

CBSE

Model Answer Sheet 2014

केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
सीनियर स्कूल सर्टिफिकेट परीक्षा (कक्षा बारहवीं)
परीक्षार्थी प्रवेश-पत्र के अनुसार भरें

विषय Subject : Chemistry (043)

परीक्षा का दिन एवं तिथि
Day & Date of the Examination : Tuesday, 11/03/2014

उत्तर देने का माध्यम
Medium of answering the paper : English

प्रश्न पत्र के ऊपर लिखे कोड को दर्शाए
Write Code No. as written on the
top of Question Paper : 56/1

अतिरिक्त उत्तर-पुस्तिका (ओं) की संख्या
No. of Supplementary answer-book(s) used NIL

किसी शारीरिक अक्षमता के प्रभावित हो तो संबंधित वर्ग में ✓ का निशान लगाएं।
If Physically challenged, tick the category

☐ B ☐ D ☐ H ☐ S ☐ C

B = दृष्टिहीन, D = मूक एवं बधिर, H = शारीरिक रूप से विकलांग, S = स्फस्टिक, C = डिस्लेक्सिक
B = Blind, D = Deaf & Dumb, H = Physically Handicapped, S = Spastic, C = Dyslexic

क्या लेखन - लिपिक उपलब्ध करवाया गया : हाँ / नहीं
Whether writer provided : Yes / No No

*एक खाने में एक अक्षर लिखें। नाम के प्रत्येक भाग के बीच एक खाना रिक्त छोड़ दें।
यदि परीक्षार्थी का नाम 24 अक्षरों से अधिक है, तो केवल नाम के प्रथम 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.

कार्यालय उपयोग के लिए

केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली
Central Board of Secondary Education, Delhi

सीनियर स्कूल सर्टिफिकेट परीक्षा (कक्षा बारहवीं)
SENIOR SCHOOL CERTIFICATE EXAMINATION (CLASS XII)



प्रमाणित किया जाता है मैंने/हमने इस उत्तर पुस्तिका का मूल्यांकन प्रश्न पत्र के समुचित सेट के अनुसार और पूर्ण रूप से मूल्यांकन पद्धति के अनुसार किया है।

Certified that I/We have evaluated this answer-book according to the correct set of question paper and strictly as per the marking scheme.

संख्या

CBSE

(1) Ans:-

chemisorption first increases with temperature as it has high activation energy, but after that it then decreases with rise in temperature.

(2) Ans:-

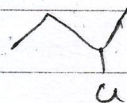
Zinc being more electro positive displaces silver from its cyanide complex and thereby helps to get ^{pure} silver



(3) Ans:-

Basicity of H_3PO_3 is two.

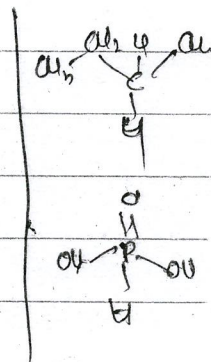
(4) Ans:-



— is chiral molecule

(5) Ans:-

Proteins are natural polymer



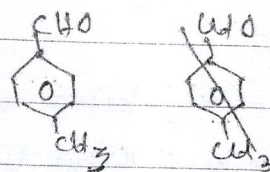
(6) Ans:- The reaction is called diazotisation reaction.

(7) Ans:

Sucrose gets hydrolysed to produce fructose and glucose.

(8) Ans:

p-methylbenzaldehyde



(9) Ans:-

As unit cell is f.c.c so, $Z = 4$

We know,

$$d = \frac{Z \times M}{a^3 \times N_A}$$

$$\therefore M = \frac{a^3 \times N_A \times d}{Z}$$

$$= \frac{(10^{-8})^3 \times 6.022 \times 10^{23} \times 2.8}{4}$$

$$= 26.99 \text{ g mol}^{-1}$$

So, Molar mass of the element is 26.99 g mol^{-1}

$$\begin{aligned} & 16 \times 10^{-8} \times 6.022 \times 2.8 \\ & 1.6 \times 6.022 \times 2.8 \\ & \therefore 0.2041 + 0.7728 \\ & \quad + 0.4472 \\ & \therefore 1.4311 \\ & \quad 2.6 \times 10^{-8} \\ & \quad 26.99 \\ & \quad 2.7 \\ & \quad 16 \times 6.022 \times 2.8 \\ & \quad 2.8 \times 2.8 \end{aligned}$$

(10) Ans:-

- (i) It is metal-excess defect, or anion deficiency defect.
- (ii) It is Schottky defect.

(11) Ans:-

Kohlrausch's law of independent migration of ion states - at infinite dilution when dissociation is complete each ion makes a definite contribution to molar conductivity of the electrolyte irrespective of other ion with which it is associated.
i.e. each ion contributes to the limiting molar conductivity of the electrolyte, and their sum of limit.

e.g. $\Lambda_{HCl}^{\circ} = \Lambda_{Cl^{-}}^{\circ} + \Lambda_{H^{+}}^{\circ}$

Conductivity of a solution is the conductance of ions present in unit volume of solution. As with dilution, number of ions present in unit volume of solution decreases, conductivity also decreases.

(12) Ans:-

- (i) The reaction is a zero-order reaction.
- (ii) The slope of curve is $(-k)$ i.e. negative of rate constant.

(13) Ans:- Principle

• In electrolytic refining, the impure metal to be purified is made the anode, while a thin sheet of the pure metal is made the cathode. The electrolyte taken is a salt solution of the same metal.

• When current is passed through it, metal ions from the solution go to the cathode and accept electrons and get deposited on it in metallic form. In the mean time equal amount of metal at anode, lose electrons and come to the solution.

• This continues, and the pure sheet of metal made as cathode gets thicker, while the impure metal electrode gets thinner.

• The other impurities get settled below anode as anode mud.

Metals like Cu, Zn etc. are purified by this method.

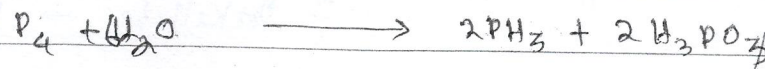
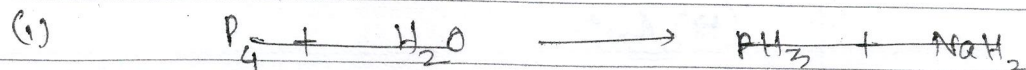
$$R = -kt + C$$

$$k_{ut} =$$

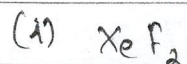
$$R = R_0 - kt$$



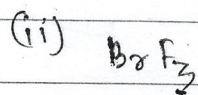
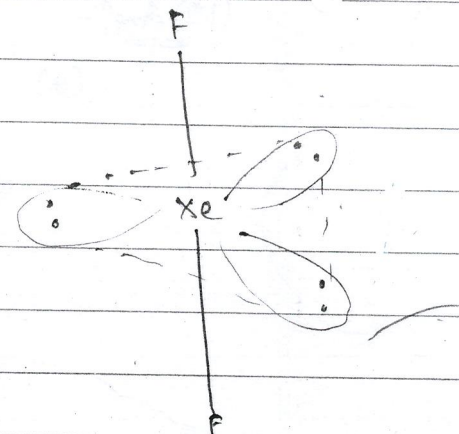
(14) Ans:-



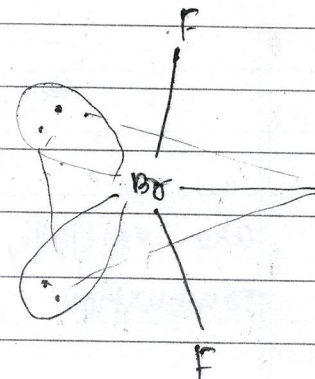
(15) Ans:-



- Linear structure
(expected - trigonal bipyramidal)



- Bent-T shaped
(expected - trigonal bipyramidal)



(18) Ans:-

① Bakelite - : Monomers - Phenol and formaldehyde

(18) Neoprene - : Monomer - 2-chloro-1,3-butadiene

(19) Ans:-

(a) given, $E_{\text{cell}}^{\circ} = 2.71 \text{ V}$, $n = 2$

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

$$= -2 \times 96500 \times 2.71$$

$$= -523030 \text{ J}$$

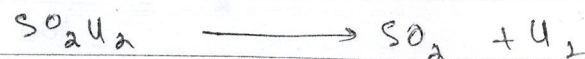
$$= -523.03 \text{ kJ mol}^{-1}$$

$$\begin{array}{r}
 1930 \\
 \times 271 \\
 \hline
 193 \\
 1351 \times \\
 386 \times \times \\
 \hline
 52303 \\
 542 \\
 \times 96500 \\
 \times 2.71
 \end{array}$$

(b)

In Apollo space programme fuel cells were used - which are specially designed galvanic cell that ^{directly} convert the energy of combustion of fuel like ~~to~~ into electrical energy.

(20) Ans:-

At time, $t=0$ At time $t=0$, p , 0.4 atm

0 0

0.4 - x x x

$$\text{So, } p_t = 0.4 - x + x + x = 0.4 + x$$

$$\Rightarrow x = p_t - 0.4$$

$$\text{Now, } p_s (\text{for SOCl}_2) = 0.4 - x$$

$$= 0.4 - (p_t - 0.4)$$

$$= 0.4 + 0.4 - p_t$$

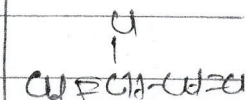
$$= 0.8 - p_t$$

$$= 0.8 - 0.7$$

$$= 0.1$$

So, taking account of given data.

$$k = \frac{2.303}{t} \log \left(\frac{p_i}{p_s} \right) = \frac{2.303}{t} \log \left(\frac{0.8}{0.1} \right)$$



0.7340

+ 2.9645

3.7285

5.3



0.4

0 0

0.4 - x x x 0.4 + x = p_t $x = p_t - 0.4$

$$0.4 - (p_t - 0.4)$$

$$0.8 - p_t$$

$$(0.1)$$

4

$$k = \frac{2.303}{t} \log \left(\frac{p_i}{p_s} \right)$$

$$k = \frac{2.303 \log \frac{0.4}{0.1}}{100}$$

$$= \frac{2.303 \log 4}{100}$$

$$= \frac{2.303 \times 0.6021}{100}$$

$$= 1.387 \times 10^{-2} \text{ s}^{-1}$$

$$\therefore, \text{rate constant} = 1.387 \times 10^{-2} \text{ s}^{-1}$$

$$0.3623 + 0.737$$

$$1.1421$$

$$\frac{1.387 \times 10^1}{1000}$$

$$1.387 \times 10^{-2}$$

(2) Ans:-

Emulsions are colloids which have both dispersion phase and dispersion media in liquid form i.e. it is a liquid-liquid type of colloid.

Two different types of emulsions are there there. -

① Oil in water type - o/w type -

e.g. milk

② Water in oil type - w/o type -

e.g. - butter

(22) Ans:-

(i) $(\text{CH}_3)_3\text{P}=\text{O}$ exists as Phosphorus has valant d-orbitals and it can extend its covalency beyond 4.

But $(\text{CH}_3)_3\text{P}=\text{O}$ $(\text{CH}_3)_3\text{N}=\text{O}$ does not exist as Nitrogen do not have d-orbitals to extend its covalency beyond 4.

(ii) As Oxygen has small size, and due to electron-electron repulsion it has less affinity for incoming electrons in comparison to Sulphur. So, Oxygen has less negative electron gain enthalpy than Sulphur.

(iii) As H_3PO_2 has two direct P-H bonds in comparison to ~~one~~ ^{one} direct P-H bond in H_3PO_3 , H_3PO_2 is stronger reducing agent than H_3PO_3 .

(23) Ans:-

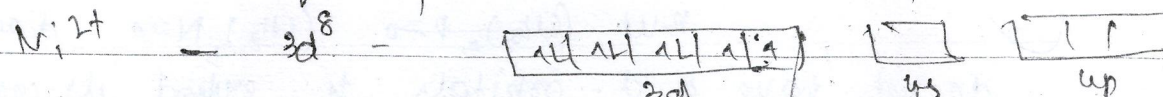
(i) Tetraamminechloridochromium(III) chloride

Tetraamminedichloridochromium(III) chloride

(ii) $[\text{Co}(\text{en})_3]^{2+}$ shows optical isomerism.

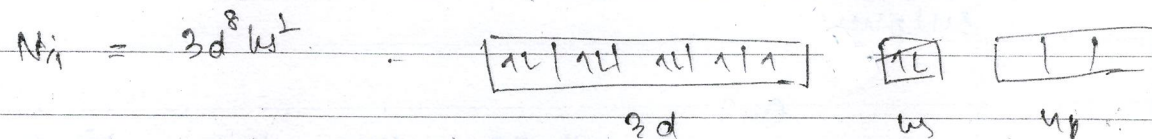
(iii)

$[\text{NiCl}_4]^{2-}$ has weak ligands in form of chloride ion. So, it can't pair up forcibly electrons. So, in $[\text{NiCl}_4]^{2-}$

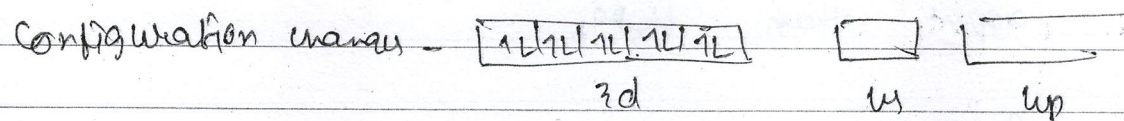


So, $[\text{NiCl}_4]^{2-}$ has two unpaired electrons and hence paramagnetic character.

But CO is a strong ligand and it pairs up electrons of $[\text{Ni(CO)}_4]$ as follow. In $[\text{Ni(CO)}_4]$



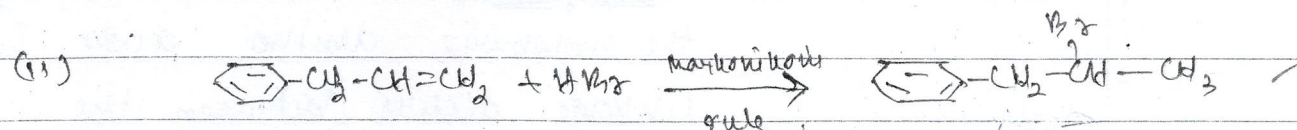
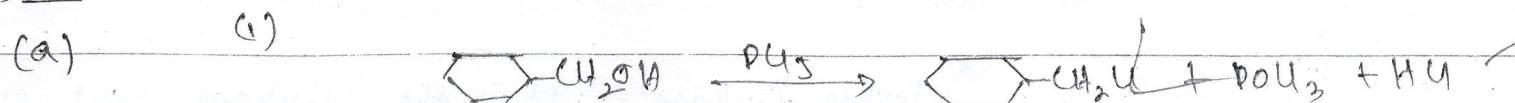
In influence of strong ligand CO.



So, there is no unpaired electron in $[\text{Ni(CO)}_4]$ and hence it is diamagnetic.



(24) Ans:

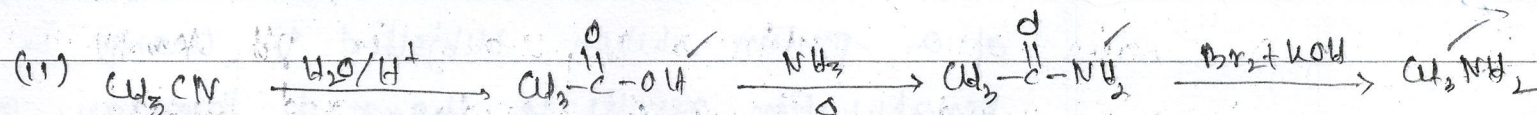
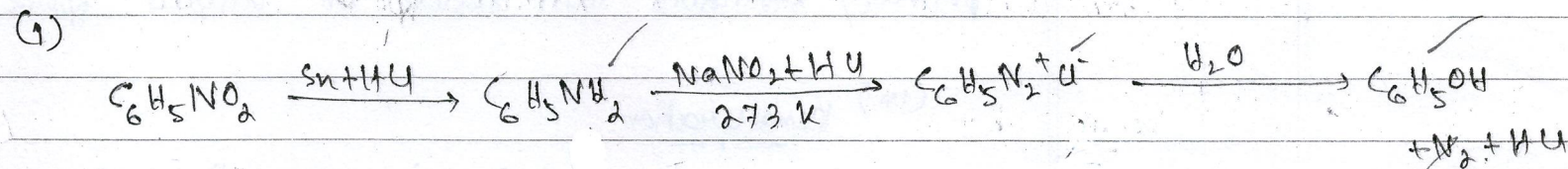


(b)

(i) CH_3I - will react faster in $\text{S}_\text{N}2$ reaction(ii) CH_3Cl - will react faster in $\text{S}_\text{N}2$ reaction

(25) Ans

(25) Ans:



(26) Ans:-

(i)

Peptide Linkage:- It is the linkage that exists between the monomeric amino acids in a polypeptide chain. This linkage occurs between the $-COOH$ group of one amino acid and the $-NH_2$ group of next amino acid. The linkage occurs by condensation of one water molecule and exists as $-CONH-$ linkage.

(ii)

Primary structure:-

Primary structure ~~of~~ depicts the way amino acids are linked to each other ^{by peptide bond} in a polypeptide chain. Primary structure is critical to a protein's biological activity. A single change in primary structure will result in altered form of protein.

(iii)

Denaturation:-

Denaturation is the disruption of native conformation of a protein when subjected to change in pH, temperature etc. Denaturation results in change of secondary and tertiary

structure but no change in primary structure.

e.g. ~~changing~~ change of milk into curd.

Ans

(i)

(a) Dr. Satpal ~~proven~~ showed values like will to help others, moral duty to society, basic human values, acute intelligence etc.

(b)

NBRC displayed values like helping people, eagerness to ensure rights to people, social responsibility etc.

(i)

Narcotic analgesics ^{like morphine in limited dose} are chiefly used for the relief of pains of terminal cancer.

(ii)

saccharin or alitame could have been recommended.



(28) Ans^o - (a)

(i) Molarity: Molarity of a ~~solute~~ substance in a solution is equal to the number of moles of the substance present in one litre of the solution.

$$\text{i.e. Molarity} = \frac{\text{No. of moles of substance}}{\text{Volume of soln in L}}$$

(ii) Molal Elevation constant (K_b):

It is also called ebullioscopic constant. It is equal to the rise in temperature of a so change in boiling point of a solution when as 1 molal solution.

$$\text{As, } \Delta T_b = K_b \cdot m$$

$$\text{So, when, Molarity} = 1, \quad \Delta T_b = K_b$$

(b)

given, $\text{Mass of urea, } W_B = 15 \text{ g}$
Molar Mass of urea, $M_m = 60 \text{ g}$.

As, The solⁿ of urea in water is isotonic to that of glucose solution

$$\text{So, } \pi_{\text{urea}} = \pi_{\text{glucose}}$$

$$C_{\text{urea}} RT = C_{\text{glucose}} RT$$

$$\frac{n_{\text{urea}} RT}{V} = \frac{n_{\text{glucose}} RT}{V}$$

$$\Rightarrow \frac{15}{60} = \frac{w_{\text{glucose}}}{180}$$

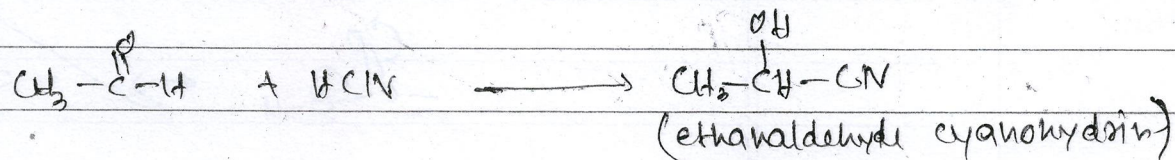
$$\Rightarrow w_{\text{glucose}} = \frac{15 \times 180}{60}$$

$$= 45 \text{ g}$$

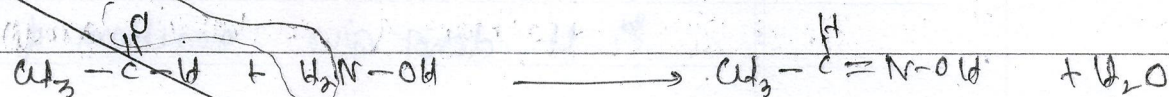
So, 45 g of glucose is present in 1 L of solution.

(30) Ans -

(i)



(ii)

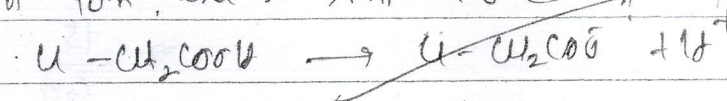


(30) Ans:-

(a)

(i)

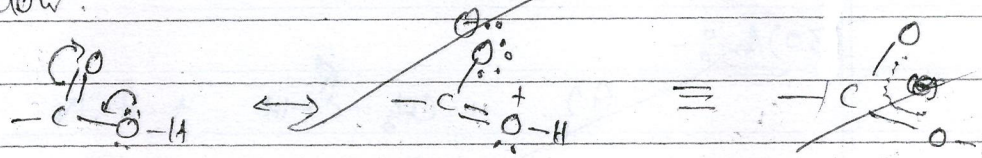
As Chlorine is an electron withdrawing species, so, it helps to disperse the negative charge on carboxylate ion after releasing of H^+ ion, and so, imparting ~~it~~ stability.



so, $Cl-CH_2COOH$ is a stronger acid than CH_3COOH .

(ii)

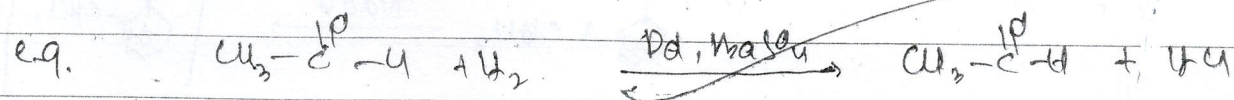
In carboxylic group, though it has a carbonyl group, but it is not a free group unlike in aldehydes and ketones. The carbonyl group participates in resonance as shown below.



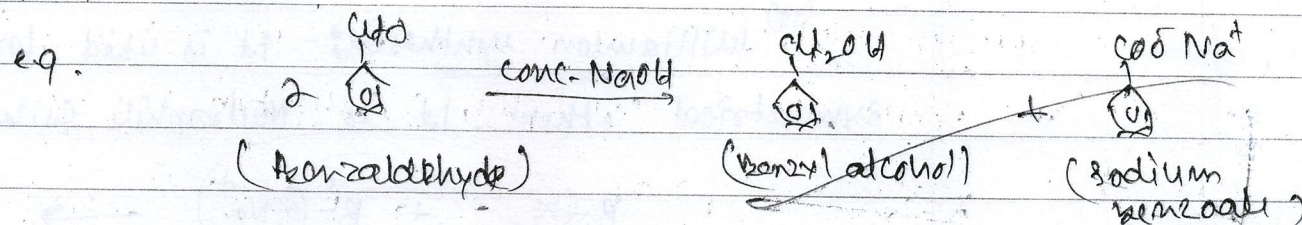
so, it does not give reactions of carbonyl group.

(b)

(i) Rosenmund reaction:- It is the process of preparation of aldehydes from acid chlorides by hydrogenation with the help of Lindlar's catalyst i.e. Palladium supported over BaSO_4 in presence of small amount of sulphur or quinoline.



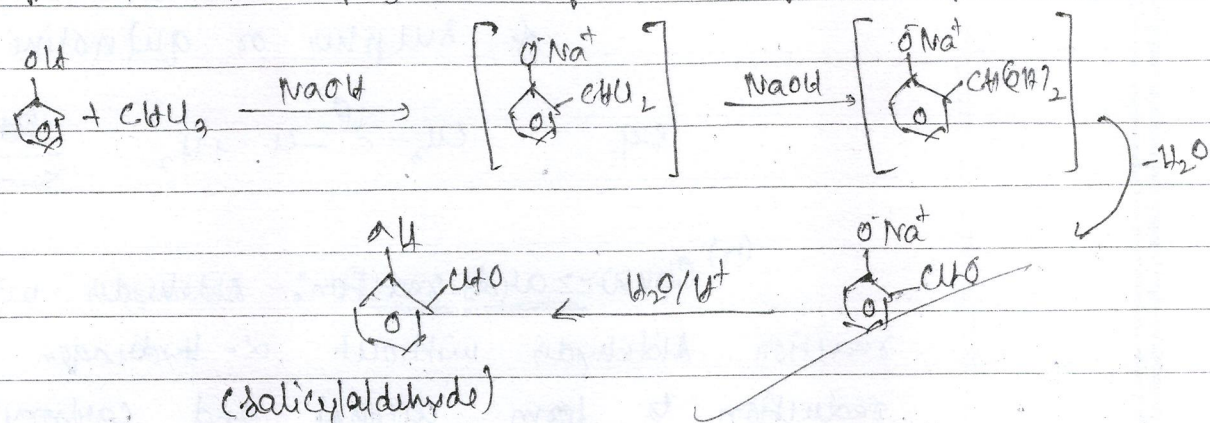
(ii) Cannizzaro's reaction:- Aldehydes without α -hydrogen give this reaction. Aldehydes without α -hydrogen undergo self-oxidation and reduction to form alcohol and carboxylate ion in presence of concentrated alkali.



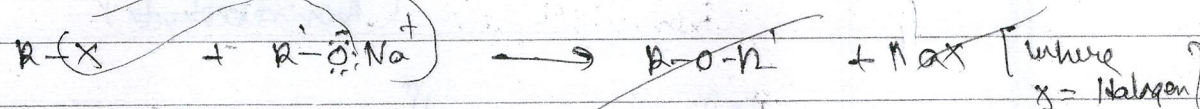
(c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}(=\text{O})\text{CH}_3$ will give iodoform test as it has a terminal methyl ketone group.

(16) Ans:-

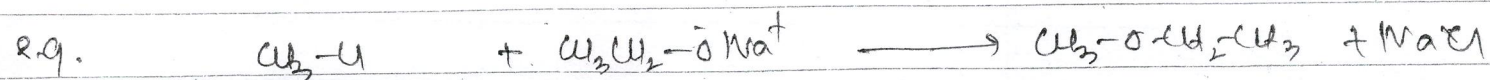
(i) ^{Reimer} ~~Reimer~~-Tiemann reaction:- Preparation of salicylaldehyde from phenol with help of Chloroform in presence of NaOH



(ii) Williamson synthesis:- It is used for preparation of both symmetrical ethers. It is Nucleophilic Substitution reaction ($\text{S}_\text{N}2$).



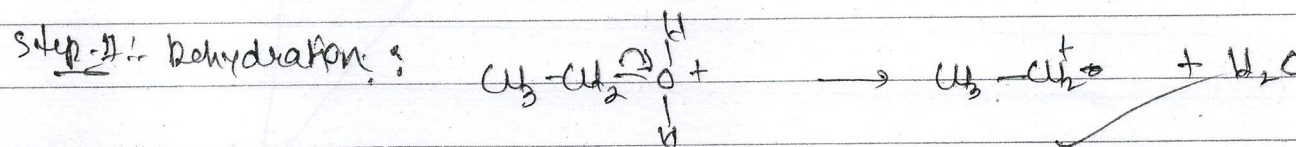
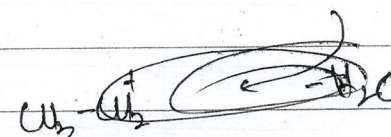
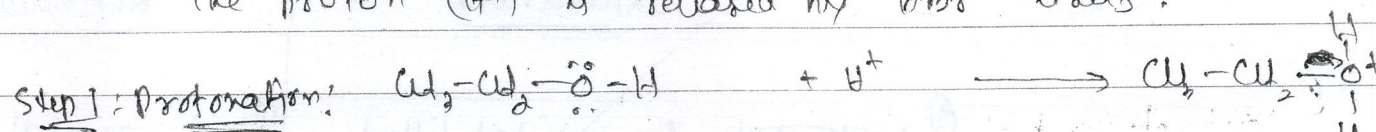
The alkoxide acts as a nucleophile substituting halide ion and form ether.



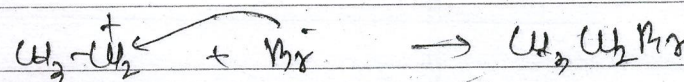
17 Ans:-

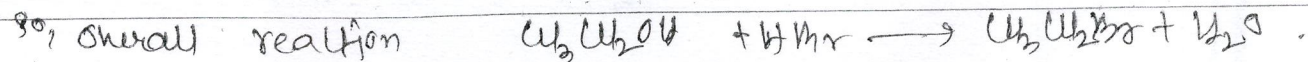
It is a nucleophilic substitution reaction where nucleophile (OH^-) is replaced by (Me^-).

As (OH^-) is a strong nucleophile, it is not a good leaving group. But when ~~$\text{CH}_3\text{CH}_2\text{OH}$~~ it is protonated to (OH_2^+) it becomes a good leaving group. Then (Me^-) substitutes it. The proton (H^+) is released by base salts.



Step III: Attack by (Me^-)
nucleophile:





(29) Ans

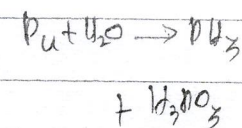
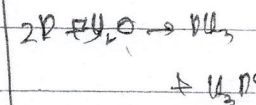
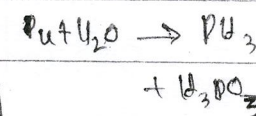
(29) Ans

(i) Differences between lanthanoids and actinoids

<u>Lanthanoid</u>	<u>Actinoids</u>
① last electron f-orbital filled here is 4f	② f-orbital filled here

(29) Ans:-

(i)	Lanthanoids	$\text{Pu} + \text{H}_2\text{O} \rightarrow \text{Pu}_3 + \text{H}_2\text{PO}_3$
(ii)	Electrons progressively gets filled up in $4f$ -orbital	$2\text{Pu} + \text{H}_2\text{O} \rightarrow \text{Pu}_3 + \text{H}_2\text{PO}_3$
(iii)	Shows oxidation state only +2 and +4, with +3 as common oxidation state	$\text{Pu} + \text{H}_2\text{O} \rightarrow \text{Pu}_3 + \text{H}_2\text{PO}_3$
(iv)	Lanthanoid contraction is less in compare to actinoid contraction as $4f$ -orbital is buried deep into atom	$\text{Pu} + \text{H}_2\text{O} \rightarrow \text{Pu}_3 + \text{H}_2\text{PO}_3$
(v)	Lanthanoids are chemically less reactive than actinoids	$\text{Pu} + \text{H}_2\text{O} \rightarrow \text{Pu}_3 + \text{H}_2\text{PO}_3$
(vi)	Most lanthanoids are not radioactive except one.	$\text{Pu} + \text{H}_2\text{O} \rightarrow \text{Pu}_3 + \text{H}_2\text{PO}_3$



$$d = \frac{2.8M}{a^{2.8M}}$$

or

$$6.4 \times 10^{-24} \times 6.022$$

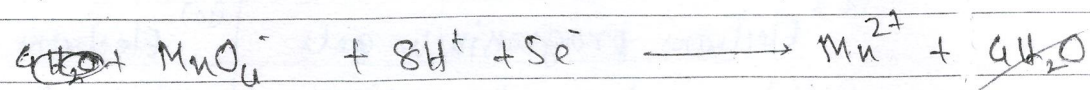
$$6.4 \times 10^{-24} \times 6.022 \times 10^{-1}$$

$$1682.8 \times 6.022 \times 10^{-1}$$

(ii)

Cerium exhibits (+4) oxidation state - ~~Ce^{+3}~~ - ~~Ce^{+4}~~
- Ce^{4+}

(iii)



(iv) Mn^{2+} with 4 unpaired electrons is more paramagnetic than Ce^{3+} with 3 unpaired electrons.

As, Magnetic moment = ~~$\sqrt{n(n+1)}$~~

where n = number of unpaired electrons.