KISA PREPARATORY EXAMINATION **(2023-2024)**

**SUBJECT- CHEMISTRY**

**ANSWER KEY**

**GRADE: XII DURATION: 3hrs**

**DATE: 12- 01-2024**

**Question 1**

1. **Fill in the blanks by choosing the appropriate word or words from those given in**

**brackets: [4x1]**

1. Ethanal, red
2. [Ni(CN)4]2-:Square planar, two.
3. Ketones, Carboxylic acids.
4. increases, decreases

**B. Complete the following statements from the correct alternative from the choices given: [4x1]**

i. c. Ethylamine

ii. a. P

iii. a. Their similar atomic size

iv. d. p-hydroxyazobenzene

v. b. 1

vi. **a.** Assertion and reason both are correct statements and reason is correct explanation for assertion.

vii. b. Assertion and reason both are correct statements and reason is not correct explanation for assertion.

C. a**.** oxidising agent

b. +6

c. K2Cr2O7 + 7H2SO4 + 6KI ------🡪 4K2SO4 + Cr2(SO4)3 + 7H2O + 3I2

**SECTION B**

**Question 2**

ΔTb = i Kb m ( formula one mark )

1.88 = i x 0.52 x 2 ( final answer 1/2 mark)

i= 1.80

As i>1, NaCl undergoes dissociation. (1/2 mark)

**Question 3 [2]**

* 1. Transition metals form coloured compounds due to d-d transition.
  2. Zn, Cd and Hg are not considered as transition elements because they possess completely filled d- orbitals.

**Question 4 [2]**

Pd /BaSO4 , S

1. C6H5COOH on reduction gives benzaldehyde.

(All the products should be written with a balanced equation )

**Question 5 [2]**

1. C6H5OCH3 + HI ------🡪 C6H5OH + CH3I
2. C2H5OH +4 I2 + 6NaOH -----🡪CHI3 + HCOONa + 5NaI + 5H2O

OR

1. 2-methyl -2-propanol , 2-butanol and 1-butanol.
2. Ethanol can form hydrogen bonding with its molecule.

**Question 6 [2]**

|  |  |
| --- | --- |
| Metallic Conduction | Electrolytic conduction |
| 1. Due to movement of electrons | ions |
| 1. Does not involve transfer of matter. | Involves. |

**Question 7**  **[2]**

1. Formaldehyde does not answer iodoform test . Acetaldehyde gives yellow ppt for iodoform test.
2. Acetaldehyde gives silver mirror with Tollens reagent Whereas acetone does not.

**Question 8 [2]**

**Δ**Tf = Kf x w2 x 1000 / M2 x w1

W2 = **Δ**Tf x M2 x w1 / Kf x 1000

W2 = 6 x 62 x 4 x 1000 / 1.85 x 1000

W2 = 804.32 g

**Question 9 [2]**

* 1. KMnO4 + H2SO4 + H2C2O4 -----🡪 Refer TB
  2. K2Cr2O7 + H2SO4 + FeSO4 -----🡪 Refer TB

**Question 10** 2 **[2]**

1. Zn / Zn2+ // Cu2+ / Cu
2. Pt, H2 (g) (1 atm) / H+ (1 mol /L)

**Question 11 [2]**

1. [A] = Benzene diazonium chloride

[B] = Chlorobenzene

1. [A] = Ethyl amine.

[B] = N – ethyl ethanamide.

**SECTION C**

**Question 12 [3]**

1. The overall order = 3
2. Rate law = k [NO] 2 [H2] 1
3. K = r / [NO] 2 [H2] 1

K = 71.85 x 10 -3 mol -2 L2 sec -1

**Question 13 [3]**

Refer TB Biomolecule chapter.

**Question 14 [3]**

1. Hunsdiecker reaction – CH3CH2 COOAg + Br2 --🡪 CH3CH2CH2Br + CO2 + AgBr
2. Wurtz – Fittig reaction – C6H5Br + 2Na + CH3Br ----🡪 C6H5CH3 + 2NaBr
3. Finkelstein reaction – CH3CH2Br + NaI ---🡪 CH3CH2I + NaBr

**Question 15 [3]**

1. C1 = C2

10 / 342 x 100 = 1.754 / M2 x 100

M2= 1.754 x 342 / 10 = 59.98

1. When two solutions are separated by a semipermeable membrane and no osmosis occurs, ie., there is no net flow of water on either side through the membrane , they are referred as isotonic solutions. [1mark]

OR

Calculation of molar conductivity :

Molecular mass of anhydrous BaCl2 = 208

Moles of BaCl2 dissolved in 400 Cm3 = 2 / 208 = 9.61 x 10 -3

Molarity of solution = 9.61 x 10 -3 x 1000 / 400 = 0.024 M

Given that k = 0.0058 S /cm.

Molar conductivity of the solution = k x 1000 / M = 0.0058 x 1000 / 0.024

= 241.67 S cm2 /mol

**Question 16 [3]**

1. Phenol to salicylic acid - Kolbe’s reaction [ Refer alcohol, phenol chapter]
2. Ethanol to acetic acid – Ethanol on oxidation
3. Ethanol with Grignard reagent gives methane.

**Question 17 [3]**

1. 1
2. Time -1
3. Slope = - k / 2.303

**Question 18 [3]**

1. Aniline being a Lewis base reacts with Lewis acid AlCl3 to form a salt.

As a result , N of aniline acquires positive charge and acts as strong deactivating group for electrophilic substitution reactions. Therefore, it does not undergo Friedel crafts reaction.

1. By ammonolysis of alkyl halides a mixture of primary secondary and tertiary amines are formed. Their separation is quite difficult.
2. -NH2 group in aromatic amine is strongly ring activating through delocalization of the lone pair of electrons on N atom over the aromatic ring. The delocalization does not take place in benzene. **SECTION D**

**Question 19 ( 1 Mark Each) [5]**

1. a. Formaldehyde does not have alpha hydrogen . so it does not undergo aldol condensation.

b. In formic acid, a hydrogen atom is attached to the carboxyl group, while acetic acid contains a methyl group attached to the carboxyl group. Since CH3 group is electron releasing group, it exerts +I effect and has the tendency to increase the electron density at the oxygen atom of the -OH group. So, release of H+ ion by acetic acid is difficult.

ii. Refer TB for reactions.

**Question 20 [5]**

1. +3 (1/2 M)
2. paramagnetic. (1/2 M)
3. d2sp3 hybridization. (1/2 M)
4. Octahedral. (1/2 M)
5. Linkage isomerism . ( 1 Mark)
6. [Co(NH3)4SO4] NO3 ( 1 Mark)
7. [Cu(NH3)4(H2O)2]SO4 ( 1 Mark)

**Question 21 [5]**

1. The net cell reaction is

2Cr + 3Fe2+ (0.01M) ----🡪 2Cr3+ (0.1M) + 3Fe(s)

Ecell = Eocell -0.059/n log10 [Cr3+(aq) ]2 / [Fe2+(aq) ]3  (1 M)

Eocell = Eo R- EoL = Eo Fe2+/Fe- Eo Cr3+/ Cr ( 1/2 Mark)

Eocell =  -0.45 – (-0.75) = 0.3 v

Ecell = 0.3 - 0.059/6 log10 (0.1)2 / (0.01)3

= 0.3 – 0.039 = 0.261v ( ½ Mark)

1. When same quantity of electricity is passed through the solutions of different electrolytes connected in series the masses of the substances liberated at the electrodes are directly proportional to their equivalent masses. (1 M)
2. λm∞ for HCl = λ∞ H+ + λ∞ Cl-

λm∞ for NaCl = λ∞ Na+ + λ∞ Cl-

λm∞ for CH3COONa = λ∞ Na+ + λ∞ CH3COO-

λm∞ HCl + λm∞ CH3COONa - λm∞ NaCl  = λ∞ H+ + λ∞ Cl- + λ∞ Na+ + λ∞ CH3COO- - λ∞ Na+ + λ∞ Cl- (1 M)

λm∞ CH3COOH = 426.1 + 91.0 – 126.5 = 390.6 Ω -1Cm2 mol-1 (1 M )

[OR]

1. When a metal is exposed to certain environment it may get deteriorated due to its reaction with the environment and its surface may become rough. This phenomenon is called corrosion.(1M)
2. Equivalent conductance is the conducting power of all the ions furnished by one gram equivalent of an electrolyte present in a definite volume of the solution. (1 M)
3. The cells which convert the chemical energy of a fuel directly into electrical energy are called fuel cells. (1M)

Anode reaction: H2 (g) + 2 OH- (aq) -----🡪 2 H2O (l) + 2 e- (1M)

Cathode reaction: O2 (g) + 2 H2O (l) + 4 e- -----🡪 4 OH – (aq) (1M)

Advantages : (1M)

1. High efficiency
2. Pollution free working.

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