



SECTION - C

Answer **any four** questions. **Each** carries a weightage of **2**.

13. Show how the parachor of any substance is related to its chemical constitution.
14. Write a note on Carnot cycle of an isothermal and adiabatic process.
15. The heat of combustion of ethyl alcohol is -330 Kcal. If the heat of formation of $\text{CO}_{2(g)}$ and $\text{H}_2\text{O}_{(l)}$ are -94.3 KCal and -68.5 KCal respectively. Calculate the heat of formation of ethyl alcohol.
16. Derive Van't Hoff reaction isochore.
17. Explain the mechanism of enzyme catalysed reactions.
18. Discuss the reasons of high and low quantum yield in photochemical reactions.

(4×2=8)

SECTION - D

Answer **any two** questions. **Each** carries a weightage of **4**.

19. i) Explain the deviation of real gases from ideal behaviour.
ii) Derive the Vander Waal's equation for n moles of a gas and
iii) Write down the units in which Vander Waal's constants are expressed.
20. Molybdenum forms body centered cubic crystals whose density is 12.96 gcm^{-3} . Calculate:
a) Edge length of unit cube
b) The distance between (110) and (111) planes
21. Explain 3rd law of thermodynamics based on the Nernst heat theorem. (2×4=8)



Reg. No. :

Name :

V Semester B.Sc. Degree (CCSS-Reg./Supple./Imp.)

Examination, November 2014

CORE COURSE IN CHEMISTRY

5B07 CHE : Physical Chemistry - 1

Time : 3 Hours

Max. Weightage : 25

SECTION - A

Answer **all** questions. Choose the correct answer. **Each** bunch of **four** questions carries a weightage of **1**.

1. i) Equal volume of all gases at the same temperature and pressure contain equal number of molecules is the statement of
a) Combined gas law b) Charle's law
c) Avogadro's law d) Boyle's law
- ii) Out of the following pairs of gases, which will diffuse through a porous plug with the same rate of diffusion.
a) NO, CO b) CH_4 , O_2
c) NO_2 , CO_2 d) NO, C_2H_6
- iii) The no. of atoms per unit cell in a simple cubic fcc and bcc are
a) 1, 2, 4 b) 2, 4, 1
c) 1, 4, 2 d) 4, 2, 1
- iv) For tetragonal crystal system, which of the following is not true ?
a) $a = b \neq c$ b) $\alpha = \beta = \gamma = 90^\circ$
c) $a \neq b \neq c$ d) None of these
2. i) In CCP pattern of metallic crystal, the co-ordination number is _____
a) 12 b) 8 c) 6 d) 4



- ii) The radius ratio of an ionic crystal of type AB lies between 0.732 – 1.000, its co-ordination number is _____
- a) 3 b) 4 c) 6 d) 8
- iii) The number of atoms in a unit cell of face centered cube is _____
- a) 2 b) 4 c) 6 d) 8
- iv) In an adiabatic process _____ can flow into or out of the system.
- a) Heat b) No heat
c) Matter d) No matter
3. i) A gas expands from 10 lit. to 20 lit. against a constant external pressure of 10 atm. The pressure volume work done by the system is _____
- a) – 100 lit. atm. b) 100 lit. atm.
c) – 10 lit. atm. d) 10 lit. atm.
- ii) For the reaction $H_2 + I_2 \rightleftharpoons 2HI$, ΔH is equal to
- a) $\Delta E + 2RT$ b) $\Delta E - 2RT$
c) ΔE d) Zero
- iii) The heat of combustion of ethane is – 337.0 Kcal at 25°C. The heat of reaction when 3g of ethane is burnt completely at 25°C is
- a) – 3.37 Kcal b) + 3.37 Kcal
c) + 33.7 Kcal d) – 33.7 Kcal
- iv) If the reaction $2A + 3D \rightarrow$ products is first order in A and second order in D, then the rate law will be rate = _____
- a) $K(A)^2 (D)^3$ b) $K(A)^2 (D)$
c) $K(A) (D)^2$ d) $K(A)^2 (D)^2$
4. i) A first order reaction requires 8.96 months for the concentration of the reactant to be reduced to 25% of its original value. What is the half life of the reaction ?
- a) 4.48 months b) 2.24 months
c) 8.96 months d) 17.9 months
- ii) Which concentration plot is linear for a first order reaction ? (A represent reactant)
- a) [A] versus time b) $\sqrt{(A)}$ versus time
c) $\ln(A)$ versus time d) $(A)^2$ versus time



- iii) The powers in the rate law are determined by
- a) Physical state of reactant and product
b) Experiment
c) The coefficients in the balanced chemical reaction
d) None of these
- iv) The real gases show nearly ideal behaviour at
- a) Low pressure and low temp.
b) High pressure and low temp.
c) High pressure and high temp.
d) Low pressure and high temp. (4×1=4)

SECTION – B

Answer any five questions. Each carries a weightage of 1.

- Calculate the root mean square velocity of CO_2 at 1000°C.
- Write short note on vacancy theory of liquids.
- Calculate the distance between two lattice planes which give first order diffraction at an angle 26.42° with X-rays of wave length 0.710 Å.
- Calculate the entropy change when 2 moles of an ideal gas are allowed to expand isothermally at 293 K from a pressure of 10 atm. to a pressure of 2 atm.
- What is the effect of increase of pressure in the following reaction $N_2O_{4(g)} \rightarrow 2NO_{2(g)}$? Give reason.
- Deduce the law of mass action based on kinetic theory of gases.
- Write the characteristics of activated complex.
- Calculate the molar refraction of CCl_4 if its refractive index and density at 293 K are 1.4573 and 1.595 $Kgdm^{-3}$ respectively. Molecular mass of $CCl_4 = 153.6$ gm. (5×1=5)