Sample Question Paper-II
CHEMISTRY
BLUE PRINT
CLASS - XII

Time Allowed : 3 Hrs **Maximum Marks : 70**

S.R.	UNIT	VSA	S.A. I	S.A. II	L.A.	TOTAL
		(1)	(2)	(3)	(5)	
1	Solid State		4(2)		-	4(2)
2	Solutions	-	2(1)	3(1)	-	5(2)
3	Electrochemistry		2(1)	3(1)	-	5(2)
4	Chemical Kinetics	-	-	-	5(1)	5(1)
5	Surface Chemistry	1(1)		3(1)	-	4(2)
6	General Principles and Processes of Extraction of Elements	1(1)	2(1)	-	-	3(2)
7	p- Block Elements	1(1)	2(1)	-	5(1)	8(3)
8	d- and f- Block Elements	-	2(1)	3(1)	-	5(2)
9	Coordination Compounds	-	-	3(1)	-	3(1)
10	Haloalkanes and Haloarenes	2 (2)	2(1)	-	-	4(3)
11	Alcohols ,Phenols & Ethers	1(1)	-	3(1)	-	4(2)
12	Aldehydes,ketones and Carboxylic Acids	1(1)	-	-	5(1)	6(2)
13	Organic Compounds Containing Nitrogen		4 (2)	-	-	4(2)
14	Biomolecules	1(1)	-	3(1)	-	4(2)
15	Polymers			3(1)	-	3(1)
16	Chemistry in everyday Life	-	-	3(1)	-	3(1)
	Total	**8 (8)**	**20(10)**	**27(9)**	**15(3)**	**70(30)**

DESIGN

S No.	Type of Question	Marks for each Question	No. of Questions	Total Marks
1.	Long Answers (LA)	5	3	15
2.	Short Answers-II (SA II)	3	9	27
3.	Short Answers-I (SA-I)	2	10	20
4.	Very Short Answer (VSA)	1	08	08
	Total		**30**	**70**

Sample Question Paper - II
CHEMISTRY
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General Instructions:

1. *All questions are compulsory.*
2. *Question No. 1 to 8 are very short questions carrying one mark each.*
3. *Question No. 9 to 18 are short answer questions carrying 2 marks each.*
4. *Question No. 19 to 27 are also short answer questions carrying 3 marks each.*
5. *Question No. 28 to 30 are long answer questions carrying 5 marks each.*
6. *Use log table if necessary. Log tables will be provided on demand. Calculator is not allowed in exam hall.*

Q.1 Write the products obtained when benzyl phenylether is heated with HI.

Q.2 Name the type of potential difference produced between the fixed charged layer and diffused layer having opposite charges around the colloidal particle.

Q.3 Write the IUPAC name of the compound

$CH_2(C\ell)COCH(CH_3)CONH_2$

Q.4 Which of the following compounds has a lone pair of electrons at the central atom?

$H_2S_2O_8$, $H_2S_2O_7$, H_2SO_3, H_2SO_4

Q.5 What type of linkage holds together the monomers of DNA?

Q.6 Complete the following reaction :

$$CH3 - CH = CH_2 \xrightarrow[\text{peroxide}]{HBr} X \xrightarrow[\text{Acetone}]{NaI} Y$$

Q.7 Write a non-exothermic reaction taking place in the blast furnace during extraction of iron.

Q.8 Iodoform has antiseptic properties. Give one reason to support this.

Q.9 Write the names associated with the following reactions

(a) $RCONH_2 + Br_2 + 4NaOH \rightarrow RNH_2 + Na_2CO_3 + 2\,NaBr + 2H_2O$

(b) $ArN_2^+x^- \xrightarrow{CuCN/KCN} ArCN + N_2$

(c) $R\text{-}NH_2 + CHCl_3 + 3KOH \xrightarrow{Heat} R\text{-}NC + 3KCl + 3H_2O$

(d) $ArN_2^+x^- \xrightarrow{Cu/HCl} ArCl + N_2 + CuX$

10. KF has ccp structure. Calculate the radius of unit cell if the side of the cube or edge length is 400pm. How many F ions and octahederal voids are there in this unit cell?

11. Give reason

    (a) Why is Frenkel defect found in AgCl?

    (b) What is the difference between Phosphorus doped and Gallium doped semi conductors?

12. Describe the construction of a H_2-O_2 fuel cell and the reactions taking place in it.

OR

Define the terms given below:

(a) Conductivity (b) Molar Conductivity

What are their units?

13. State Raoult's law for a solution containing volatile liquids. Explain with suitable example the concept of maximum boiling azeotropes.

14. Give chemical reactions in support of the following observations.

    (a) Sulphuric acid has low volatility

    (b) Iodide ions can be oxidized by oxygen in acidic medium.

15. Propose mechanism of the reaction taking place when

    (a) (-) - 2-Bromooctane reacts with sodium hydroxide to form (+)-octane-2-ol.

    (b) 2-Bromo pentane is heated with (alc.) KOH to form alkenes.

16. What is a flux? What is the role of flux in the metallurgy of Iron and Copper?

17. The sum of first and second ionization enthalpies and third and fourth ionization enthalpies of nickel and platinum are:

	IE_1+IE_2 ($MJmol_{-1}$)	IE_3+IE_4 ($MJmol^{-1}$)
Ni	2.49	8.80
Pt	2.66	6.70

Based on the above information, answer the following:

(a) Which is the most common oxidation state for Ni and Pt? why?

(b) Out of the two, name the metal which can easily form compounds in +4 oxidation state and why?

18. Describe a chemical test in each case to distinguish between the following pairs of compounds .

    (a) Aniline and N-ethyl aniline.

    (b) N-Methyl propane-2-amine and N-Ethyl-N-methyl ethanamine.

19. Give reason

(a) Why does an alkaline medium inhibit the rusting of iron?

(b) Why does a dry cell become dead after a long time even if it has not been used?

(c) Why is Zinc better than Tin in protecting iron from corrosion?

20. Write :

(a) Reaction involved in the preparation of a biodegradable polyester.

(b) Monomer unit of synthetic rubber (neoprene).

(c) One use of Nylon-6,6

21. (a) Write the Zwitter ion structure of glycine.

(b) What is meant by inversion of sugar?

(c) Name the Vitamin in each case whose deficiency causes

(i) Night Blindness

(ii) Poor coagulation of blood.

22. Write chemical equations for the following reactions :

(a) Oxidation of nitrite ion by MnO_4^- in acidic medium.

(b) Acidification of potassium Chromate solution.

(c) Disproportionation of Manganese(VI) in acidic solution.

OR

Account for the following

(a) Europium (II) is more stable than cerium(II).

(b) Transition metals have high enthalpies of atomization.

(c) Actinoid ions are generally coloured.

23. Give plausible explanation for each of the following:

(a) Ortho-nitrophenol is more acidic than ortho-methoxyphenol.

(b) Alcohols are easily protonated in comparison to phenols.

(c) The relative ease of dehydration of alcohols is tertiary > secondary > primary.

24. On dissolving 19.5 g of CH_2FCOOH in 500 g of water, a depression of 1°C in freezing point of water is observed. Calculate the Van't Hoff factor and dissociation constant of fluoro acetic acid. Given, $K_f = 1.86$ K kg mol^{-1}

25. (a) Name one substance which can act as both:-

(i) Analgesic and antipyretic.

(ii) Antiseptic and disinfectant.

(b) Explain the following terms with suitable example of each :

(i) Broad spectrum antibiotics.

(ii) Anionic detergents.

26. (a) Heat of adsorpation is greater for chemisorptions than physisorption. Why?

(b) What is colloidion?

(c) Differentiate between peptization and coagulation.

27. (a) State the hybridization & magnetic behaviour of $[C_r(CO)_6]$.

(b) What are the various factors affecting crystal field splitting energy?

(c) Which of the two is more stable and why?

$K_4[Fe(CN)_6]$ OR $K_3[Fe(CN)_6]$.

28. (a) An orange solid A on heating gives a colourless gas B. The gas B in dry condition is passed over heated Ca to give a solid C . The solid C further reacts with water to produce gas D which forms a blue coloured compound E on reaction with Copper sulphate solution. Identify A,B,C,D,E and give the sequence of reactions involved.

(b) Arrange the following in order of property indicated for each set:

(i) HCl, HI, HBr,HF – Decreasing thermal stabilty.

(ii) Xe,He, Kr, Rn, Ne – Decreasing order of electron gain enthalpy.

OR

(a) Give Reasons:

(i) Solid $PC\ell_5$ is an ionic compound.

(ii) Most of the reactions of fluorine are exothermic.

(iii) Ozone is thermodynamically unstable.

(b) Draw the structures of the following

(i) XeOF4 (ii) $H_4P_2O_7$

29. (a) A compound A on oxidation gives $B(C_2H_4O_2)$. A reacts with dil. NaOH and on subsquent heating forms C. C on catalytic hydrogenation gives D. Identify A,B,C,D and write down the reactions involved.

(b) Write chemical equations to carry out the following conversions :-

(i) Benzene to Benzylalcohol.

(ii) Propane nitrile to 1-phenylpropanone.

OR

(a) An organic compound X undergoes acid hydrolysis to form two compounds Y and Z. Y reacts with Sodium carbonate to form A. A is heated with Soda lime to form B (CH_4) . Y on reduction with $LiA\ell H_4$ forms Z. Identify X,Y,Z,A,B and write the reactions involved.

(b) Account for the following:-

(i) Benzoic acid does not undergo Friedel-Craft reaction.

(ii) pKa value of chloro acetic acid is lower than pKa value of acetic acid.

30. (a) For the reaction

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{H^+} C_6H_{12}O_6 + C_6H_{12}O_6$$

write:

(i) Rate of reaction expression,

(ii) rate law equation,

(ii) molecularity,

(iii) order of reaction

(b) The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at constant volume.

$$SO_2Cl_2\ (g) \rightarrow SO_2\ (g) + Cl_2\ (g)$$

Experiment	Time/s	Total pressure/atm
1	0	0.5
2	100	0.6

Calculate the rate of reaction when total pressure is 0.65 atm.

OR

(a) Illustrate graphically the effect of catalyst on activation energy.

(b) Catalysts have no effect on the equilibrium constant. Why?

(c) The decomposition of A into product has value of k as $4.5 \times 10^3\ s^{-1}$ at 10^oC and activation energy is 60 kJ mol^{-1}. Calculate the temperature at which the value of k W (J) be $1.5 \times 10^4\ s^{-1}$

MARKING SCHEME OF
CHEMISTRY
SAMPLE PAPER-II

A.1 Phenol and benzyl iodide 1

A.2 Zeta potential 1

A.3 4-Chloro-2-methyl-3-oxo butanamide 1

A.4 H_2SO_3 1

A.5 Phosphodiester linkage 1

A.6 X = CH_3-CH_2-CH_2-Br ½ +½

Y = CH_3-CH_2-CH_2-I

A.7 $CaCO_3$ —— CaO + CO_2 1

A.8 Iodoform has antiseptic properties due to free liberated iodine. 1

A.9 (a) Hoffmann Bromide Degradation

(b) Sandmeyer's reaction

(c) Carbylamine reaction

(d) Gattermann Reaction (½ x 4=2)

A.10 For ccp Lattice

$$r = \frac{\sqrt{2}a}{4}$$ ½

$$r = \frac{1.414 \times 400\ pm}{4}$$

r = 141.4 pm 1

There are four F^- ions and octahedral voids. ½

A.11 (a) Due to smaller size of Ag^+ cation.

(b) Silicon doped with Phosphorus gives n-type whereas Silicon doped with Gallium are p-type semi conductors. 1+1

A.12 Fuel cell consists of porous carbon electrodes containing catalysts (finely divided platinum or palladium metal) incorporated in them. Conc. Aqueous KOH/ NaOH solution is placed between the electrodes act as electrolyte. H_2 and oxygen are bubbled through porous electrodes into the electrolytic solution. (1)

At Anode : $2H_2(g) + 4OH^-(aq) \longrightarrow 4H_2O(l) + 4e^-$ (½)

At Cathode : $O_2(g) + 2H_2O(l) + 4e \longrightarrow 4OH^-(aq)$ (½)

(a) Inverse of resistivity is called conductivity/conductance of one centimeter cube of the solution of the electrolyte.

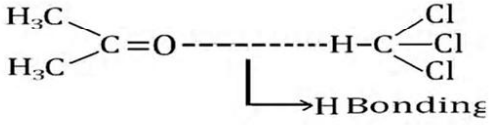
S I.Unit is Sm^{-1} (1)

(b) Molar conductivity : The conductance of the solution of an electrolyte containing one mole of electrolyte kept between two electrodes of a conductivity cell at unit distance. (1)

S I Unit Sm^2mol^{-1}

A.13 Roult's Law : For a solution of volatile liquids, the partial pressure of each component in a solution is directly proportional to its mole fraction. (½)

The solution showing large negative deviation from Raoult's law are maximum boiling azeotrops. e.g. mixture of chloroform and acetone.



(½)

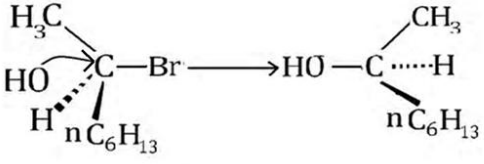
Hydrogen bonding formation decreases escaping tendency of a molecule i.e. exerts low V.P which leads to high B.P. (1)

A.14 (a) $2MX + H_2SO_4 \longrightarrow 2HX + M_2SO_4$ (1)

$(X = F, C\ell, NO_3)$

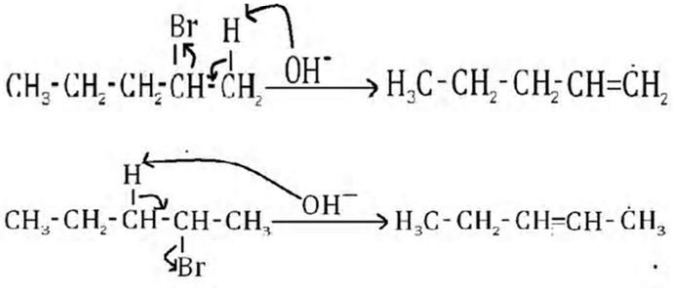
(b) $4I^- + 4H^+ + O_2 \longrightarrow 2I_2 + 2H_2O$

A.15 (a)



(1)

(b)



(1)

major

A16. Flux is a substance that combines with gangue (which may still be present in roasted or the calcined ore) to form slag. (1)

$FeO + SiO_2$ ——— $FeSiO_3$ (½)

In the blast furnace CaO(flux) removes silica presention in the Ore. (½)

$CaO + SiO_2 + CaSiO_3$

A.17 (a) Ni = + 2 Pt = + 4 because these have lower ionization enthalpy. (1)

(b) Pt, The sum of first four Ionization enthalpies for Pt is lower than of Ni. (1)

A.18 (a) Aniline is a primary amine. Therefore it gives carbyamine test, i.e., when heated with an alcoholic solution of KOH and $CHCl_3$, it gives offensive smell of phenyl isocyanide.

But N-ethyl aniline is a secondary amine and hence does not give carbylamines test. (1)

(b) N-methylpropane-2 amine is a secondary amine,on adding Hinsberg's reagent compound formed is soluble in aqueous NaOH.But N-ethyl-N-methylethamine does not react with Hinsberg's reagent.(or any other suitable test) (1)

A.19 (a) Rusting of Iron takes place in presence of H^+. Alkaline medium will neutralize H^+ and will inhibit rusting.

(b) This is because the acidic $NH_4C\ell$ corrodes the Zinc container.

(c) Zinc protects better because reduction potential of $Zinc^{2+}$ is lower but that of Tin^{2+} is higher than that of $iron^{2+}$. (1x3=3)

A.20 (a) $CH_3\text{-}\underset{OH}{CH}\text{-}CH_2\text{-}COOH + CH_3\text{-}\underset{OH}{CH}\text{-}CH_2\text{-}CH_2\text{-}COOH \longrightarrow$

3- Hydroxybutanoic acid **3- Hydroxypentanoic acid**

$$\left(O\text{-}\underset{CH_3}{CH}\text{-}CH_2\text{-}\underset{O}{\overset{\|}{C}}\text{-}O\text{-}\underset{CH_2CH_3}{CH}\text{-}CH_2\text{-}\underset{O}{\overset{\|}{C}}\right)_n$$

PHVB

(b) $CH_2= \underset{Cl}{C} - CH=CH_2$

2-chloro- 1, 3- butadiene

(c) For making sheets/ bristles for brushes/In Textile industry. (1x3=3)

A.21 (a) $C\text{-}\underset{:NH_2}{CH}\text{-}\overset{O}{\overset{\|}{C}}\text{-}O\text{-}H \rightleftharpoons H\text{-}\underset{:\overset{+}{N}H_3}{CH}\text{-}\overset{O}{\overset{\|}{C}}\text{-}O^-$

(Zwitter Ion) (1)

(b) The change of specific rotation of sugar from dextrorotation to laevorotation is called inversion of sugar. (1)

(c) (i) Vitamin A (ii) Vitamin K (½ + ½)

A.22 (a) $5NO_2^- + 2MnO_4^- + 6H^+ \longrightarrow 2Mn^{2+} + 3H_2O + 5NO_3^-$

(b) $2K_2CrO_4 + 2H^+ \longrightarrow K_2Cr_2O_7 + 2K^+ + H_2O$

(c) $3MnO_4^{2-} + 4H^+ \longrightarrow 2MnO_4^- + MnO_2 + 2H_2O$

OR

(a) Europium(II) has stable electronic configuration i.e [Xe]$4f^7 5d^0 6s^\circ$. (1)

(b) Due to large number of unpaired electrons in their atoms, stronger interatomic interaction & hence stronger bonding between their atoms is found. (1)

(c) Unpaired electrons present in their Ions undergo f-f transitions. (1)

A.23 (a) Due to strong -R and -I effect of $-NO_2$ group, electron density in the OH bond decreases

(b) In alcohols lone pair of electrons on oxygen is available for proton due to absence of resonance.

OR

Lone pair of electrons at oxygen are not available for donation due to resonance in phenols.

(c) Due to order of stability of carbocations, $3^O > 2^O > 1^O$

OR

Tertiary alcohols form more substituted alkenes.

A.24 Given ω_A = 19.5g , ω_B = 500g, Kf = 1.86KKg mol^{-1}

(Tf)obs = 1^OC

$$\Delta Tf = \frac{Kf \times \omega_B \times 1000}{M_B \times M_A} \quad (½)$$

$$MB = \frac{Kf . \omega_B \times 1000}{\Delta Tf \times M_A}$$

$$= \frac{1.86 \text{ K kg mol}^{-1} \times 19.5 \text{ g} \times 1000 \text{ g}}{1.0 \text{ K} \times 500 \text{ kg}} = 72.54 \text{ gmol}^{-1} \quad (½)$$

Molecular mass of CH_2FCOOH= 12+2+19+32+1 = 78 g mol^{-1}

i = normal molecular mass/observed molecular mass = 78/72.54 (½)

= 1.0753 (½)

$CH_2FCOOH \rightleftharpoons CH_2FCOO^- + H^+$

C mol L^{-1} 0 0

$C(1-\alpha)$ $C\alpha$ $C\alpha$

α = i -1 = 1.0753-1 = 0.0753 (½)

$$Ka = \frac{[CH_2FCOO^-][H^+]}{[CH_2FCOOH]} = \frac{C\alpha}{C(1-\alpha)} = \frac{C\alpha^2}{1-\alpha}$$

$$C = \frac{19.5 \times 1000}{78 \quad 500} = 0'5M$$

$Ka = C\alpha^2$

$Ka = 0.5X(0.0753)^2$

$Ka = 3.07 \times 10^{-3}$ (1)

A.25 (a) (i) Aspirin (½)

(ii) Phenol (½)

(b) Antibiotics which kill or inhibit the growth of wide range of gram positive and gram negative bacteria. e.g., Chloramphenicol . (1)

(c) Sodium salts of sulphonated long chain alcohols or hydrocarbons are anionic detergents. e.g., Sodium lauryl sulphate. (1)

A.26 (a) Due to the formation of chemical bonds between adsorbate and Adsorbent. (1)

(b) 4% solution of nitro cellulose in a mixture of alcohol and ether. (1)

(c) Peptization: process of converting a precipitate into colloidal sol by adding an electrolyte. But coagulation is the settling of colloidal particles. (1)

A.27 (a) d^2sp^3 , diamagnetic (1)

(b) Factors : (i) Field produced by the ligand. (½)

(ii) Charge on the metal ions. (½)

(c) $K_4[Fe(CN)_6]$ is more stable due to higher charge or smaller size of metal ion. (1)

A.28 (a) $(NH_4)_2Cr_2O_7 \longrightarrow N_2(g) + 4H_2O(l) + Cr_2O_3(s)$ (1)

(A) (B)

$3Ca + N_2 \xrightarrow{Heat} \underset{(C)}{Ca_3N_2} \qquad \underset{(C)}{Ca_3N_2} + 6H_2O \longrightarrow \underset{(D)}{NH_3(g)} + Ca(OH)_2$ (1)

$Cu^{2+}(aq) + 4NH_3(aq) \rightleftharpoons [Cu(NH_3)_4]^{2+}(aq)$ (1)

(Blue) Deep blue (E)

(b) (i) HF > HCl > HBr > HI (1)

(ii) Ne > Kr > Xe > Rn > He (1)

OR

(a) (i) It exists as $[PCl_4]^+ [PCl_6]^-$ (1)

(ii) Due to low bond dissociation enthalpy of fluorine and strong bond formation with other elements. (1)

(iii) Decomposition of Ozone $[2O_3 \longrightarrow 3O_2]$

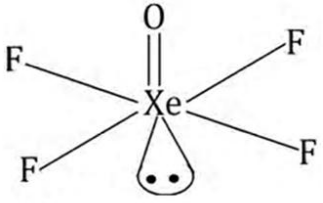
results in

ΔH =negative

ΔS =positive

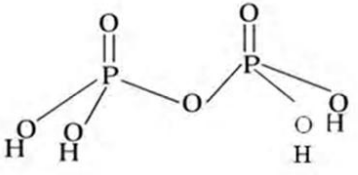
According to Gibb's equation $\Delta G = \Delta H - T\Delta S$, reactions with negative ΔG value are spontaneous (1)

(b) (i)



(1)

(ii)



(1)

A.29 (a) $CH_3\text{-}\underset{\underset{A}{|}}{\overset{\overset{O}{\|}}{C}}\text{-}H$ oxidation $CH_2\text{-}\overset{\overset{O}{\|}}{C}\text{-}OH$ (1)

(1)

$CH_3OHO + CH_3CHO \xrightarrow{NaOH(aq)} CH_3\text{-}\underset{\underset{OH}{|}}{CH}\text{-}CH_2\text{-}CHO$

(A) (A)

(1)

$CH_3\underset{\underset{OH}{|}}{CH}\text{-}CH_2CHO \xrightarrow{Heat} CH_3CH{=}CH.CHO$

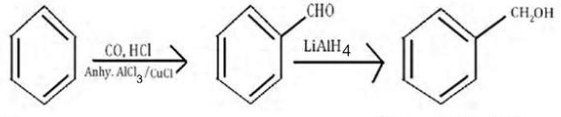
(C)

(1)

$CH_3\text{-}CH{=}CH.CHO \xrightarrow{H_2/N_2} CH_3\text{-}CH_2\text{-}CH_2\text{-}CHO$

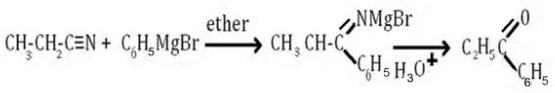
(C) (D)

(b) (i)



Benzene Benzylalcohol

(1)

(ii)  (1)

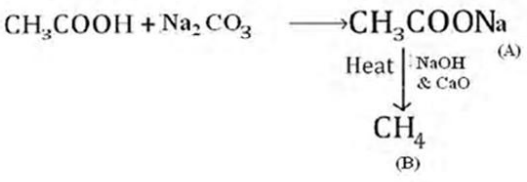
Propane nitrile

1- Phenylpropanone

OR

a) $CH_3COOC_2H_5 \xrightarrow{H_3O^+} CH_3COOH + C_2H_5OH$ (1)

(X) (Y) (Z)



(1)

$$CH_3COOH \xrightarrow{LiAlH4} CH_3CH_2OH_{(z)}$$

(b) (i) – COOH group is deactivating and combines with Aluminium chloride(catalyst) during the reaction. (1)

(ii) Due to - I effect of chlorine atom in chloroacetic acid larger number of H^+Ions are released in its aqueous solution.Therefore It has lower PKa value. (1)

A.30 (a) 1. Rate equation

$$Rate = \frac{d[C_{12}H_{22}O_{11}]}{dt} = -\frac{d[H_2O]}{dt} = \frac{d[C_6H_{12}O6]}{dt} = \frac{d[C_6H_{12}O_6]}{dt}$$ (½)

Rate law equation:

$$Rate = K\,[C_{12}H_{22}O_{11}]$$ (½)

Molecularity ⟶ 2 (½)

Order ⟶ first order (½)

(b) As the reaction is of first order therefore

$$k = \frac{2.303}{t} \log \frac{P^o}{2P_o - P_T}$$ (½)

When t = 100s

k = (2.303)/100 log(0.5) 2 x 0.5 x 0.6

k = (2.303)/100 log1.25

= (2.303)/100 (.0969)

= -2.2316 x 10^{-3} sec^{-1} (½)

When

P_o= 0.65 atm i.e P_o+ P = .65 atm

P = 0.65 - P^o = 0.65 - 0.50 = .15 atm (½)

Therefore the pressure of SO_2Cl_2 at time t (PSO_2Cl_2)

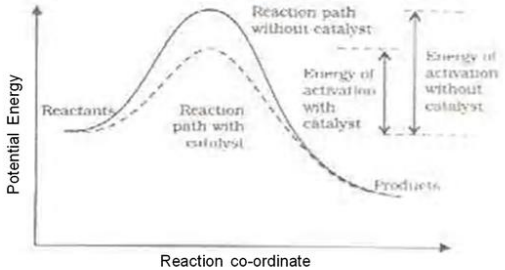
= P_o - P = (0 .50 - .15) atm = 0.35 atm (½)

Rate at that time = K x PSO_2Cl_2 = 2.2316 x 10^{-3} x 0.35

= 7.8 x 10^{-5} atm sec^{-1} (1)

OR

(a)



Effe (2)

(b) Because catalyst catalyses the forward as well as backward reaction to the same extent. (1)

Given

K= 4.5 x 10^3 s^{-1}, T_1 = 283 K

K= 1.5 x 10^4 s^{-1}, T_2= ? , Ea = 60 Kj mol^{-1}

$$\log\frac{K_2}{K_1}=\frac{Ea}{2.303R}\left[\frac{T_2-T_1}{T_1.T_2}\right]$$

$$\text{Log } (1.5 \times 10^4)\ (4.5 \times 10^3)= 60000/(2.303\times 8.314)\left[\frac{T_2 - T_1}{T_1T_2}\right] \quad (½)$$

Log 3.333 = 3133.63 [(T_2-283)/(283T)] (½)

T_2= 283/0.9528

=297K =(297-273)°C

= 24°C (1)