BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL

First Pre-Board EXAMINATION 2024-25

CHEMISTRY (043) Answer Key

Class: XII
Date:13.11.24
Admission No.:

Duration : 3 Hrs
Max. Marks: 70
Roll No.:

SECTION A

The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section

1. (b) 1.35V
2. (c) Na is deposited
3. (a) Pb
4. (c) first
5. (c) Zr Hf
6. (b) $FeSO_4 (NH_4)_2 SO_4 .6H_2O$
7. (d) Ca^{2+} and Mg^{2+} ions
8. (b) $(CH_3)_2CH(Br)CH_3$
9. (a) sp^3
10. (c) $O_2N\text{-}CH_2NH_2$
11. (d) both (a) and (b)
12. (d) Proteins
13. d
14. d.
15. **a**
16. a

SECTION B

This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17. **(i) Ideal solution :** An ideal solution is that which obeys Raoult's law and in which the intermolecular interactions between the different components are of same magnitude as that is found in pure components.
(ii) Azeotrope : It is a type of liquid mixture having a definite composition and boiling like a pure liquid, (distills without change in compositions) 2

18.Electrochemical cell.
Cathode: $O2 (g) + 2H2O(l) + 4e– \longrightarrow 4OH– (aq)$
Anode: $2H2 (g) + 4OH– (aq) \rightarrow 4H2O(l) + 4e–$
Overall reaction being: $2H2 (g) + O2 (g) \rightarrow 2 H2O(l)$ 2

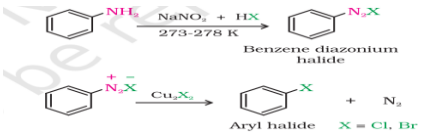
OR

i) First Law: The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte (solution or melt). (ii) Second Law: The amounts of different substances liberated by the same quantity of electricity passing

through the electrolytic solution are proportional to their chemical equivalent weights (Atomic Mass of Metal ÷ Number of electrons required to reduce the cation)..

19 . (a) Definition. The Order of Reaction refers to the power dependence of the rate on the concentration of each reactant. Thus, for a first-order reaction, the rate is dependent on the concentration of a single species.

(b) Total number of particles participate in chemical reaction is called molecularity

20. (a) 

(b) CH_3Cl + NaI → **CH_3 I**

2

21. Account for the following: 2

(a) d^1 config.

(b) due to presence of unpaired electron d-d transition.

SECTION C

This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.

22. Lead storage battery is a secondary cell that can be charged by passing a current. Reactions occurring in the lead storage battery while operating (during discharge) are:

At cathode $PbO_2+SO^{2-}_4+4H^++2e-\rightarrow PbSO_4+2H_2O$

At anode $Pb+SO^{2-}_4\rightarrow PbSO_4+2e-$

overall reaction $Pb+PbO2+2H2SO4\rightarrow 2PbSO4+2H2O$.

3

23.

Let the initial quantity be = a

$x=0.75a,(a-x)=a-0.75a=0.25a$

$k=2.4\times10-3s-1$

For a first order reaction,

$t=2.303kloga(a-x)$

or $t=2.3032.4\times10-3s-1loga0.25a$

$=9.60\times102log10.25$

$=9.60\times102\times(log1-log0.25$

$=9.6\times102\times0.6021=577sec.$

24. Explain why :

3

(a) Sp2 and SP3.

(b) less energy is released

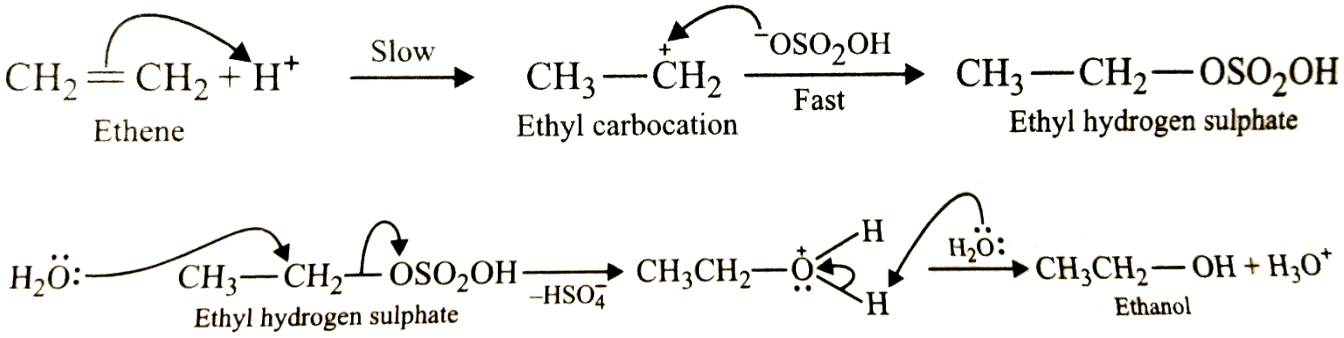
(c) $C_6H_5CH(C_6H_5)Br$ is more reactive in
S_N1 substitution reaction because of bulky group.

25. Write the IUPAC name of the following compounds: 3

(a) 1,2 methoxy ethane
(b)
2,3-di nitro phenol
(c) propane 1,3 diol

26.

Direct addition of H2O to ethene in presence of an acid does not occur. Indirectly, ethene is first passed through conc. H2SO4, when ethyl hydrogenn sulphate is formed.



3

27. (i) It is due to weak molecular association in aldehydes and ketones arising out of the dipole- dipole interactions.
(ii)Formaldehyde does not contain a-hydrogen atom. Therefore it does not take part in aldol condensation.
(iii) Ethanal is soluble in water due to H-bonding between the polar carbonyl group and water molecules.

28. 3

(a)
$C_6H_5NH_2$, $<C_6H_5N(CH_3)_2$, $< CH_3NH_2 < (C_2H_5)_2NH$
(b)
p-toluidine Aniline, p-nitroaniline and
(c) In an increasing order of pK_b values :
$C_6H_5NH_2$ $C_6H_5NHCH_3$, $C_2H_5NH_2$, $(C_2H_5)_2NH$

OR

State reasons for the following: 3
(a) sp2
(b) hydrophobic in nature
(c) more number of hydrogen bonding

SECTION D

The following questions are case-based questions. Each question carries 4 marks. Read the passage carefully and answer the questions that follow

(a) d10 in Zn 1
(b) Ag2+ is unpaired 1
(c) unpaired and packing efficiency higher. 2

OR

(c) Mn and 3d54s2 configuration ?

30. Read the given passage and answer the questions that follow
Proteins are the most abundant biomolecules of the living system. The chief sources of proteins are milk, cheese, pulses, fish, meat, peanuts, etc. They are found in every part of the body and form a fundamental basis of the structure and functions of life. These are also required for the growth and maintenance of the body. The word protein is derived from the Greek word, 'proteios' meaning 'primary' or of 'prime importance'. Chemically, proteins are the polymers in which the monomeric units are the α-amino acids. Amino acids contain an amino ($-NH_2$) and carboxylic (-COOH) functional groups. Depending upon the relative position of the amino group with respect to the carboxylic group, the amino acids can be classified as α, β, and γ-amino acids. Amino acids which are synthesised by the body are called non-essential amino acids. On the other hand, those amino acids which cannot be synthesized in the human body and are supplied in the form of diet (because they are required for proper health and growth) are called essential amino acids
(a) – CONH – bond is called peptide bond 2

(c) Both (a) and (b)
(b) Peptide linkage

OR

(ii) (b) Hydrogen bonding

SECTION E

The following questions are long answer type and carry 5 marks each. All questions have an internal choice.

31. Answer

(a) Given:
Urea (W) = 30 g; H_2O (W) = 846 g

$M = 60; \qquad M = 18$

$$\text{So, } \frac{P^0 - P_s}{P^0} = X_2$$

$$\frac{23.8 - P_s}{23.8} = \frac{W_{Urea} \times M_{(H_2O)}}{M_{Urea} \times W_{(H_2O)}}$$

$$\frac{23.8 - P_s}{23.8} = \frac{30}{60} \times \frac{18}{846}$$

$$23.8 - P_s = 0.0106 \times 23.8$$

$$23.8 - P_s = 0.2531$$

$$\text{So, } P_s = 23.8 - 0.2531 \quad \therefore \quad P_s = \mathbf{23.54\ mm\ Hg}$$

(b)

	Ideal Solution	Non- Ideal solution
OR	(i) They obey Raoult's law over the enitre range of concentration.	(i) They do no obey Raoult's law over the entire range of concentration
31. (a)	(ii) Neither the heat is evolved or absorbed during dissolution	(ii) Heat is evolved or absorbed during dissolution
	(iii) $\Delta_{mix}H = 0$ $\Delta_{mix}V = 0$	(iii) $\Delta_{mix}H$ is not equal to 0. $\Delta_{mix}V$ is not equal to 0.

Glucose is a non-volatile solute, therefore, addition of glucose to water lowers the vapour pressure of water as a result of which boiling point of water increases.

(b) **Given :** $K_H = 1.67 \times 10^8$ Pa

$pCO_2 = 2.53 \times 10^5$ Pa

Using Henry's law

$$pCO_2 = K_H \times xCO_2$$

$$\therefore \quad xCO_2 = \frac{pCO_2}{K_H} = \frac{2.53 \times 10^5 \text{Pa}}{1.67 \times 10^8 \text{Pa}}$$

$$\therefore \quad xCO_2 = 1.515 \times 10^{-3}$$

$$\frac{nCO_2}{nH_2O + nCO_2} = \frac{nCO_2}{nH_2O} = 1.515 \times 10^{-3}$$

No. of moles of water present in 500 ml

soda water $= \frac{500}{18} = 27.78$ mol

i.e. $nH_2O = 27.78$ mol

No. of moles of CO_2

$nCO_2 27.78 = 1.515 \times 10^{-3}$

i.e. $nCO_2 = 42.08 \times 10^{-3}$ moles = 0.042 mol

32.Answer:

(a) (i) $[Co(en)_3]Cl_3$ show's optical isomerism.

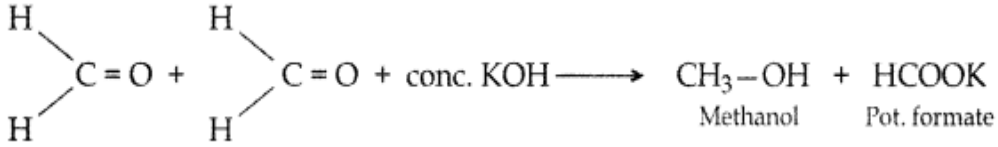
(ii) IUPAC name: Triamminetrichloridochromium(III).
(iii) Since in $[NiCl_4]^{2-}$ Cl^- is a weak field ligand, it forms outer orbital complex and has unpaired electrons which imparts paramagnetic character to complex while in $[Ni(CN)_4]^{2-}$, CN^- is a strong field ligand, forms inner orbital complex and has paired electrons which imparts diamagnetic character to it.

(b) Any four points.

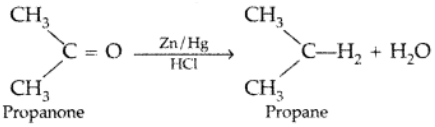
OR

(a) (i) $[Co(en)_3]^{3+}$ is more stable complex than $[CO(NH_3)_6]^{3+}$ because of chelate effect.
$[Ni(NH_3)_6]Cl_2$
(ii) IUPAC name : Hexaamminenickel (II) chloride.
(iii) IUPAC name : Triammine chlorido nickel (II) nitrate $[Ni(NH_3)_3NO_3]Cl$
(b) Chelate effect : When a bidentate or a polydentate ligand contains donor atoms positioned in such a way that when they coordinate with the central metal ion, a five or a six membered ring is formed. This effect is called Chelate effect. As a result, the stability of the complex increases.
Example: the complex of Ni^{2+} with '+ion' is more stable than NH_3.

33. (a) (i)



(ii)



(b) **Calculation of Molecular formula :**

C = 69.77%, H = 11.63%

$\therefore$ O = 100 – (69.77 + 11.63) = 18.6%

Element	*%*	*Molar mass*	*%/Molar mass*	*Simplest ratio*
C	69.77	12	5.88	5
H	11.63	1	11.63	10
O	18.6	16	1.16	1

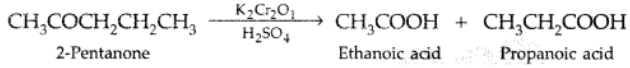
Empirical formula of given compound = $C_5H_{10}O$

Empirical formula mass = $5 \times 12 + 10 \times 1 + 16 = 86$

$\therefore \quad n = \frac{\text{Empirical formula mass}}{\text{Molar mass}} = \frac{86}{86} = 1$

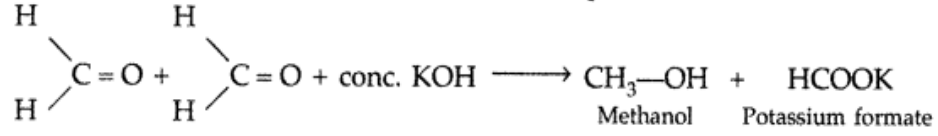
Molecular formula of the given compound= $1 \times C_5H_{10}O = C_5H_{10}O$

Determination of structure : Since the compound does not reduce Tollen's reagent and gives positive iodoform test so it may be a **ketone.**



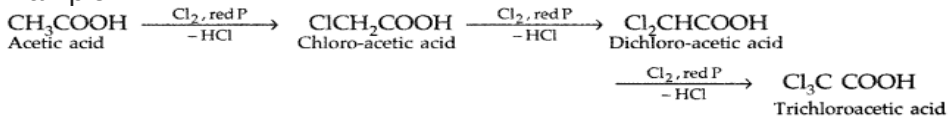
OR

(a) (i)



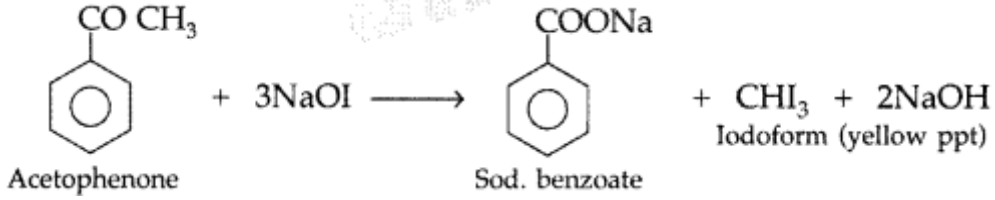
(ii)

Example :

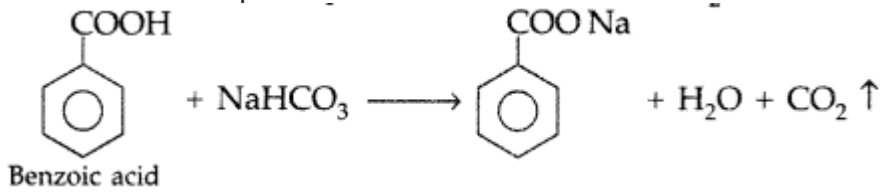


(b) (i) Propanal and propanone: Propanal gives a positive test with the Fehling solution in which a red ppt. of cuprous oxide is obtained while propanone does not respond to test

(ii) Acetophenone and Benzophenone: They can be distinguished by iodoform test which is given by only acetophenone with the formation of yellow ppt. while benzophenone does not respond to iodoform test



(iii) Phenol and Benzoic acid: On addition of $NaHCO_3$ to both solutions carbon dioxide gas is evolved with benzoic acid while phenol does not form CO_2



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