

CHE 201

Reg. No. ....

CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION - APRIL 2012

**CHEMISTRY**

**PAPER II: GENERAL CHEMISTRY**

**Duration: 3 Hours**

**Max Marks: 80**

**PART A**

**1. Answer any TEN of the following: 2x10=20**

- a) What is Calendering?
- b) How are abrasives classified? Give one example for each type.
- c) How does oxidising power of elements vary along the period and down the group in the periodic table?
- d) State the law of Mass Action.
- e) Write the rate expression and predict the order of the reaction for the thermal decomposition of nitrogen pentoxide.
- f) Define gold number. What is its significance?

- g) Give reason, why colloidal arsenic sulphide is readily precipitated by the addition of small amount of  $\text{AlCl}_3$  while a larger amount of  $\text{NaCl}$  is required for the same precipitation.
- h) Define electronegativity? Name the most electro negative element in the periodic table.
- i) Why cyclopenta dienyl anion is aromatic while the corresponding cation is not?
- j) Write the two differences between inductive and mesomeric effect.
- m) What is nitrene? Give an example for a reaction involving this.
- n) Give an example each for -  
(i) antiaromatic compound (ii) aromatic heterocyclic compound

## PART-B

### UNIT-I

Answer any **TWO** of the following.

**10x2=20**

- |    |   |    |
|----|---|----|
| 2. | a) Outline the different steps involved in the manufacture of cane sugar. | 04 |
|    | b) Write a note on safety glass and Crookes glass.                        | 03 |
|    | c) Explain any three factors affecting ionisation energy.                 | 03 |
| 3. | a) Explain the manufacture of cement.                                     | 04 |
|    | d) How is ionic radius determined by Lande's method?                      | 03 |
|    | e) Explain the structure of silicon carbide.                              | 03 |
| 4. | a) How electron affinity of an element is evaluated by Born-Haber Cycle?  | 04 |
|    | b) Explain the properties of refractories.                                | 03 |
|    | c) Define (i) isoelectronic ions (ii) covalent radius                     | 03 |

### UNIT-II

Answer any **TWO** of the following.

**10x2=20**

- |    |   |    |
|----|---|----|
| 5. | a) Describe an expression for rate constant of $n^{\text{th}}$ order reaction.  | 04 |
|    | b) Explain any two applications of colloids.  | 03 |
|    | c) The equilibrium constant $K_p$ for the reaction.<br>$\text{A} + \text{B} \rightleftharpoons \text{C} + \text{D}$ is $10^{-12}$ at $327^\circ\text{C}$ and $10^{-7}$ at $427^\circ\text{C}$ .<br>Calculate the enthalpy of the reaction ( $R = 8.314 \text{ J/K/mol}$ ) | 03 |
| 6. | a) Derive Clapeyron – Clausius equation for a liquid – vapour equilibrium.  | 04 |
|    | b) Describe the cleansing action of soap on the basis of micelle formation.   | 03 |
|    | c) A second order reaction with equal initial concentration of the reactants is 60% complete in 80 minutes. Calculate the rate constant of the reaction.  | 03 |

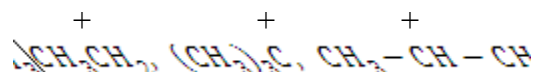
7. a) Derive Van't Hoff's reaction isotherm. 04  
 b) Explain the determination of order of a reaction by half-life method. 03  
 c) What are gels? How they are classified? Give one example for each. 03

### UNIT-III

Answer any TWO of the following.

10x2=20

8. a) Arrange the following in decreasing order of stability and give suitable explanation for it. 04



- d) Explain the mechanism of chlorination of benzene. 03  
 e) What is an elimination reaction? Explain with suitable example. 03
9. a) Give the mechanism of Reimer – Tiemann reaction.  
 b) What are aromaticity and hyper conjugation effect? Explain with suitable example.  
 c) Explain the electronic interpretation of the orienting influence of ortho-para directing group with an example. 03
10. a) Explain the mechanism of aldol condensation and name the reaction intermediate.  
 b) Write the mechanism for the conversion of benzene to toluene. 03  
 c) How do you predict the reaction mechanism by product analysis method? 03

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CHE 201

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**CHEMISTRY**

**PAPER II: GENERAL CHEMISTRY**

**Duration: 3 Hours**

**Max Marks: 80**

**PART A**

**1. Answer any TEN of the following: 2x10=20**

- a) Write the structure of silicon carbide.
- b) What is calendaring?
- c) How does ionic radius vary along a period and down the group in the periodic table?
- d) Arrange F, Cl, Br & I in the order of increasing electron affinity.
- e) Define gold number.
- f) The half life period for a second order reaction is 25 seconds, when the initial concentration of the reactant is  $0.02 \text{ mol/dm}^3$ . Calculate rate constant.
- g) Chemical equilibrium is dynamic equilibrium. Justify.
- h) What are gels? How are they classified?
- i) Why cyclopentadienyl anion is aromatic while the corresponding cation is not?
- j) What is elimination reaction? Give one example.
- o) What are homolytic and heterolytic fission?
- p) What is the reaction intermediate in the conversion of
  - (i) Bromobenzene to aniline
  - (ii) Benzene to toluene

**PART-B**

**UNIT-I**

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

2.
  - a) Describe the manufacture of cement by dry process. 04
  - b) How are the metallic and oxidizing properties of the elements predicted on the basis of periodic properties? 03
  - c) How is ionization energy determined by discharge tube method. 03

3. a) Outline the different steps involved in the manufacture of cane sugar. 04  
 f) Define electronegativity. How does this property decide the bond type in compounds? 03  
 g) What are refractories? How they are classified? 03
4. a) Write the composition and properties of optical glass and flint glass. 04  
 b) Give reason  
 (i) The second ionisation energy is higher than the first ionisation energy for an element  
 (ii) The size of an anion is larger than the corresponding neutral atom. 03  
 c) Write a note on glazing. 03

### UNIT-II

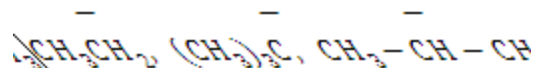
**Answer any TWO of the following. 10x2=20**

5. a) Derive van't Hoff's reaction isotherm. 04  
 b) What is Brownian movement? How is it caused? 03  
 c) The half life periods for a chemical reaction with initial concentrations 1M and 2M are 40 minutes and 13.2 minutes respectively. Calculate the order of the reaction. 03
6. a) Derive an expression for rate constant of a second order reaction with the same initial concentrations of the reactants. 04  
 b) What are emulsifiers? Give two examples. 03  
 c) Calculate the heat of vaporization of water, if the vapour pressure of water at 373.6K and 372.6K are respectively 109.53 kPa and 99.50 kPa. 03
7. a) Derive the relationship between rate constant and equilibrium constant using transition state theory. 04  
 b) Explain the experiment to determine the charge on the colloidal particle. 03  
 c) Write the differential and integrated form of van't Hoff's equation. Explain the terms in it. 03

### UNIT-III

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

8. a) Arrange the following in decreasing order of stability and give suitable explanation for it. 04



- f) Explain the mechanism of nitration of benzene. 03
- g) What are antiaromatic and non-aromatic compounds? Give one example each. 03
9. a) Give the mechanism of electrophilic addition of HBr to prepene.  
 b) How do you predict the reaction mechanism by kinetic method?  
 c) Explain the mechanism of conversion of chlorobenzene to aminobenzene. 03
10. a) Explain the orientating influence of – OH group in phenol and – NO<sub>2</sub> group in nitrobenzene towards electrophilic substitution reactions.  
 b) Write the mechanism of a reaction involving nitrene. 03  
 c) Explain hyperconjugation with suitable example. 03

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CHE 201

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CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2014

**CHEMISTRY**

**PAPER II: GENERAL CHEMISTRY**

Duration: 3 hours

Max marks: 80

**PART A**

1. Answer any TEN of the following: 2x10=20
- a) What is annealing of glass?
- b) How does size of an atom vary along period and group of the periodic table?
- c) Write Mulliken's electronegativity scale.
- d) What are the raw materials required for the manufacture of white ware?
- e) Explain delta formation.
- f) The half-life period of a radioactive element is 5600 yrs. Starting from 1g of the substance what amount will be left behind after 22, 400 yrs.

- g) Calculate the  $K_p$  for the reaction  $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$  at 298 K if  $K_c$  for the reaction is 10.
- h) The half life of a second order reaction is 2108 min. Calculate the rate constant if the initial concentration of the reactant is 1 mol/l.
- i) Give reasons: Presence of chlorine in benzene ring is ortho-para directing for electrophilic substitution reaction.
- j) Explain the stability of primary, secondary and tertiary carbocations.
- q) Explain hyperconjugation with an example.
- r) Give reasons: Tertiary butyl benzene yields 80% p-tertiary butylnitrobenzene on nitration.

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

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

2. a) How is glass manufactured? 03  
 b) What are refractories? How are they classified? Explain their properties with examples. 04  
 c) How is atomic radius determined by Lande's method? 03
3. a) How is Portland cement manufactured? 04  
 b) How is paper manufactured? 03  
 c) Define electron affinity. Explain why electron affinity of fluorine is less than that of chloride. 03
4. a) How is metallic/nonmetallic, and oxidizing/reducing properties of elements predicted using ionization energy and electronegativity? 04  
 b) What are the factors determine the ionization energy? Why is ionization energy of nitrogen greater than that of oxygen. 03  
 c) Give reasons:  
 (i) Ionization energy of beryllium is greater than that of boron  
 (ii) Size of alkali metals increases down the group. 03

**UNIT-II**

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

5. a) Derive Van't Hoff equation. 04  
 b) Derive an expression for the rate constant of second order reaction. 03  
 c) Explain protecting action of colloids using Gold number. 03
6. a) Derive Clausius Clayperon equation. 04

- b) Explain with example, the determination of mechanism of a reaction by kinetic method. 03
- c) Calculate the heat of vapourization of water if the vapour pressure of water at 374K and 372K are 105 kPa and 99.5 kPa respectively 03
7. a) Explain kinetic and optical properties of colloids. 04
- b) Explain transition state theory of reaction rates. 03
- c) Derive Van't Hoff reaction isotherm. 03

### UNIT-III

Answer any TWO of the following. 2x10=20

8. a) Explain the mechanism of nitration of an aromatic compound. 03
- h) Explain the mechanism for the Markownikoff's addition of HBr to propene. 03
- i) How is reaction mechanism predicted by using isotope effect. 04
9. a) Explain the mechanism for aldol condensation reaction.
- b) What is electromeric effect? Explain the orientation influence of methyl group in the benzene ring. 04
- c) Explain the formation of intermediates in
- i) Hofmann reaction
- ii) Chlorination of methane 03
10. a) Explain the orientation influence of  $NH$  and  $NO$  groups present in aniline and nitrobenzene respectively on electrophilic substitution reaction.
- b) Explain the mechanism of Friedel Crafts alkylation 04
- c) Explain inductive effect with examples. 03

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## CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2015

**CHEMISTRY****PAPER II: GENERAL CHEMISTRY**

Duration: 3 hours

Max marks: 80

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

10x2=20

- Write the structure of silicon carbide and one application.
- What are basic refractories? Give an example.
- Give the Pauling's scale of electronegativity.
- What are isoelectronic ions? Give example.
- How is the order of a reaction related to the half life period?
- $K_p$  for the reaction  $2\text{NH}_3 \rightleftharpoons \text{N}_2 + 3\text{H}_2$  at 400K is 41. Find the value of  $K_p$  for reaction  $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$  at same temperature.
- Explain emulsifier with example.
- Write an expression for disintegration constant of radioactivity and explain the terms.
- Give an example each for antiaromatic and heterocyclic aromatic compounds.
- Explain the stability of benzene.
- Give reason: chloroacetic acid is more acidic than acetic acid.
- Give reasons: Presence of bromine in benzene ring is ortho para director for electrophilic substitution reaction.

**PART-B****UNIT-I**Answer any **TWO** of the following.

2x10=20

- How is Portland cement manufactured? 04
  - Explain the process of extraction of sugar from sugarcane. 03
  - Define electron affinity. How is electron affinity evaluated by Born-Haber Cycle? 03
- How is glass manufactured? 04
  - How is atomic radius determined by Lande's method? 03
  - What are refractories? Explain its applications. 03
- Define electronegativity. What are the factors influencing the electronegativity? Give its two applications. 04

- b) How does atomic radius vary in the periodic table? Explain its influence on ionization energy of neutral atom. 03
- c) Predict the chemical behavior of the following elements using periodic properties. Na, Fe, Cl. 03

### UNIT-II

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

5. a) (i) What are emulsions? Explain different types with examples. 04  
 (ii) What are gels? How are they classified? 04
- b) Derive an expression for rate constant of  $n^{\text{th}}$  order reaction. 03
- c) Explain collision theory of reaction rates. 03
6. a) The half time period of a reaction is one hour at certain concentration. When the concentration is reduced to one half of the initial concentration the half time period is 30 minutes. Calculate the order of the reaction. 03
- b) Derive Clausius Clapeyron equation.  $\ln \frac{P_2}{P_1} = \frac{H}{RT_1} - \frac{H}{RT_2}$  03
- c) The equilibrium constant  $K_p$  for the reaction  $N_2 + 3H_2 \rightleftharpoons 2NH_3$  is 4.6210 at 400 K. What will be the equilibrium constant at 600 K if heat of reaction in this temperature range is -45 kJ/mol. 04
7. a) How is mechanism of decomposition of  $NO$  determined by chemical kinetics. 03
- b) How is order of a reaction determined experimentally for the hydrolysis of an ester in alkali medium. 03
- c) (i) Explain Hardy-Schulze rule with examples. 03  
 (ii) Define gold number. 04

### UNIT-III

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

8. a) Explain the formation of intermediates in  
 (i) Hofmann reaction (ii) Chlorination of methane 04
- j) Explain the mechanism of Friedel craft acylation reaction. 03
- k) What are the criteria for aromaticity? 03
9. a) How is the reaction mechanism predicted by  
 (i) Kinetic studies (ii) presence of intermediate
- b) Explain the stability of carbocation, carbonion and carbene. 04
- d) Give the mechanism of addition of hydrogen bromide to propene in the presence of peroxide. 03

10. a) Explain the mechanism of Reimer-Tiemann reaction. 03

CHE 201.2

Reg. No. ....

**CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2015**

**CHEMISTRY**

**PAPER II: GENERAL CHEMISTRY**

**Duration: 3 hours**

**Max marks: 80**

- Note: 1. Write question numbers and subdivisions clearly.  
2. Write chemical equations and diagrams wherever necessary.**

**PART A**

**1. Answer any TEN of the following: 2x10=20**

- a) Explain the role of gypsum in the setting of cement.
- b) Explain why alkaline earth metals impart characteristic colour to the flame?
- c) What are the raw materials used in the manufacture of cement?
- d) Give reason: Alkali metals have low ionization potential.
- e) State the law of mass action and give the mathematical expression.
- f) Define order of reaction and give one example for first order reaction.
- g) Define half life period of reaction and give the mathematical expression that relates half life period and initial concentration of the reactant.
- h) Write Clapeyron-Clausius equation and explain the terms.
- i) Explain phthalic anhydride formation reaction.
- j) What is Gattermann reaction?
- u) What is  $S_N1$  mechanism? Give one example.
- v) What is peroxide effect?

**PART-B**

**UNIT-I**

Answer any TWO of the following. 2x10=20

2. a) Explain how cement is manufactured? 04
- b) What is diagonal relationship? What are its causes? 03
- c) Explain why lithium is a very good reducing agent? 03
  
3. a) Explain the functions of sodium, potassium, magnesium and calcium in biological systems. 04
- b) Explain the manufacture of sodium hydroxide. 03
- c) Compare the reducing property of alkali metals and alkaline earth metals. 03

4. a) Explain the manufacture of soda ash. 04  
 b) Compare the reactivity of alkali metals and alkaline earth metals with water. 03  
 c) How is calcium phosphate manufactured? 03

### UNIT-II

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

5. a) Derive Van't Hoff equation. 04  
 b) What is the scopes of green chemistry? 03  
 c) Explain how order of a reaction determined by half life method. 03
6. a) The vapour pressure of water at <sup>38</sup> and <sup>05</sup> are 580 mm and 680 mm respectively. Calculate the molar heat of vapourisation of water between <sup>05</sup> and <sup>05</sup>. (Given <sup>05</sup>) 04  
 b) Derive an expression for the velocity constant of a second order reaction, when the initial concentration of the reactants are the same. 03  
 c) What is atom economy? Explain with an example. 03
7. a) A second order reaction in which the initial concentration of both the reactants are same and it takes 600s for 45% completion of the reaction. How long will it take for 75% completion of the reaction? 04  
 b) Write a note on pseudo first order reaction. 03  
 c) Explain how is order of a reaction determined by differential method. 03

### UNIT-III

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

8. a) Write short notes on orientation effect of substituents. 04  
 l) Explain how methanol is manufactured from water gas. 03  
 m) Explain the mechanism of addition reaction of hydrogen chloride to propene. 03
9. a) Explain the manufacture of ethanol from molasses.  
 b) Explain the acidic character of phenols. 03  
 e) Explain the aromatic electrophilic substitution reaction by nitration. 03
10. a) Describe the manufacture of glycerol from spent bye.  
 b) Explain the mechanism of Fries rearrangement. 03  
 c) Explain the mechanism of conversion of chloro benzene to amino benzene. 03



## CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2016

**CHEMISTRY****PAPER II: GENERAL CHEMISTRY**

Duration: 3 hours

Max marks: 80

- Note: 1. Write question numbers and subdivisions clearly.  
2. Write chemical equations and diagrams wherever necessary.

**PART A**1. Answer any **TEN** of the following: 2x10=20

- a) Name any two fertilizers of phosphorous and mention their uses.
- b) What are the raw materials used for the production of  
(i) Phosphoric acid (ii) Calcium phosphate
- c) Explain why alkali metals impart characteristic colour to the flame.
- d) What is the action of water on alkali metals? Explain.
- e) What is meant by chemical equilibrium? What is equilibrium constant?
- f) What is meant by half life period of a reaction?
- g) Give any two factors affecting the rate of reaction.
- h) What measures can be taken to prevent the production of hazardous and toxic wastes?
- i) What is  $E_1$  mechanism? Write an example for  $E_1$  mechanism.
- j) What is Markownikoff's rule? Give a reaction following Markownikoff's rule.
- k) Give any two applications of (i) Ethylene glycol (ii) Glycerol
- l) Explain Libermann reaction.

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

2.
  - a) Explain the manufacture of Chlorine. 04
  - b) Compare the ionization potential of alkali metals and alkaline earth metals. 03
  - c) What is diagonal relationship? What are its causes? 03
3.
  - a) Explain setting of cement. 04
  - b) Compare the basic character of hydrides of alkali metals. 03
  - c) Explain the manufacture of Ammonium phosphate. 03
4.
  - a) Discuss the diagonal relationship between lithium and magnesium. 04
  - b) Explain the manufacture of Orthophosphoric acid. 03
  - c) How is Sulphuric acid produced? Give its uses. 03

## UNIT-II

Answer any **TWO** of the following.

10x2=20

5. a) Derive Kinetic equation for  $n^{\text{th}}$  order reaction. 04  
b) At 1500K the standard free energy change  $\Delta G^\circ$  for a reaction is  $-85.02\text{kJ mol}^{-1}$ . Calculate the equilibrium constant for the reaction at 1500K. ( $R = 8.314\text{JK}^{-1}\text{mol}^{-1}$ ) 03  
c) Write any three principles of green chemistry. 03
6. a) Derive Clayperon-Clausius equation. 04  
b) A second order reaction in which the initial concentration of both the reactants are same and is 30% completed in 700 sec. How long will it take for 70% completion of the reaction? 03  
c) What is atom economy? Explain with an example. 03
7. a) What are the criteria borne in mind while designing a green synthesis. 04  
b) The equilibrium constant  $K_p$  for a reaction is 20.2 atmosphere at  $950^\circ\text{C}$  and 9.2 atmosphere at  $1070^\circ\text{C}$ . Calculate the heat of the reaction. ( $R = 8.314\text{JK}^{-1}\text{mol}^{-1}$ ) 03  
c) How is order of a reaction determined by half life method 03

## UNIT-III

Answer any **TWO** of the following.

2x10=20

8. a) Explain the method of manufacture of ethanol from molasses. 04  
b) How are Phenols classified? Give one example each. 03  
c) Explain the mechanism for the reaction between ethyl bromide with ethoxide ion. 03
9. a) Give the mechanism of Claisen rearrangement. 04  
b) Explain Lucas test for distinguishing different types of alcohols. 03  
c) Explain the mechanism for hydrolysis of t-butyl bromide. 03
10. a) Write short notes on orientation effect of substituents. 04  
b) How is glycerol manufactured from spent bye? 03  
c) Phenols show acid character. Explain. 03

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