

केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
संचालित सर्वेक्षिक वर्षांश (क्रमांक संख्या)
परीक्षार्थी प्रवेश पत्र के अनुसार भरें

Subject : CHEMISTRY

Date & Date of Examination: Monday, 11.03.2013

Language:

Medium of answering the paper:

English

Write the code number at the top
Write Code No. as written on the top
of the Question paper.

56/3

No. of supplementary answer books used

Zero

The candidate is requested to indicate in the box if he/she has any physical disability or any other disability

to the correct set of questions.

B D H S C

For visually Handicapped, H-Handicapped, S-Spastic, C-Confused

Whether writing provided? Yes / No

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*पाठ्य वाचन में अलग अलग भावों के बीच एक छात्रा विभिन्न दृष्टि दें, जहाँ परीक्षार्थी का
नाम 24 अक्षर से अधिक है तो उसके नाम के पास 24 अक्षर ही लिखें।

Each letter be written in one box and one box be left blank between each part of the
name. In case Candidate's Name exceeds 24 letters, write first 24 letters.

Space for office use

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प्राचीन राजस्व अधिकारी का प्रशंसन (कक्षा द्वातांत्र्य) ३
प्राचीन राजस्व अधिकारी का प्रशंसन (कक्षा द्वातांत्र्य)
SENIOR SCHOOL CERTIFICATE EXAMINATION (CLASS XII) - CENTRAL BOARD OF SECONDARY EDUCATION, DELHI



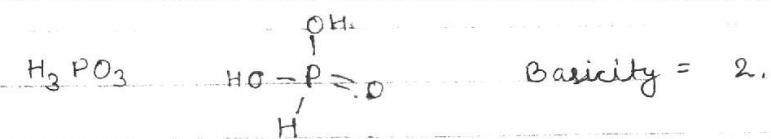
प्रमाणित गणित है कि मैंने इसी उत्तर-पुस्तिका का मूल्यांकन किया और इसका अनुग्रह दिया है।
Certified that I/we have evaluated this answer book according to the correct set of question paper and standards as per the marking scheme.

(Signature)

Ans. (1) -

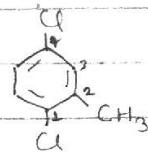
Tyndall effect, i.e. path of light is observed due to scattering of light when seen perpendicularly from the direction of light. Colloidal particles shine as bright stars upon black background.

Ans. (2) -



Only two hydrogen those attached to oxygen are ionisable to give H^+ ions.

Ans. (2) -



IUPAC name: 1,4-dichloro-2-methylbenzene

Ans. (4) -

Electrolytic refining, in which impure copper act as an anode and pure as cathode.

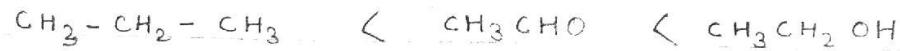
Ans. (5)-

β -(D)-galactose and β -(D)-glucose are hydrolysis product of lactose.

Ans. (6)-

$\left(\text{CH}_2 - \text{CH} \right)_n$ is a homopolymer of styrene \Rightarrow $\text{CH}_2 = \text{CH}$

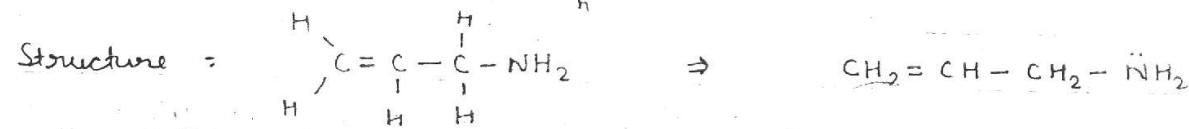
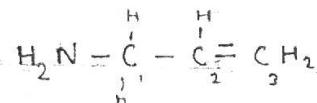
Ans. (7)-



Boiling Point increases

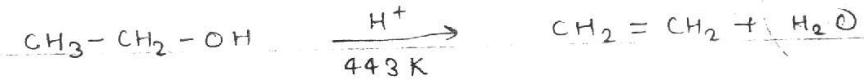
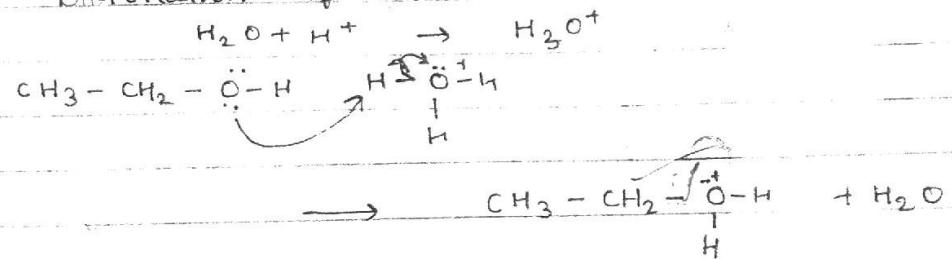
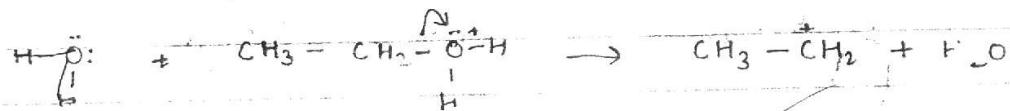
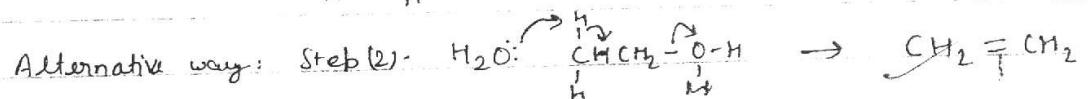
Ans. (8)-

Prop-2-en-1-amine



P.T.O.

Ans. (9)-

MechanismStep (1) Protonation of AlcoholStep (2) loss of H₂O molecule to form carbocationStep (3) deprotonation of carbocation to yield ethene.

Ans. (D)

Interhalogen Compounds are formed by direct combination of halogen (different) molecules at suitable physical condition. e.g.

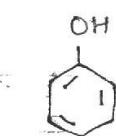


General composition so is assigned as XX' or XX'_3 , XX'_5 , XX'_7

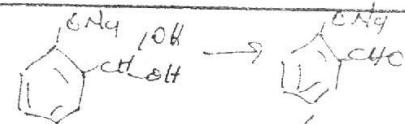
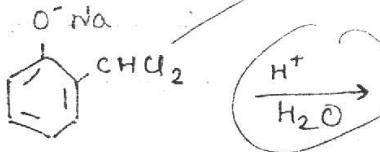
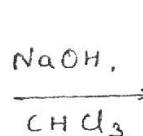
where X is larger halogen molecule than X' .

Ans. (II)

(i) Riemer Tiemann reaction.



Phenol



Salicylaldehyde

P.T.O.

6

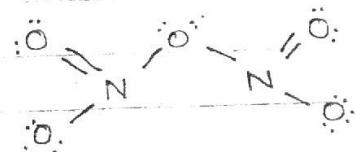
(ii) Williamson's ether synthesis: (Unsymmetrical ether)



Alkoxide ion attack on halocalkane to yield ether.

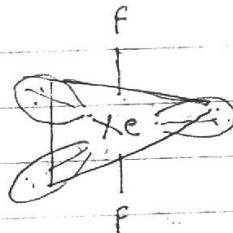
Ans. (12)-

(i) N_2O_5

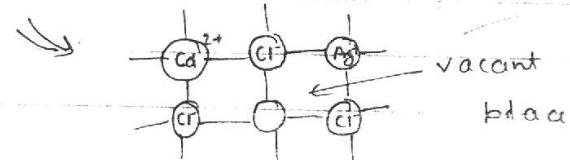


(ii) XeF_2

Linear

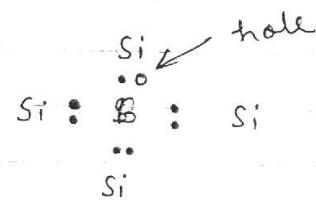


Ans. (3) (a) When AgCl doped with CdCl_2 , some of the Ag^+ ions are displaced by Cd^{2+} . To maintain electrical neutrality of the compound 2Ag^+ ions displaced for one Cd^{2+} . This creates a type of vacancy defect known as Impurity defect in the compound imparts colour to the compound.



(b)

(b) p -type semiconductor because Boron only have 3 valence electrons. 4th e^- of Silicon can't bond, and hole is created that is responsible for conduction.



Ans. (14)

For FCC structure

$$R = \frac{a}{2\sqrt{2}}$$

$$a = 2\sqrt{2} R$$

where R = Radius, a = edge length.

$$a = 2 \times 1.414 \times 125 \text{ pm}$$

$$= 250 \times 1.414 \text{ pm}$$

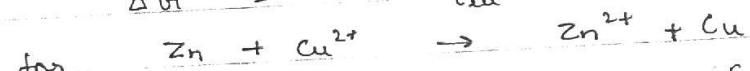
$$= 353.500 \text{ pm}$$

$$\text{length of side} = 353.50 \text{ pm}$$

$$= 3.53 \text{ } \text{\AA}$$

Ans. (15)

$$\Delta G^\circ = -nFE_{\text{cell}}^\circ$$



$$n = 2, F = 96500 \text{ C/mol}, E_{\text{cell}}^\circ = 1.1 \text{ V}$$

$$\Delta G^\circ = -2 \times 96500 \times 1.1 \text{ J}$$

$$= -2 \times 106150$$

$$\Delta G^\circ = -212300 \text{ J} = -212.3 \text{ KJ}$$

Thus $\Delta G^\circ = -212.30 \text{ KJ}$

Ans. (16) (a) $n = k [A]^{1/2} [B]^2$

$$\text{Order} = 2 + \frac{1}{2} = \frac{5}{2} = 2.5$$

(b) $T_{1/2} = \frac{0.693}{k}$

$$= \frac{0.693}{5.5 \times 10^{-14}} = \frac{0.693 \times 10^{14}}{5.5} = \frac{6.93 \times 10^{13}}{5.5}$$

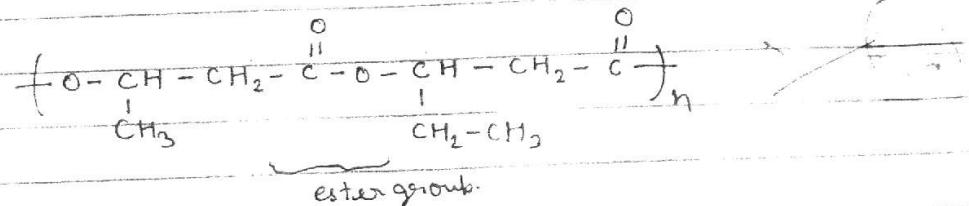
$T_{1/2} = 1.26 \times 10^{13} \text{ Second}$

1.26
 550 693
 550
 1430
 1100
 3300
 3300

Ans. (17) Biodegradable Polymer: Polymers that can be degraded in environment by bacteria, fungus are other microorganisms during reasonably short time are called biodegradable polymer. These don't pollute environment like non-biodegradable polymer like polyethene.

Biodegradable aliphatic polyester -

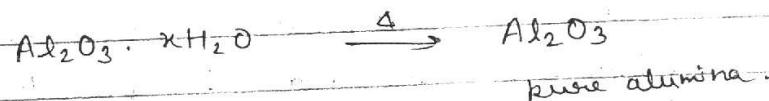
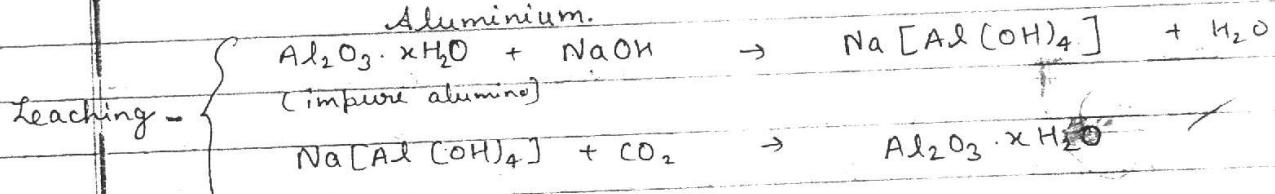
PHBV - { β -polyhydroxybutyrate - co- β -polyhydroxyvalerate).



Ans: (18)

Principal ore of Aluminium Bauxite $\text{Al}_2\text{O}_3(\text{OH})_{4-x}$.

Leaching is significant because it concentrates the ore and remove impurities to get pure alumina. Then alumina reduced to get pure Aluminium.



Ans.(19) (i) Macromolecular Sol : These are colloidal sol in which dispersed phase have Macromolecules of colloidal size like proteins, gums, albumin. These are especially stable and can be prepared easily by dissolving and shaking.

e.g. Protein.

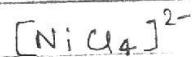
(ii) Reptization: It is method of preparing generally lyophobic sol. Adding an electrolyte in a freshly prepared precipitate, break the particles in colloidal size.

e.g. Reptization of gold to form sol.

(iii) Emulsion: Emulsions are colloids in which both dispersed phase and dispersion medium are ~~of~~ colloidal size liquid. There are 2 types (i) O/W type
(ii) W/O type

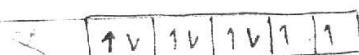
e.g. Milk is an emulsion of fat as dispersed phase in water.

Ans. (20) =



(i) IUPAC name : Tetrachloridonickel(II) ion.

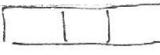
Tetrachloridonickelate (II) ion

(ii) Ni^{2+} orbital

3d

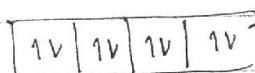
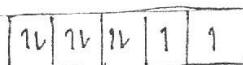


4s



4p

Cl^- is weak field ligand and doesn't cause pairing of electrons.

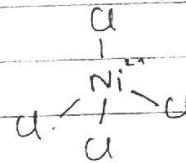


electrons
from Cl^- .

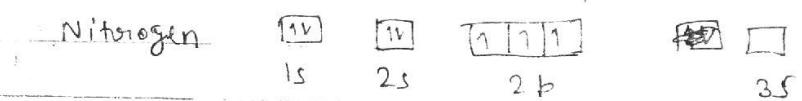
sp^3 hybridized orbital

So hybridization = sp^3 .

(iii) thus shape : Tetrahedral

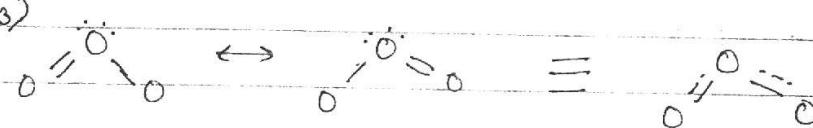


Ans.(2) (i) Though nitrogen exhibits +5 oxidation state. But it can't form pentahalides because it does not have vacant d-orbital to share e⁻ with halogens. So its covalency is limited to 4 due to 1s and 3p orbitals.



(ii) Fluorine has anomalous behaviour due to very small size. Thus when it accepts electron to form F⁻, due to small size, repulsion of electron happens. Due to this energy released is less than that of chlorine which is large, i.e. Electron gain enthalpy is less negative for fluorine.

(iii) Ozone is the hybrid of its 2 canonical resonance structures (O₃)



Thus two bonds in actual structure hybrid structure of ozone are equivalent and have same bond length.

Ans. (22)-

$$\log \left(\frac{k_2}{k_1} \right) = \frac{E_a}{2.303 R} \left(\frac{T_2 - T_1}{T_1 T_2} \right)$$

If rate of reaction becomes four times

then $\frac{k_2}{k_1} = 4$

$$T_1 = 293 \text{ K} \quad T_2 = 313 \text{ K} \quad R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$$

$$E_a = ?$$

$$\log 4 = \frac{E_a}{2.303 \times 8.314} \times \left(\frac{20}{293 \times 313} \right)$$

$$= \frac{0.6021 \times 2.303 \times 8.314 \times 293 \times 313}{20} \quad J = E_a$$

$$= \frac{11.454 \times 91709}{20}$$

$$\approx 52503.4 \text{ J} = 52503.4 \text{ J}$$

$$= 52.5 \text{ KJ} = 52.50 \text{ KJ}$$

$$E_a = 5.25 \text{ KJ}$$

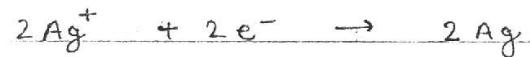
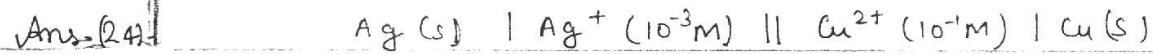
$$E_a = 52.50 \text{ KJ}$$

$$\begin{array}{r}
 16 \times 2.3 \times 8.3 \\
 1.3 \diagup 8 \\
 \times 8.3 \\
 \hline
 414
 \end{array}
 \quad
 \begin{array}{r}
 293 \\
 813 \\
 \hline
 879
 \end{array}
 \quad
 \begin{array}{r}
 293 \\
 879 \\
 \hline
 91709
 \end{array}$$

Ans. (23) (i) Values shown by Mrs. Anuradha are very positive and valuable. She is helpful, kind, caring, loving and curious. She even cares for her servant's health. She is not miser. She also helps her economically that cures her servant in a month.

(ii) Vitamin B-12.

A. (iii) Vitamin C.



According to Nernst eqn.

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.059}{n} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^+]^2} \quad \text{at } 25^\circ\text{C}$$

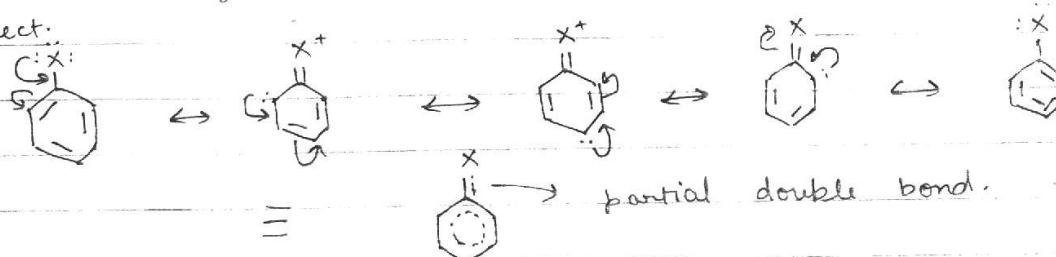
$$\begin{aligned}
 E_{\text{cell}} &= 0.46 - \frac{0.059}{2} \log \frac{10^{-1}}{(10^3)^2} \\
 &= 0.46 - \frac{0.059 \times 5}{2} \\
 &= 0.46 - \frac{0.295}{2} = 0.46 - 0.1475 \\
 E_{\text{cell}} &= 0.3125 \text{ V.}
 \end{aligned}$$

Ans. (25)- (i) $\text{C}_2\text{H}_5-\text{I}$ undergoes S_N2 reaction faster than $\text{C}_2\text{H}_5-\text{Br}$ because I^- is good leaving group than Br^- . Thus better the leaving group, faster is the S_N2 reaction.

(ii) (\pm) 2-Butanol is optically inactive. Because it is a racemic mixture which contain + (dextrorotatory) and - laevorotatory enantiomers in equal amounts. Thus total rotation of plane polarised light is zero. So (\pm)-2-Butanol is optically inactive.

(iii) C-X bond length in halobenzene is shorter than C-X bond in $\text{CH}_3\text{-X}$ because in halobenzene, resonance imparts partial double bond character to C-X bond and X attached to carbon is halobenzene is sp^2 hybridised carbon.

+R effect:



Ans.(26): (i) Antacid. (Ranitidine)

(ii) Synthetic detergent because it does not react to Ca^{2+} ions to form scum.

(iii) 0.2% phenol is an antiseptic

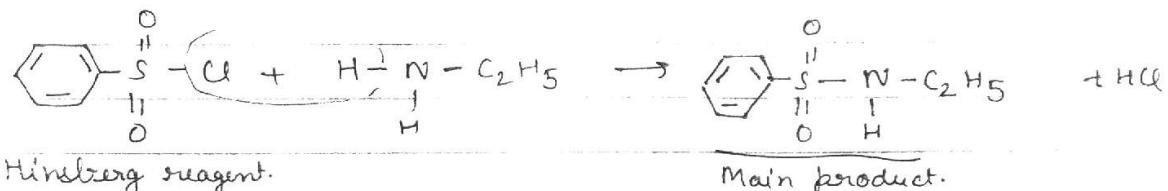
but 1% phenol is disinfectant.

Ans. (F.T)-



Ethanol.

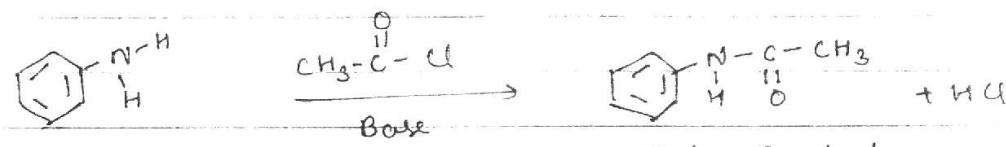
(ii)



Hinsberg reagent.

Main product.

(iii)



Benzylation.

Main Product.

Ans.(28)

(a) Transition metal have vacant d-orbitals and generally unpaired electrons. These electrons have almost nearly same energy which can promote to show variable oxidation state.

(b) (i) Manganese (Mn) show oxidation states +2 to +7 because of maximum no. of unpaired electron.

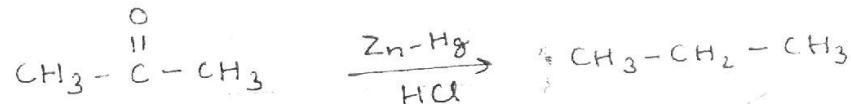
(ii) Scandium (Sc) only shows +3 oxidation state Sc^{+3} . Because it (Sc^{+3}) has noble gas configuration and stable.

(b) Lanthanoid Contraction: Filling of 4f orbitals before 5d orbitals shorten the radius of Lanthanoids and 3rd series transition element. 4f orbitals have even low shielding effect than 5d, so effective nuclear charge increases that results in small radii.

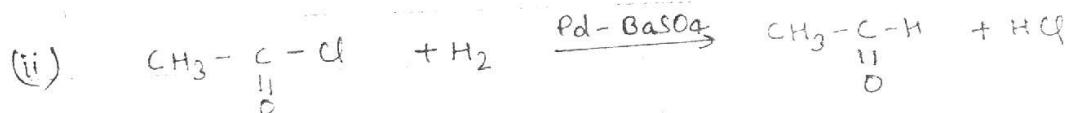
'Mischmetall' has 95% component as lanthanoid, 5% d-block elements and traces of P, C, Al.

Ans. (29) -

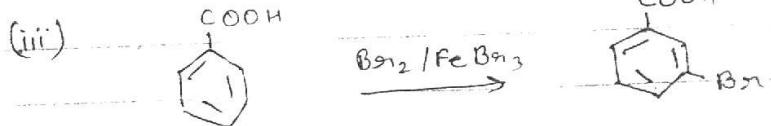
(i)



Clemmensen Reduction



Rosenmund Reaction.



-COOH is strong deactivating and meta directing group.

(iv) (i) $\text{F}-\text{CH}_2-\text{COOH}$ is stronger acid than $\text{Cl}-\text{CH}_2-\text{COOH}$ (-I effect)

because F is more electronegative and withdraw electrons (-I effect) that makes $\text{F}-\text{CH}_2-\text{COOH}$ more acidic.

(ii)

CH_3COOH is more acidic than

$$\text{pK}_a = 4.38$$



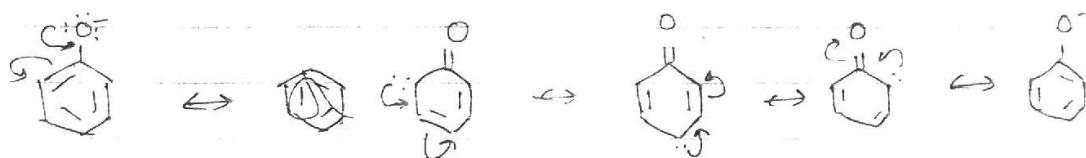
$$\text{pK}_a = 10.76$$

due to more stable carboxylate ion (CH_3COO^-) than

Phenoxide ion Ph-O^- according to resonance



and



Although phenoxide ion have more resonance structure, it is less stable because negative charge resides on less electronegative atom Carbon.

While in carboxylate ion, negative charge is only on more electronegative oxygen.

Ans. (30) -

(a) Raoult's Law: According to this law, vapour pressure exerted by a volatile component in solution is directly proportional to its mole fraction in solution i.e.

$$p = p^{\circ} x$$

p° = vapour pressure when pure volatile component.

x = mol fraction.

According to Henry law partial pressure of gas in vapour state is directly proportional to the mole fraction of gas in solution.

i.e.
$$p = K_H x$$

When volatile component in solution is a gas then p° is equal to K_H (Henry law const.).
Thus Raoult's law becomes a special case of Henry law.

Total vapour pressure $\Rightarrow p_T = p_1 + p_2 + \dots = p_1^{\circ} x_1 + p_2^{\circ} x_2 + \dots$

(b) Depression in freezing point :

$$\Delta T_f = K_f \cdot m$$

$$K_f = 5.12 \text{ K kg/mol}$$

$$m = \frac{w_1 \times 1000}{M \times w_2}$$

$$\text{where } w_1 = 1 \text{ g}, w_2 = 50 \text{ g}$$

$$\Delta T_f = 0.40 \text{ K}$$

Putting in eqn (1)

$$0.40 \text{ K} = 5.12 \times \frac{20}{M \times 80}$$

$$M = \frac{51.2 \times 20}{0.40} = \frac{51.2 \times 20^5}{8} = 256.0 \text{ g/mol}$$

Molar mass of solute : 256 g/mol

