid.
- e) What is inversion temperature? How is it related to vander Waal's constants of a gas?
- f) Define viscosity of a liquid and write its S.I. Unit.
- g) What is heterogeneous catalysis? Give an example.
- h) Write B.E.T. equation. Explain the various terms involved in it.
- i) How do you convert Phenol to salicylaldehyde?
- j) Nitrophenols are more acidic than resorcinol. Explain.
- k) Name the products of acid and base catalysed ring opening reaction of methyl epoxide.
- l) Mention any two industrial application of glycol.

**PART-B  
UNIT-I**

Answer any **TWO** of the following.

10x2=20

2.
  - a) Compare the hydration of ions of alkali metals and alkaline earth metals. 03
  - b) Explain the general trends in the properties of oxides of p-block elements. 03
  - c) Explain the structure of different types of silicates. 04
3.
  - a) Compare the basic nature of hydroxides of alkali and alkaline earth metals. 03
  - b) Explain the structure and geometry of XeF<sub>6</sub> 03
  - c) Explain the properties of different types of carbides. 04

- |    |    |  |    |
|----|----|--|----|
| 4. | a) | Explain the role of calcium and magnesium in biosystems.                                       | 03 |
|    | b) | What is inert pair effect? Explain its effect on the oxidation states of elements of group 14. | 03 |
|    | c) | Explain the oxidation states exhibited by halogens.  | 04 |

#### UNIT-II

Answer any **TWO** of the following. **10x2=20**

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|----|----|--|----|
| 5. | a) | Explain Linde and Claude process of liquefaction of gases.   | 03 |
|    | b) | Explain the different characteristics of a catalyst.   | 03 |
|    | c) | Explain the determination of surface tension of a liquid by drop number method.  | 04 |
| 6. | a) | Calculate the critical temperature of a gas for which critical pressure is 101325 pascals and 'b' is $4.15 \times 10^{-4} \text{ m}^3 \text{ mol}^{-1}$ ( $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ ) | 03 |
|    | b) | Explain adsorption theory of catalysis.  | 03 |
|    | c) | Explain the different types of intermolecular forces in liquids.   | 04 |
| 7. | a) | Explain P-V isotherms of carbon dioxide.   | 03 |
|    | b) | What is enzyme catalysis? Give its characteristics?  | 03 |
|    | c) | Deduce the Langmuir's equation for adsorption of gases and explain the adsorption isotherm.  | 04 |

#### UNIT-III

Answer any **TWO** of the following. **10x2=20**

- |      |    |   |    |
|------|----|---|----|
| 8.a) |    | Describe any two methods for the preparation monohydric alcohols.           | 03 |
|      | b) | Explain the mechanism of Reimer – Tiemann reaction.                         | 04 |
|      | c) | Explain the acid-catalysed ring opening of epoxides.                        | 03 |
| 9.   | a) | Give the mechanism of Fries rearrangement reaction.                         | 03 |
|      | b) | Give one method each for the synthesis of ether and epoxide.                | 04 |
|      | c) | How are alcohols converted to alkenes and alkyl halides?                    | 03 |
| 10.  | a) | Explain Lucas test to distinguish primary, secondary and tertiary alcohols. | 03 |
|      | b) | How is phenol manufactured by Dow's process?                                | 03 |
|      | c) | Explain the mechanism of Lederer – Manasse reaction?                        | 04 |

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CHE 301

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CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2013

**CHEMISTRY**

PAPER III: GENERAL CHEMISTRY

Duration: 3 hours

Max marks: 80

- Note: 1) Write the question number of sub division clearly.  
2) Write equations wherever necessary.  
3) Answer Part-A in the first TWO pages of the answer book.

**PART A**

1. Answer any TEN of the following:

10x2=20

- b) Write the structure of  $\text{XeO}_3$  and mention the type of hybridization.
- c) Alkaline earth metals have relatively higher ionization energy than alkali metals. Why?
- d) What is the colour imparted to the flame by the following ions?
  - i) Lithium ii) Barium
- d) Oxygen does not show positive oxidation states. Give reason.
- e) What is homogeneous catalysis? Give an example.
- f) Define surface tension. Give its SI unit.

- g) Define critical pressure and critical volume.
- h) What is a catalytic promoter? Give an example.
- i) Give an example for acid catalysed ring opening of epoxides.
- j) Write the applications of resorcinol and picric acid.
- m) How do you prepare ethylene oxide from ethylene chlorohydrin?
- n) What is esterification reaction? Give an example.

**PART-B  
UNIT-I**

Answer any **TWO** of the following.

**2x10=20**

- |    |  |    |
|----|--|----|
| 2. | a) Explain the diagonal relationship between lithium and magnesium.                                | 04 |
|    | b) Give the structures of orthophosphoric acid, nitrous acid and sulphuric acid.                   | 03 |
|    | c) Compare the reducing property of alkali metals with alkaline earth metals.                      | 03 |
| 3. | a) Explain the structure, hybridization and geometry of Xenon difluoride.                          | 04 |
|    | b) What are silicates? Name the different types of silicates.                                      | 03 |
|    | c) Describe the complex formation tendencies of alkali metals.                                     | 03 |
| 4. | a) Explain the types of oxyacids of chlorine.  | 04 |
|    | b) Explain the Lewis acid character of borontrihalides.  | 03 |
|    | c) Give biological importance of the following elements.<br>i) Potassium ii) Sodium iii) Magnesium | 03 |

**UNIT-II**

Answer any **TWO** of the following.

**2x10=20**

- |    |  |    |
|----|--|----|
| 5. | a) Derive reduced equation of state for a gas.   | 04 |
|    | b) Explain the intermediate compound formation theory for catalysts.   | 03 |
|    | c) Describe the structure of a liquid based on vacancy theory.   | 03 |
| 6. | a) Explain the method of determination of viscosity of a liquid.   | 04 |
|    | b) Calculate critical temperature of a gas for which critical pressure is 101325 Pa and Vander Waal's constant,<br>$b = 4.14 \times 10^{-4} \text{ m}^3 \text{ mol}$ | 03 |
|    | c) Write a short note on enzyme catalysis.   | 03 |
| 7. | a) Derive Langmuir's adsorption isotherm.  | 04 |

- b) What are the important characteristics of catalysis? 03  
c) Explain liquification of gases based on Joule-Thomson effect. 03

**UNIT-III**

**Answer any TWO of the following. 2x10=20**

8. a) Give the mechanism of Reimer-Tiemann reaction. 04  
d) Explain auto oxidation of ether with an example. 03  
e) How do you prepare isopropyl alcohol from propene? 03
9. a) Describe Ziesel's method for the estimation of alkoxy group in ether. 04  
b) Explain the manufacture of phenol by cumene process. 03  
c) Write one industrial application each of ethanol, glycol and glycerol. 03
10. a) Give the mechanism of Claisen rearrangement. 04  
b) How do you distinguish between primary, secondary, and tertiary alcohols using Lucas test. 04  
c) Explain Williamson's ether synthesis with an example. 02
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**CHEMISTRY**  
**PAPER III: GENERAL CHEMISTRY**

Duration: 3 hours

Max marks: 80

**PART A**

1. Answer any **TEN** of the following:

10x2=20

- e) What colour is imparted to flame by following metals?  
(i) Potassium, (ii) Calcium
- f) Why fluorine does not show positive oxidation state?
- c) How do you prepare  $\text{XeO}_3$ ? Write the chemical reaction?
- d) Write the structure of sulphurous acid and ortho phosphoric acid.
- e) State law of corresponding states.
- f) Define surface tension. Give its SI unit.
- g) Write B.E.T. equation for multilayer adsorption and explain the terms involved in it.
- h) What is catalytic promoter? Give an example.
- i) Give any two industrial applications of glycol.
- j) What happens when ethyl alcohol is heated with excess of concentrated sulphuric acid? Write the chemical reaction.
- o) Complete the following reaction and indicate the name of the reaction.  
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl} + \text{NaOH}$
- p) Explain Williamson's ether synthesis with suitable example.

**PART-B**  
**UNIT-I**

Answer any **TWO** of the following.

2x10=20

- 2. a) Explain the diagonal relationship between Li & Mg. 04
- b) Write any two biological importance of the following elements. 03  
(i) sodium (ii) magnesium
- c) Carbon dioxide is a gas while silicon dioxide is a solid of great hardness. Give reason. 03
- 3. a) Describe the structure and hybridization of  $\text{XeF}_4$  04
- b) Compare the reducing property of alkali metals and alkaline earth metals. 03
- c) What are silicates? Name different types of silicates. 03
- 4. a) Discuss the variation in properties of group-14 elements with reference to  
(i) oxidation state (ii) ionization energy 04
- b) Explain the complex formation tendencies of alkali metals. 03

- c) Write a short note on clathrate compounds. 03

### UNIT-II

Answer any **TWO** of the following. **2x10=20**

5. a) Derive the expression for critical constants of a gas using vander Waal's equation of state. 04  
b) Explain the different types of intermolecular forces in liquid. 03  
c) What is enzyme catalysis? Give its characteristics. 03
6. a) Explain the principles and method of determination of viscosity of a liquid using Ostwald's viscometer. 04  
b) Describe the liquification of gases based on Joule-Thomson effect. 03  
c) Write a short note on intermediate compound formation theory for catalytic reaction. 03
7. a) Derive the expression for Langmuir's adsorption isotherm for adsorption of gases. 04  
b) Describe PV diagram of carbon dioxide. 03  
c) The density of a liquid at  $T_1$  is  $d_1$ . If the refractive index is 1.552. Calculate its molar refractivity. (molecular mass of liquid  $M$ ).

### UNIT-III

Answer any **TWO** of the following. **2x10=20**

8. a) Give the mechanism of Fries rearrangement. 04  
f) How do you distinguish between  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  alcohols using Lucas test? 03  
g) Explain acid catalysed ring opening of epoxides. 03
9. a) Describe Ziesel's method for estimation of alkoxy group in ether. 04  
b) Explain the effect of the following substituents on the acidity of phenol. 03  
i) -CH<sub>3</sub> (ii) -NO<sub>2</sub>  
c) Give the mechanism of Gattermann reaction. 03
10. a) Describe any two methods of preparation of monohydric alcohols. 04  
b) Explain the manufacture of phenol by cumene process. 03  
c) With a suitable example explain the cleavage of ether molecule by acid. 03

CHE 301.1

Reg. No. ....

CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2015

**CHEMISTRY**

**PAPER III: GENERAL CHEMISTRY**

Duration: 3 hours

Max marks: 80

**PART A**

1. Answer any TEN of the following: 10x2=20

- a) Which alkali metal is hydrated to the maximum extent? Why?
- b) Write the structure of sulphuric acid.
- c) Name the product formed when isopropyl alcohol is oxidized.
- d) What is heterogeneous catalysis? Give an example.
- e) What is meant by adsorption isotherm?
- f) Define critical temperature of a gas.
- g) State the law of corresponding states.
- h) What is the role of sodium in living systems?
- i) p-nitrophenol is more acidic than phenol. Give reason.
- j) Write any one method of preparation of epoxides.
- q) What happens when ethyl methyl ether is heated with concentrated hydroiodic acid?
- r) Write any two uses of glycerol.

**PART-B  
UNIT-I**

Answer any TWO of the following. 2x10=20

2.
  - a) Explain the flame colouration exhibited by s-block elements. 04
  - b) What is inert pair effect? Explain with suitable example. 03
  - c) Write the structure of nitrous acid, sulphurous acid and pyrophosphoric acid. 03
3.
  - a) Discuss the structure of  $XeF_4$  and  $XeO_3$ . 04
  - b) Give any three diagonal resemblances between lithium and magnesium. 03
  - c) Write a note on oxidation states of group 16 elements. 03
4.
  - a) What are silicates? Name the different types and write their structures. 04
  - b) Compare the properties of alkali and alkaline earth metal hydrides. 03
  - c) i) Compare the solubilities of hydroxides of alkaline earth metals.

ii) What are clathrates? Give an example. 03

### UNIT-II

Answer any **TWO** of the following. **2x10=20**

5. a) Explain the structural differences between solids, liquids and gases. 03  
b) Deduce the reduced equation of state. 04  
c) Explain enzyme catalysis with an example. 03
6. a) Derive the expressions for the critical constants in terms of vander wall's constants. 04  
b) Explain adsorption theory of catalysis. 03  
c) Explain the application of Joule-Thomson expansion in liquefaction of gases. 03
7. a) Explain continuity of state. 03  
b) Derive Langmuir's adsorption isotherm. 03  
c) Discuss the Andrew's isotherms of carbon dioxide. 04

### UNIT-III

Answer any **TWO** of the following. **2x10=20**

8. a) i) What happens when epoxides are treated with Grignard reagents.  
ii) Explain auto-oxidation reaction of ether. 2+2  
h) Explain the mechanism of Lederer-Manasse reaction. 03  
c) Explain Victor Meyer method for distinguishing primary and secondary amines. 03
9. a) How is phenol manufactured from Dow's process. 03  
b) How is ethoxy group estimated by Zeisel's method. 04  
c) Write the mechanism of esterification reaction between ethyl alcohol and acetic acid. 03
10. a) Discuss the hydroboration method of preparation of alcohols. 03  
b) Explain the effect of substituents on the acidity of phenol. 04  
c) Explain the mechanism of Reimer-Tiemann reaction. 03

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## CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2016

**CHEMISTRY**

## PAPER III: GENERAL CHEMISTRY

Duration: 3 hours

Max marks: 80

## Note:

1. Write the question number and subdivision clearly.
2. Write equation wherever necessary.
3. Answer Part-A in the first TWO pages of the answer book.

## PART A

1. Answer any **TEN** of the following: 10x2=20

- a) Arrange the following hydrides in the increasing order of ionic character  
*RbH, KH, NaH, CsH*
- b) Why fluorine does not show positive oxidation state?
- c) Write the structure of  $XeF_4$  and mention the types of hybridization.
- d) What is inversion temperature? How is it related to van der Waal's constants?
- e) What is the colour imparted to the flame by following metals ions?  
i) Strontium ii) Sodium
- f) What is enzyme catalysis? Give an example.
- g) Define surface tension. Give its SI unit.
- h) State the law of corresponding states.
- i) Give an example each for cyclic and crown ethers.
- j) Give reason: paranitrophenol is more acidic than phenol.
- k) What is a dihydric alcohol? Give an example?
- l) Give two applications of glycerol.

PART-B  
UNIT-IAnswer any **TWO** of the following. 2x10=20

2. a) How do you prepare  $XeO_3$ ? Describe its structure, hybridization & geometry. 04  
b) Carbon dioxide is a gas, while  $SiO_2$  is a solid of great hardness. Explain. 03  
c) Write the biological importance of the following elements:  
(i) potassium (ii) Magnesium (iii) Calcium 03
3. a) Explain the following properties of hydrides of alkali-metals:  
(i) Reducing Property (ii) Hydrolysis 04  
b) What are carbides? Name the different types. 03  
c) Write a short note on clathrate compounds. 03

4. a) Explain the diagonal relationship between lithium and magnesium. 04  
 b) Write a short note on oxidation states of halogens. 03  
 c) Describe the basic characters of hybrids of group 15 elements. 03

### UNIT-II

Answer any **TWO** of the following. 2x10=20

5. a) Derive the expression for critical constants of a gas using van der Waal's equation of state. 04  
 b) Explain the term catalytic promoter and catalytic inhibitor with suitable example. 04  
 c) Write BET equation and explain the terms. 02
6. a) Describe drop number method for the determination of surface tension of a liquid. 04  
 b) Explain adsorption theory for catalysis. 03  
 c) Explain the Langmuir's adsorption isotherm at high and low pressures. 03
7. a) Describe Linde's method for liquefaction of gases. 04  
 b) Explain the different types of intermolecular forces existing in liquid. 03  
 c) Some volume of benzene takes 46 seconds to flow through an Ostwald's viscometer while an equal volume of water takes 68 seconds at the same temperature. Their respective densities are  $803\text{kgm}^{-3}$  and  $998\text{kgm}^{-3}$ . Calculate viscosity of benzene. (Given viscosity of water is  $8.5 \times 10^{-4}\text{kgm}^{-1}\text{s}^{-1}$ ) 03

### UNIT-III

Answer any **TWO** of the following. 2x10=20

8. a) Give the mechanism of Fries rearrangement. 04  
 b) How do you prepare 2-Methyl-2-propanol from methyl magnesium iodide? 03  
 c) Explain base catalysed ring opening reaction of epoxide. 03
9. a) How do you distinguish between primary, secondary and tertiary alcohols using Victor Meyer's test? 04  
 b) Give the mechanism of Ledirer Manasse reaction in acid medium. 03  
 c) With suitable example explain the cleavage of ether molecules by acids. 03
10. a) How is phenol manufactured by Dow's process? 04  
 b) Explain the mechanism of etherification reaction. 03  
 c) What happens when 2, 3 – epoxy butane reacts with methyl magnesium bromide in the presence of dry ether? 03

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## CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2016

**CHEMISTRY****PAPER III: GENERAL CHEMISTRY**

Duration: 3 hours

Max marks: 80

**PART A**1. Answer any **TEN** of the following: 10x2=20

- a) What are carbides? How are they classified?
- b) Describe the Lewis acid character of boron trihalides.
- c) Water has a higher boiling point than hydrogen sulphide. Give reason.
- d) Explain the structure of  $XeF_2$
- e) Write the van der Waal's equation for one mole of a gas. Explain the terms.
- f) State Law of constancy of interfacial angle.
- g) Define viscosity of a liquid. Write its SI unit.
- h) Write Bragg's equation and explain the terms.
- i) Explain metamerism with an example.
- j) What is the action of acetone on hydrazine.
- k) What happens when oxalic acid is heated?
- l) Explain the reaction of nitrous acid with amides.

**PART-B****UNIT-I**Answer any **TWO** of the following. 2x10=20

2. a) Explain the structure of the following: 04  
(i)  $XeO_3$  (ii)  $XeF_6$
- b) Discuss the variation in oxidation state of group 13 elements. 03
- c) Write a note on hydrides of group 15 elements. 03
3. a) Explain the structure and bonding in diborane. 04
- b) What is inert pair effect? Explain its effect on the oxidation state of group 14 elements. 03
- c) Explain the method of formation of clathrates and give one application. 03
4. a) Explain the oxidation states of halogens. 04
- b) Write the structure of i) Sulphuric acid (ii) Nitric acid 03
- c) What are silicates? Explain any two different types of silicates. 03

## UNIT-II

Answer any TWO of the following.

2x10=20

5. a) State Law of corresponding states. Derive reduced equation of state for a gas. 04  
b) Write a note on vacancy theory. 03  
c) How is X-ray diffraction used to show that sodium chloride has FCC lattice? 03
6. a) What is crystallography? Write the fundamental Laws of crystallography? 04  
b) Explain the principle and the determination of surface tension by drop number method. 03  
c) How are gases liquefied by Joule Thomson effect? 03
7. a) Explain P-V isotherm of carbon dioxide. 04  
b) Explain the intermolecular forces in liquids. 03  
c) Calculate the Miller Indices for a plane with intercepts 3 and 2 on X and Y axes and parallel to the Z axis. 03

## UNIT-III

Answer any TWO of the following.

2x10=20

8. a) Explain the addition of HCN and sodium bisulphite to aldehydes. 04  
b) Explain HVZ reaction. 03  
c) Explain the acid catalysed cleavage reaction of ethylene oxide. 03
9. a) How is anisole and phenatole prepared? 04  
b) Explain the addition of Grignard reagent to aldehydes and ketones. 03  
c) Explain the effect of substituents on the acidity of carboxylic acid. 03
10. a) Give any two methods for the preparation of acid anhydride. 04  
b) Explain the mechanism of benzoin condensation. 03  
c) Explain Rosenmund reduction reaction of acid chlorides. 03

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