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 (ओ) 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 रुप 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 छोड 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
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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 मैने/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

(1) Ans:-

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

(2) Ans:-

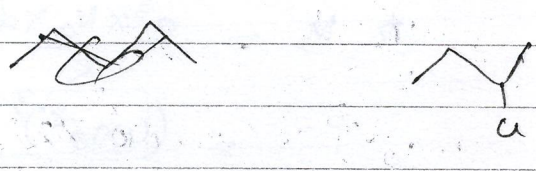
Zinc being more electro positive displaces silver from its cyanide complex and thereby helps to get pure silver

$$Zn + 2[Ag(CN)_2]^- \longrightarrow [Zn(CN)_4]^{2-} + 2Ag\downarrow$$

(3) Ans:

Basicity of H_3PO_2 is two.

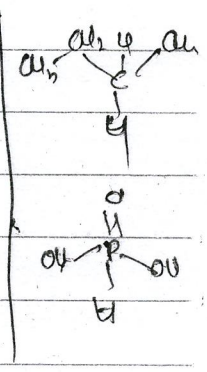
(4) Ans:



– is chiral molecule

(5) Ans:

Proteins are natural polymer



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

(7) Ans.

Sucrose gets hydrolysed to produced fructose and glucose.

(8) Ans.

P-methylbenzaldehyde -

(9) Ans:-

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

We know, $d = \frac{Z \times M}{a^3 \times N_a}$

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

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

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

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

$16 \times 10^{-24} \times 6.022 \times 28$

$1.6 \times 6.022 \times 2.8$

$\Rightarrow 0.2041 + 0.7798 + 0.4472$

$\Rightarrow 1.4311$

2.6×10

26.98

27

$\frac{16 \times 6.022 \times 2.8}{9 \times 2.25}$

(10) Ans:-

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

(ii) It is schotky 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. limiting

i.e. each ion contributes to the molar conductivity of the electrolyte. ~~and their sum of limi~~

e.g. $\Lambda^\circ_{HCl} = \Lambda^\circ_{Cl^-} + \Lambda^\circ_{H^+}$

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~~ 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 goes to ~~ano~~ cathode and accept electron and gets deposited on it metallic form. In the mean time equal amount of metal at anode, lose electrons and come to the solution.

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

* The other impurities gets settled below anode as anode mud.

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

$n = -kt + C$

$C_{kt} =$

$n_2 = n_1 - kt$

(14) Ans:-

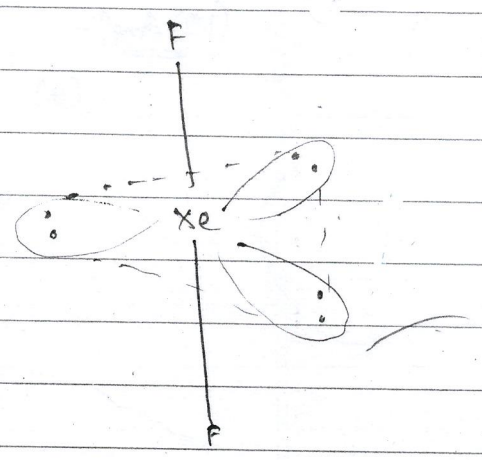
(i) $P_4 + H_2O \longrightarrow PH_3 + NaH_2$

$P_4 + H_2O \longrightarrow 2PH_3 + 2H_3PO_2$

(ii) $XeF_4 + O_2F_2 \longrightarrow XeF_6 + O_2$

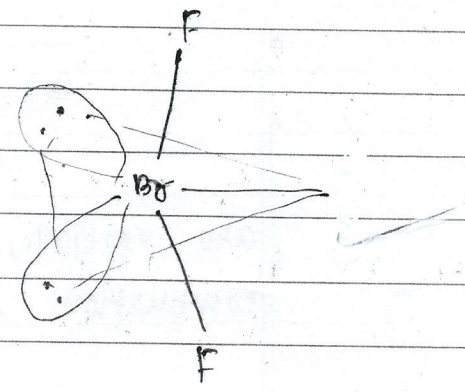
(15) Ans:-

(i) XeF_2



- Linear structure
(expected - trigonal bipyramidal)

(ii) BrF_3



- Bent-T shaped
(expected - trigonal bipyramidal)

(18) Ans:-

① Bakelite — : Monomers — Phenol and formaldehyde

(ii) Neoprene — : Monomer - 2-Chloro-1,3-butadiene

(19) Ans:-

(a) given, $E^\circ_{cell} = 2.71\ V$, $n = 2$

we know $\Delta_r G = -nF E^\circ_{cell}$

$= -2 \times 96500 \times 2.71$

$= -523030\ J$

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

1930
271
193
1351 ×
386 ××
52303
5.42×965
542
-nFE
-2×96500×2.71

(b)

In Apollo space programme fuel cells were used - which are specially designed galvanic cell that directly convert the energy of combustion of fuels into electrical energy.

(20) Ans°-

$$SO_2Cl_2 \longrightarrow SO_2 + Cl_2$$

~~At time, t=0~~

At time t=0,	p,	0.4 atm	0	0
		0.4−x	x	x

So, $p_t = 0.4 - x + x + x = 0.4 + x$

$\Rightarrow x = p_t - 0.4$

Now, p_s (for $SOCl_2$) $= 0.4 - x$

$= 0.4 - (p_t - 0.4)$

$= 0.4 + 0.4 - p_t$

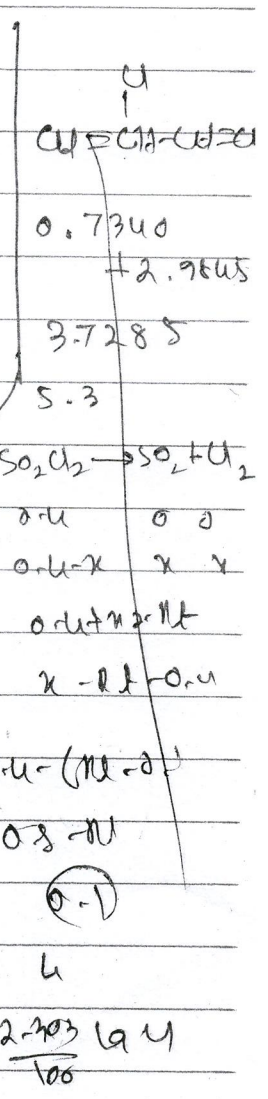
$= 0.8 - p_t$

$= 0.8 - 0.7$

$= 0.1$

So, taking account of given data.

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



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

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

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

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

So, rate Constant $= 1.387 \times 10^{-2}\ s^{-1}$

0.3623 + 0.7782

1.1421

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

1.387×10^{-2}

(21) Ans:-

Emulsions are colloids which have both dispersion phase and dispersion media in liquid form i.e. its 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) $(CH_3)_3P=O$ exists as Phosphorus has vacant d. orbitals and it can extend its covalency beyond 4.

But $(CH_3)_3P=O$ $(CH_3)_3N=O$ 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 Sulpher. So, Oxygen has less negative electron gain enthalpy than Sulpher.

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

(23) Ans:-

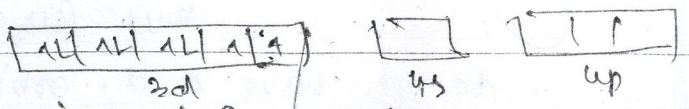
(i) ~~Tetraamminechloridochromium(III) chloride~~

Tetraamminedichloridochromium (III) chloride

(ii) $[Co(en)_3]^{3+}$ shows optical isomerism.

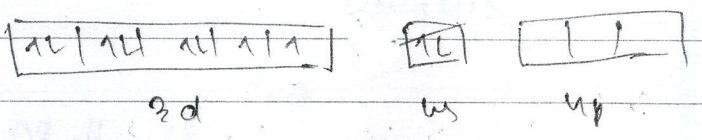
(iii)

$[Ni(CO)_4]$ has weak ligands in form of chloride ion. So, it cant pair up forcibly electrons. So, in $[Ni(CO)_4]^{2-}$

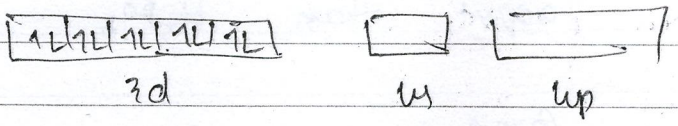
Ni^{2+} — $3d^8$ — 

So, $Ni(CO)_4$ It has two unpaired electrons and hence paramagnetic character.

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

$Ni = 3d^8 4s^1$. 

In influence of strong ligand CO.

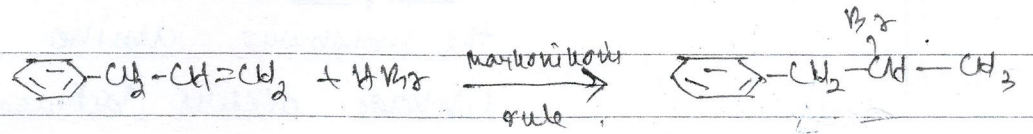
Configuration changes - 

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

(24) Ans.

(a) (i)

(ii)



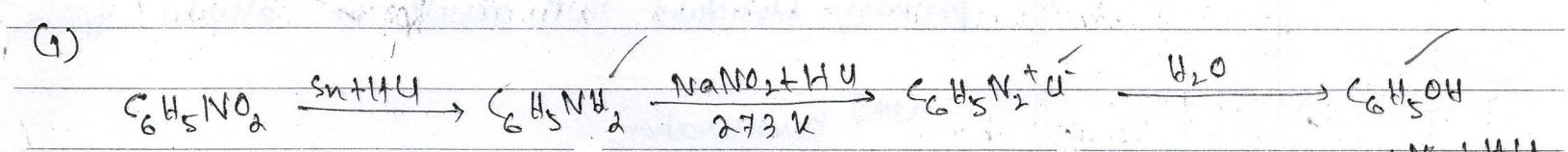
(b) (i) CH_3I - will react faster in SN_2 reaction

(ii) CH_3Cl - will react faster in SN_2 reaction

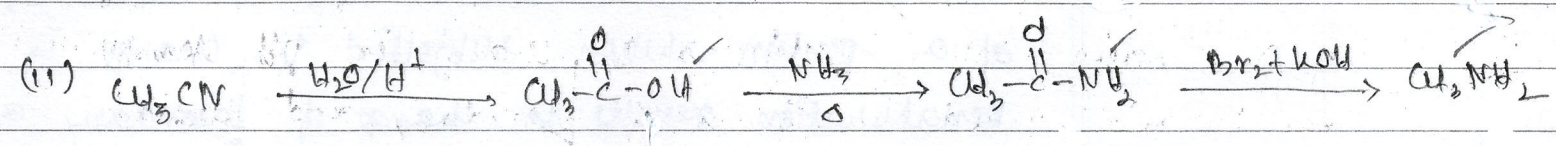
~~(25) Ans~~

(25) Ans:

(i)



(ii)



(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 α-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 a protein 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. ~~curdling~~ change of milk into curd.

Q7) Ans

(i)

(a) Dr. Satpal pravu 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.

(ii) Narcotic analgesics (like morphine in limited dose) are chiefly used for the relief of pains of terminal cancer

(iii) Saccharin or alitame could have been recommended

(28) Ans:- (a)

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

i.e. $\text{Molarity} = \frac{\text{No. of Moles of Substance}}{\text{Volume of Sol}^{n}\text{. in L}}$

(ii) Molal Elevation constant (K_b):

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

As, $\Delta T_b = K_b \cdot m$

So, when, Molality = 1, $\Delta T_b = K_b$

(b)

given, Mass of urea, $W_B = 15\,g$

Molar Mass of urea, $M_m = 60\,g$.

Ans, The sol^n. urea in water is isotonic to that of glucose solution

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

$C_{urea} RT = C_{gluc} RT$

$\frac{n_{urea} RT}{V} = \frac{n_{gluc} RT}{V}$

$\Rightarrow \frac{15}{60} = \frac{w_{gluc}}{180}$

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

$= 45\ g$

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

(30) Ans:-

(i) $CH_3-\overset{O}{\overset{\|}{C}}-H + HCN \longrightarrow CH_3-\underset{OH}{\underset{|}{CH}}-CN$ (ethanaldehyde cyanohydrin)

(ii) $CH_3-\overset{O}{\overset{\|}{C}}-H + H_2N-OH \longrightarrow CH_3-\overset{H}{\overset{|}{C}}=N-OH + H_2O$

(30) Ans:-

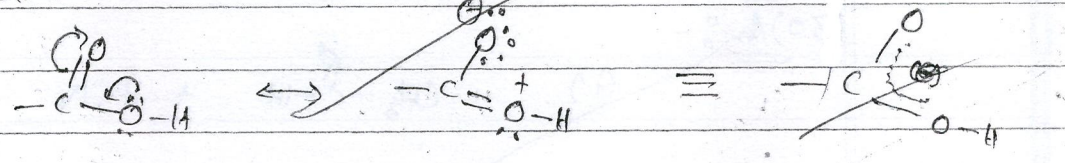
(a)

(i) 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 stability.

$$Cl-CH_2COOH \longrightarrow Cl-CH_2COO^- + H^+$$

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.



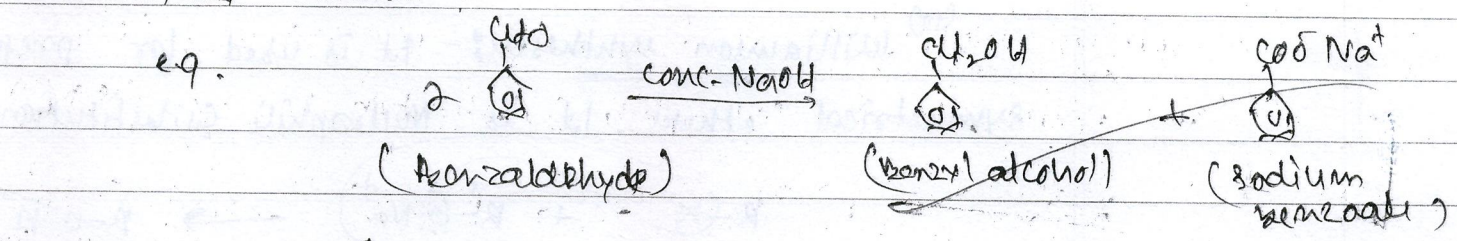
So, It donot give reactions of carbonyl group.

(b)

(i) Rosenmund reaction :- It is the prouss 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.

e.g. $CH_3-\overset{O}{\overset{\|}{C}}-Cl + H_2 \xrightarrow{Pd,\ BaSO_4} CH_3-\overset{O}{\overset{\|}{C}}-H + HCl$

(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

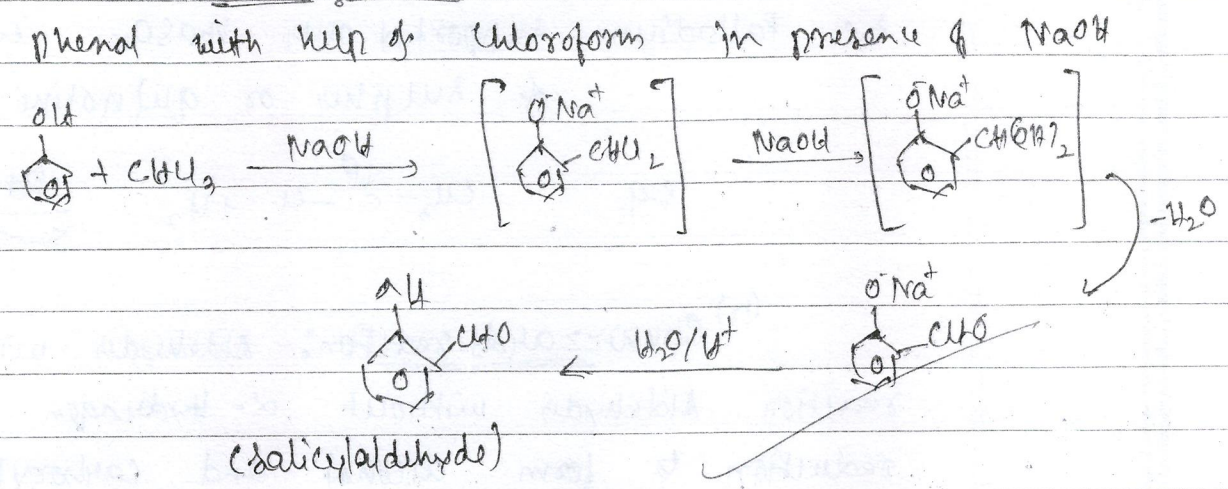
e.g. 

(Benzaldehyde) (Benzyl alcohol) (Sodium benzoate)

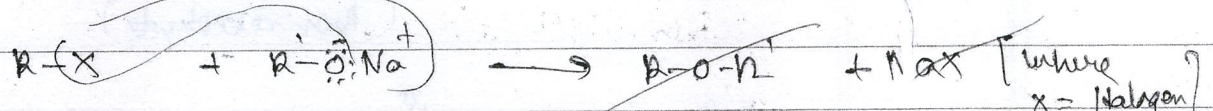
(c) $CH_3CH_2-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$ will give iodoform test as it has a terminal methyl ketone group.

(16) Ans:-

(i) 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 Nucleophili Substitution reaction (S_N2).



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

e.g. $CH_3-I + CH_3CH_2-\ddot{O}Na^+ \longrightarrow CH_3-O-CH_2-CH_3 + NaCl$

17 Ans:-

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

As (OH^-) is a strong nucleophile, it is not a good leaving group. But when ~~CH_3-CH_2-OH~~ it is protonated to (OH_2^+) it becomes a good leaving group. Then (Br^-) substitutes it. The proton (H^+) is released by HBr acid.

Step I: Protonation: $CH_3-CH_2-\ddot{O}-H + H^+ \longrightarrow CH_3-CH_2-\overset{\overset{H}{|}}{\overset{+}{O}}-H$

$CH_3-CH_2^+ + H_2O$

Step II: Dehydration: $CH_3-CH_2-\overset{\overset{H}{|}}{\overset{+}{O}}-H \longrightarrow CH_3-CH_2^+ + H_2O$

Step III: Attack by (Br^-) nucleophile: $CH_3-CH_2^+ + Br^- \longrightarrow CH_3CH_2Br$

So, overall reaction $CH_3CH_2OH + HBr \longrightarrow CH_3CH_2Br + H_2O$.

~~(29) Ans~~

(29) Ans:

(i) Differences between lanthanoids and actinoids

Lanthanoid	Actinoids
① ~~last electron~~ f-orbital filled there is 4f	① f-orbital filled wi

(29) Ans:-

(i)

Lanthanoids	Actinoids
(ii) Electrons progressively gets filled up in 4f- orbital	(ii) Electrons get progressively filled in 5f- orbital
(iii) Shows oxidation state only +2 and +4, with +3 as common oxidation state	(iii) Can show more oxidation state +2, +3, +4, +5, +6 with +3 common oxidation state
(iii) Lanthanoid contraction is less in compare to actinoid contraction as 4f -orbital is buried deep into atom	(iii) Actinoid contraction is more in comparison to lanthanoid contraction.
(iv) Lanthanoids are chemically less reactive than actinoids	(iv) Actinoids are more reactive than lanthanoids
(v) Most lanthanoids are not radioactive except one.	(v) Most actinoids are radioactive

$Pu + H_2O \rightarrow PH_3 + H_3PO_3$

$2P + H_2O \rightarrow PH_3 + H_3PO_3$

$P_4 + H_2O \rightarrow PH_3 + H_3PO_3$

P

$d = \frac{ZM}{a^3 N_A}$

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

$6.4 \times 10^{-1} \times 16 \times 2.8 \times 6.022 \times 10^{-1}$

(ii)

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

(iv)

$$MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O$$

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

As, Magnetic moment $= \sqrt{n(n+2)}$

where n = number of unpaired electron.