

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Degree Examination, November 2018

BCHE3B03 - Physical Chemistry I

(2016 Admission onwards)

Max. Time: 3 hours

Max. Marks: 80

Section A (One word)**Answer all questions. Each question carries 1 mark**

1. The temperature at which the second virial coefficient B is zero for a gas is called....
2. Give the SI unit of molar refraction.
3. For the equilibrium, $\text{CaCO}_{3(s)} \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$, the equilibrium constant K_p is equal to
4. Isothermal reversible expansion of an ideal gas involves absorption of 5 kJ of heat. How much work is done in the process?
5. During the vapourisation of a liquid, entropy.....
6. Among CO_2 , SO_2 , H_2 and O_2 which gas will have the highest value of RMS velocity at 25°C .
7. For a process at equilibrium, the free energy change is
8. Exothermic reactions involving a decrease in entropy become spontaneous if ΔH is than $T\Delta S$ in magnitude.
9. What is the number of modes of vibration of acetylene?
10. If the v_{rms} velocity of a gas at a certain temperature is 100ms^{-1} , what is its average velocity at the same temperature.

(10 x 1 = 10 Marks)**Section B (Short Answer)****Answer any 10 questions. Each question carries 2 marks**

11. Define inversion temperature and explain its relation with the Joule-Thomson coefficient?
12. What happens to the entropy of the universe in (i) a reversible process (ii) an irreversible process?
13. Obtain the relation : $dA = -SdT - PdV$
14. Give the relationships of 'a' and 'b' in terms of P_c and T_c .
15. Explain the effect of temperature on surface tension.
16. State the Lorentz - Lorenz equation and explain the terms.
17. Show that in an isothermal expansion of an ideal gas (a) $\Delta U = 0$ and (b) $\Delta H = 0$.
18. State the law of mass action.
19. Define K_x . How is it related to K_p ?
20. Calculate the entropy change involved in raising the temperature of 1 mole of an ideal gas from 298K to 1000 K at constant pressure. $C_p = 2.5R$
21. Differentiate between statistical probability and thermodynamic probability.
22. Show that $T_C = 8T_B/27$ for a gas, where T_B and T_C are respectively the Boyle temperature and critical temperature.

(10 x 2 = 20 Marks)

Section C (Paragraph)

Answer any five questions. Each question carries 6 marks

23. Derive an expression relating C_p and C_v for n moles of an ideal gas.
24. Show that $-(\Delta G)_{T,P} = -w_{useful}$. Discuss the physical significance of Gibb's energy.
25. The boiling point of a liquid at 1 atm is 318.5 K. At what temperature will it boil at 0.9671 atm. Given $\Delta H_v = 21.9224 \text{ kJ mol}^{-1}$.
26. K_p for the reaction $\text{N}_2\text{O}_4(g) \rightleftharpoons 2\text{NO}_2(g)$ at 298 K is 0.14. Calculate ΔG° for the reaction in calories.
27. Derive the van't Hoff equation showing the temperature dependence of equilibrium constant and arrive at its integrated form..
28. If the total vapour pressure of the system $\text{NH}_4\text{HS}(s) \rightleftharpoons \text{NH}_3(g) + \text{H}_2\text{S}(g)$ at equilibrium at 298 K is 0.63 atm, Calculate K_p .
29. Define parachor. Discuss its use in the structural elucidation with suitable examples.
30. What is Stirling's approximation? What is its importance in statistical thermodynamics?

(5 x 6 = 30 Marks)

Section D (Essay)

Answer any two questions. Each question carries 10 marks

31. Describe the Carnot's Cycle and derive an expression for the efficiency of a heat engine.
32. State Le Chatelier's principle and apply it to the equilibrium in Haber process.
33. (a) Discuss the method for determining the molecular mass of a polymer by viscosity measurement.
(b) Derive the van der Waals' equation of state for a real gas.
34. What is Kirchoff's equation? The enthalpy of reaction for the formation of ammonia according to the reaction: $\text{N}_2(g) + 3\text{H}_2(g) \rightleftharpoons 2\text{NH}_3(g)$ at 27°C was found to be -91.94kJ . What will be the enthalpy of reaction ΔH at 50°C ? The molar heat capacities at constant pressure and at 27°C for nitrogen, hydrogen and ammonia are 28.45, 28.32 and 37.07 J, respectively.

(2 x 10 = 20 Marks)

1B3N18135

(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Degree Examination, November 2018

BCHE3C03 - Organic Chemistry

(2016 Admission onwards)

Max. Time: 3 hours

Max. Marks: 64

SECTION A (One word)

(Answer all questions. Each question has 1 mark)

1. The IUPAC name of acetic acid is
2. What kind of bond cleavage yields charged fragments?
3. The most stable conformation of ethane isconformation.
4. How many sigma bonds are there in acetylene molecule.....
5. Cycloheptatrienyl cation is otherwise known as
6. $-\text{NO}_2$ group has.....directing influence in aromatic electrophilic substitution.
7. What is the structural formula of 1-ethoxypropane .
8. In normal DNA , which base does adenine pair with ?
9. Which is the monomer of starch ?
10. Draw the structure of nicotine.

(10 x 1 = 10 Marks)

SECTION B (Short answer)

(Answer any seven questions. Each question carries 2marks)

11. What are carbocations ? Give examples.
12. Arrange acetic acid, chloroacetic acid and dichloroacetic acid in the increasing order of their acidities. Justify your answer.
13. Among $\text{CH}_3\text{-CH}(\text{Cl})\text{-CH}_2\text{OH}$, $\text{HOOC-CH}_2\text{-CH}_2\text{OH}$, and $(\text{HO})\text{H}_2\text{C-(HO)HC-CH}_2\text{OH}$, which one shows optical isomerism ? Why ?
14. Outline one method for the resolution of racemic modification.
15. What are benzenoid and non benzenoid aromatic compounds ? Give examples.
16. Differentiate between enantiomers and diastereoisomers.
17. Which is more acidic; phenol or P- nitro phenol ? Justify.
18. What is TNT ? Mention two uses of TNT.
19. What are epimers ?
20. State and explain isoprene rule.

(7 x 2 = 14 Marks)

SECTION C(Paragraph)

(Answer any four questions. Each question carries 5marks)

21. What is mutarotation? Give examples.
22. Discuss the optical isomerism in tartaric acid.
23. Give the mechanism of bromination of benzene.
24. Explain the term Walden inversion.
25. How is phenolphthalein prepared? What are its uses ?
26. Explain the Lucas test to distinguish between 1^o, 2^o and 3^o alcohols.

(4 x 5 = 20 Marks)

SECTION D (Essay)

(Answer any two questions. Each question carries 10 marks)

27. Discuss in details the factors affecting the reactivity of alkyl halides in S_N² reaction.
28. Discuss the structure of protein. How are they classified ?
29. Discuss the hybridization of carbon in the following molecules and illustrate how the concept explains their shapes (i) ethane (ii) ethylene (iii) acetylene.
30. (a) Explain the term DNA fingerprinting and discuss its applications.
(b) Explain the sources, structure and physiological activity of coniine and piperine.

(2 x 10 = 20 Marks)