



# Sanjay Ghodawat University, Kolhapur

2018-19

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

FY B.Sc.-I

School of Science

Semester II

CHS 102

Chemistry II

Max Marks: 100

24 May 2018

End Semester Examination (ESE)

Time: 3 Hrs

10:30 AM To 1:30 PM

## Instructions:

- 1) All Questions are compulsory.
- 2) Use of calculator is allowed

### Q.1 Multiple choice questions (each one mark)

10 Marks CO  
CO1

i) A ----- property of a system, which depends upon the amount of the substance present in the system.

- a) Intensive
- b) Extensive
- c) both a and b
- d) none of these

ii) A process which proceeds infinitesimally slowly is called

CO1

- a) irreversible
- b) isothermal
- c) reversible
- d) adiabatic

iii) The mathematical form of first law of thermodynamics is

CO1

- a)  $dq = dU + dw$
- b)  $dq = dU - dw$
- c)  $dU = dq + dw$
- d) None of these

iv) Standard state refers to

CO1

- a) One atmosphere pressure and 25 °C temperature
- b) One atmosphere pressure and 100 °C temperature
- c) One atmosphere pressure and 0 °C temperature
- d) none of these

v) According to law of mass action, for the following reaction

CO1



Which equation holds good?

- a)  $\text{Rate} = k[A][B]$
- b)  $\text{Rate} = k[A][B]^2$
- c)  $\text{Rate} = k[A]^2[B]$
- d) none of these

vi) Relation between  $K_c$  and  $K_p$  is .....

CO2

- a)  $K_p = K_c (RT)^{\Delta n}$
- b)  $K_p = K_c (RT)^{\Delta n/2}$
- c)  $K_p = K_c (RT)$
- d) none of these

vii) Substances which conduct electricity in aqueous solution are called.....

CO2

- a) Non-electrolyte                      b) Electrolyte  
c) Buffer                                      d) None of these.

viii) A ----- solution is defined as a solution whose pH remains constant on addition of small amount of acid or base.

CO2

- b) Buffer                                      b) Electrolyte  
c) Non-electrolyte                      d) none of these

ix) The fraction of total molecules of the electrolyte that dissociates into ions is called as .....

CO2

- a) Salt hydrolysis                      b) conductivity  
c) Degree of ionization              d) ionic product

x) If an equilibrium subjected to a stress, the equilibrium shifts in such a way so as to reduce the stress is the .....principle.

CO2

- a) Kirchoff's                              b) Le-Chatelier's  
c) Einstein                                d) none of these

**Q.2 a) Solve any one of the following (Eight mark each)**

20  
Marks

i) State third law of thermodynamics. How does this law help in the determination of absolute entropies of chemical compounds?

CO1

ii) a) Derive an expression for ionization constant of a weak acid.

CO2

b) The degree of ionization of 0.1 M bromoacetic acid solution is 0.132. Calculate the pH of the solution and  $pK_a$  of bromoacetic acid.

**b) Solve the following (Six marks each)**

- i) Derive thermodynamically Kirchoff's equation.  
ii) Derive relation between  $K_p$  and  $K_c$ .

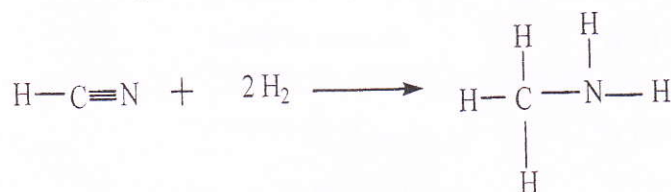
CO1  
CO2

**Q.3 Write any 4 of the following ( Five marks each)**

20  
Marks

- i) Enthalpy change ( $\Delta H$ ) for the reaction is  $-150$  kJ. Calculate bond energy of  $C\equiv N$  bond.

CO1



Given that bond energies of C-H = 414, H-H = 435, C-N = 293, N-H = 396 kJ.

- ii) Calculate the enthalpy change ( $\Delta H^0$ ) for the reaction:

CO1



Given that  $\Delta H_f^0$  for  $\text{CO}_2(g)$ ,  $\text{CO}(g)$ , and  $\text{H}_2\text{O}(g)$  are  $-393.5$ ,  $-111.3$  and  $-241.8 \text{ kJ.mol}^{-1}$ , respectively.

- iii) What is buffer solution and what is meant by buffer action?

CO2

- iv) Ionization constant of acetic acid and ionic product of water

CO2

are  $1.75 \times 10^{-5}$  and  $1 \times 10^{-14}$  respectively. Calculate the hydrolysis constant of sodium acetate and degree of hydrolysis in 0.1 M solution at 25 °C.

- v) What is LeChatelier's principle? Explain effect of change of temperature with example.

CO2

- vi) What is solubility product? Write applications of solubility product.

CO2

#### Q.4 Multiple choice questions (each one mark)

10  
Marks

- i) Huckel's rule is related to .....

CO3

- a) Acidity
- b) Basicity
- c) Aromaticity
- d) Unsaturation.

- ii) Benzene on reaction with acetyl chloride in presence of  $\text{AlCl}_3$  gives

CO3

- a) Benzophenone    b) acetic anhydride
- c) Acetophenone    d) ethyl benzene

- iii) Benzene reacts with propylene in presence of Lewis acid ( $\text{BF}_3$ ) forms

CO3

- a) Cumene                      b) benzoic acid
- c) Bromobenzene            d) ethyl benzene

- iv) Alkyl Halide can be prepared from alcohols by the action of ..... CO3
- a)  $\text{PCl}_3$                       b)  $\text{PCl}_5$   
c)  $\text{SOCl}_2$                       d) All the above CO3
- v) Williamson's method is used for the synthesis of ..... CO4
- a) alcohols                      b) ethers  
c) esters                        d) Hydrocarbons
- vi) Which of the following compound is least soluble in water? CO4
- a)  $\text{CH}_3\text{-OH}$                       b)  $\text{CH}_3\text{-CH}_2\text{-OH}$   
c)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$         d)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-OH}$
- vii) Which of the following cannot react with sodium metal? CO4
- a)  $\text{CH}_3\text{-OH}$                       b)  $\text{C}_2\text{H}_5\text{OH}$   
c)  $\text{C}_2\text{H}_5\text{-O- C}_2\text{H}_5$               d)  $\text{C}_2\text{H}_5\text{-Br}$
- viii) Intramolecular hydrogen bonding is present in..... CO4
- a) *p*-nitrophenol  
b) *o*-nitrophenol  
c) *m*-nitrophenol  
d) phenol
- ix) The compound in which -OH group is directly attached to aromatic ring will be..... CO4
- a) Neutral in nature  
b) Acidic in nature  
c) Basic in nature  
d) A good oxidizing agent.
- x) The compound which reacts fastest with Lucas reagent is CO4
- a) Tertiary alcohol        b) Secondary alcohol  
c) Primary alcohol        d) none of these



**Q.5 a) Solve any one of the following (Eight mark each)**

**20**  
**Marks CO3**

i) What is Friedel Craft alkylation? How it is carried out using

- a) Alky halide    b) alkene    c) alcohol

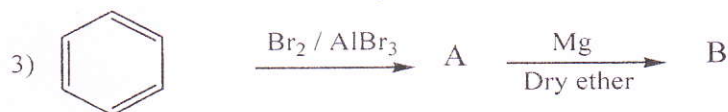
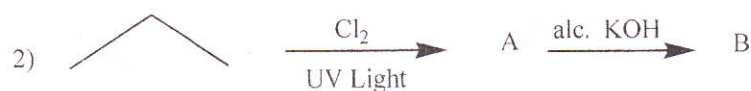
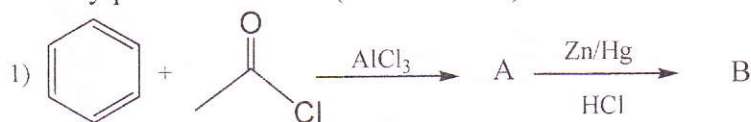
ii) Write methods of preparation of alcohol from Grignard reagent and ester hydrolysis.

**CO4**

**b) Solve the following (Six marks each)**

i) Identify product **A** and **B** (2 marks each)

**CO3**



ii) What are ethers? How they are classified? How will you prepare dimethyl ether?

**CO4**

**Q.6 Write short notes on any 4 of the following (Five marks each)**

**20**  
**Marks CO3**

i) Aromaticity

**CO3**

ii) Huckel's rule

**CO4**

iii) Benzyne mechanism for nucleophilic aromatic substitution

**CO4**

iv) Pinacol-pinacolone rearrangement.

**CO4**

v) Write note on nitration of phenol.

**CO4**

vi) Gattermann-Koch reaction

**CO4**