

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

II Pre-board Examination, 2022-23 Class 12

CHEMISTRY (Theory)

Time allowed: 3 hours

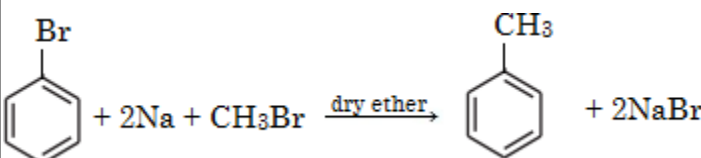
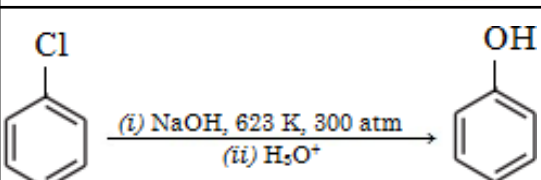
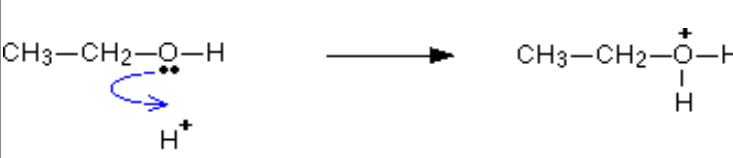
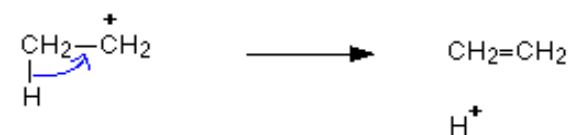
Maximum Marks: 70

MARKING SCHEME

Question No.	Value Points	Marks
SECTION A		
1.	(d) Equivalent weight of electrolyte	1
2.	(d) -2.36 V	1
3.	(a) 2.5	1
4.	(a) $6.25\text{ L}^2\text{mol}^{-2}\text{s}^{-1}$	1
5.	(b) First order reaction	1
6.	(c) It causes the $\text{K}_2\text{Cr}_2\text{O}_7$ solution to change its color from orange to yellow	1
7.	(d) Oxygen	1
8.	(a) 1	1
9.	(c) The oxidation state of cobalt in the complex is +1	1
10.	(b) Alkyl isocyanide	1
11.	(a) Primary	1
12.	(b) Oxygen-hydrogen	1
13.	(b) $\text{III} > \text{IV} > \text{I} > \text{II}$	1
14.	(d) $\text{CH}_3\text{—CH=N—NH}_2$	1
15.	(i) Both Assertion (A) and Reason (R) are correct statements, and the Reason (R) is the correct explanation of the Assertion (A).	1
16.	(ii) Both Assertion (A) and Reason (R) are correct statements, but the Reason (R) is not the correct explanation of the Assertion (A).	1
17.	(iv) Assertion (A) is incorrect, but Reason (R) is a correct statement.	1
18.	(iii) Assertion (A) is correct, but Reason (R) is an incorrect statement.	1
SECTION B		
19.	At infinite dilution, when dissociation of electrolyte is complete, each ion makes a definite contribution of its own towards the molar conductivity of electrolyte, irrespective of the nature of the other ion with which it is associated.	1

		$\Omega^0 = \nu^+ \lambda^{\circ+} + \nu^- \lambda^{\circ-}$	1
		OR - B - Dilution causes the degree of dissociation/ionization of B to increase, resulting in greater number of ions.	1
20.		- The reactions which have actual order higher than 1, but under certain conditions behave like a first order reactions. - Acidic hydrolysis of ethyl acetate or sucrose.	1
21.		For a first order reaction, $k = \frac{0.693}{t} = \frac{0.693}{69.3} = 0.01 \text{ min}^{-1}$ $t = 2.303 \log \frac{R_0}{R}$ $0.01 = \frac{2.303}{\log} \log \frac{100}{20}$ $= \frac{2.303}{0.01} \log 5$ $= 230.3 \times 0.6990$ $t = 160.9 \text{ min}$ (Half mark to be deducted for not writing or writhing wrong unit)	1/2 1/2 1/2 1/2
22.	(a)	Ionization isomerism	1
	(b)	Coordination isomerism	1
23.	(a)	An optically inactive mixture of two enantiomers in equal proportions.	1
	(b)	A carbon atom attached to four different atoms or group of atoms.	1
		OR	
	(a)	The boiling points of isomeric alkyl halides decrease with branching because of the weakened van der Waal's forces.	1
	(b)	It is because <i>para</i> -isomers fit in the crystal lattice better than <i>ortho</i> - and <i>meta</i> -isomers.	1
24.	(a)	- Bicarbonate test (treatment with NaHCO_3). - Brisk effervescence of CO_2 are formed when benzoic acid is reacted with HCO_3^-.	1/2 1/2
	(b)	- Fehling's test. - Formaldehyde gives a red precipitate of Cu_2O with Fehling's solution.	1/2 1/2
25.		- The coagulation of proteins when it is subjected to change in temperature or pH. - Coagulation of white of an egg on boiling.	1 1
SECTION C			
26.		$M_B \text{ of solute, } \text{C}_6\text{H}_8\text{O}_6 = (6 \times 12) + (8 \times 1) + (6 \times 16)$ $= 176 \text{ g mol}^{-1}$	1/2
		$W_B = \frac{\Delta T_f \times M_B \times W_A}{K_f \times 1000}$	1/2
		$= \frac{1.5 \times 176 \times 75}{3.9 \times 1000}$	1
		$= 5.08 \text{ g}$	1

27.	The IUPAC name of the complex is tetracyanonickelate (II).		1
	(a)	It uses dsp^2 hybridization.	1

	(b)	The strong CN^- ligands cause all d^8 electrons to pair in the $3d$ orbital (spin-pairing).	1
	(a)	OR Ligands which have two different donor atoms and either of the two ligates in the complex.	1
	(b)	The complexes in which the metal is bonded to two or more different types of ligands.	1
	(c)	A series formed when several ligands are arranged in the increasing or decreasing order of their field strength.	1
28.	(a)		1
	(b)	$\text{CH}_3\text{CH}=\text{CH}_2 + \text{HBr} \xrightarrow{\text{peroxide}} \text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$	$\frac{1}{2}$
		$\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{KOH}_{(\text{aq})} \xrightarrow{\text{heat}} \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{KBr}$	$\frac{1}{2}$
	(c)		1
29.		Mechanism of dehydration of ethanol: $\text{H}_2\text{SO}_4 \rightarrow \text{H}^+ + \text{HSO}_4^-$	$\frac{1}{2}$
			$\frac{1}{2}$
			$\frac{1}{2}$
			$\frac{1}{2}$ 1
		Ethoxyethane (diethyl ether).	

30.	(a)	Phthalimide N - Alkylphthalimide (1° amine)	1
	(b)	$\text{R}-\text{CONH}_2 + \text{Br}_2 + 4\text{NaOH} \rightarrow \text{R}-\text{NH}_2 + \text{Na}_2\text{CO}_3 + 2\text{NaBr} + 2\text{H}_2\text{O}$ Amide 1° amine	1
	(c)	$\text{R}-\text{NH}_2 + \text{CHCl}_3 + 3\text{KOH} \rightarrow \text{R}-\text{NC} + 3\text{KCl} + 3\text{H}_2\text{O}$ 1° amine alkyl isocyanide	1
	(a)	OR $\text{C}_6\text{H}_5\text{NH}_2 < \text{C}_6\text{H}_5\text{CH}_2\text{NH}_2 < \text{CH}_3\text{NH}_2$	1
	(b)	N,N-Dimethylbenzeneamine	1
	(c)	Aniline, a Lewis base, forms salt with catalyst AlCl_3 , a Lewis acid.	1
SECTION D			
31.	(a)	Because the surface has less dissolved oxygen due to less pressure. OR Nitrogen gas from the cylinder carried by the diver's combine with his blood at high pressure deep into the water.	1
	(b)	Y, because it has the least pressure.	$\frac{1}{2} + \frac{1}{2}$
	(c)	According to Henry's law, $p = K_H x$ $\therefore x = \frac{p}{K_H} = \frac{760}{4.27 \times 10^5}$ $\therefore x = 178 \times 10^{-5}$	$\frac{1}{2}$ $\frac{1}{2} \times 1$
32.	(a)	Insulin.	1
	(b)	They are not needed to be supplied by food.	1
	(c)	Because they play an important role in communication between different cells. OR Pituitary gland	1
	(d)	Adrenaline (or epinephrine)	1
SECTION E			

		$= 0.935 - \frac{0.059}{2} \log 2$ $= 0.935 - (0.0295 \times 0.3010)$ $= 0.935 - 0.0088$ $= 0.9262 \text{ V}$ <i>(Half mark to be deducted for not writing or writing wrong unit)</i>	1
	(b)	$\Lambda = \frac{\kappa \times 1000}{c}$ $= \frac{6.065 \times 10^{-4} \times 1000}{0.005}$ $= 121.3 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ <i>(Half mark to be deducted for not writing or writing wrong unit)</i>	$\frac{1}{2}$ $\frac{1}{2}$ 1
34.	(a)	It has fully-filled d^{10} configuration, so no $d-d$ transition is possible.	1
	(b)	It has six unpaired electrons, so it forms extensive metallic/covalent bonds.	1
	(c)	It achieves stable noble gas configuration after losing three electrons.	1
	(d)	They have reasonably large void where a small-sized element like hydrogen, boron or carbon can be trapped.	1
	(e)	They don't have unpaired electrons in their $(n-1)d$ orbital in their elemental form or in their common oxidation states.	1
	(a)	OR - Lanthanide contraction is the steady decrease in the atomic and ionic sizes of lanthanide elements. - Its major cause is the inability of inner $4f$ electrons to screen the outer $6s$ electrons. - Its consequences include comparable atomic sizes of $4d$ and $5d$ series elements and regular decrease in basic strength from $\text{La}(\text{OH})_3$ to $\text{Lu}(\text{OH})_3$.	1 1 $\frac{1}{2} + \frac{1}{2}$
	(b)	It is because Ce^{4+} gains one electron to convert to more stable Ce^{3+} .	1
	(c)	$2\text{MnO}_4^- + \text{H}_2\text{O} + \text{I}^- \rightarrow 2\text{MnO}_2 + 2\text{OH}^- + \text{IO}_3^-$ <i>($\frac{1}{2}$ marks to be deducted if the reaction is not balanced)</i>	1
35.		- A : $\text{C}_6\text{H}_5\text{COCH}_3$ - B : $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_3$ - C : $\text{C}_6\text{H}_5\text{COOH}$ - D : $\text{C}_6\text{H}_5\text{COONa}$ - E : CHI_3	1 1 1 1 1
35.		OR	
	(a)	CH_4	1
	(b)	$\text{CH}_3\text{CH}(\text{Br})\text{COOH}$	1
	(c)	$\text{C}_6\text{H}_5\text{COCl}$	1
	(d)	$\text{C}_6\text{H}_5\text{COOH}$	1
	(e)	CH_3CHO	1

