Maharashtra Board Class 12 Chemistry Answer Key + Solution 2020 PDF

Q.1)

i	D
ii	A
iii	B
iv	C
v	B
vi	C
vii	D
viii	C
ix	B
x	A

Q.2) Answer the Following questions: — [8M]

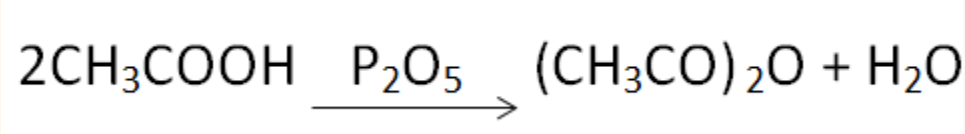
i). What is the Concentration of dissolved oxygen at 500C under pressure of one atmospheric if partial pressure of oxygen at 500C is 0.14 atm. (Henry's law constant for oxygen = 1.3 * 10-3 mol dm–3 atm -1)

Answer: 1.82 × 10-4 mol dm-3.

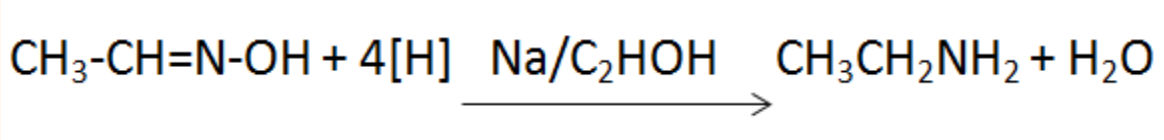
ii). Write the Structural formulae of the alcohol that results when acetaldehyde is reacted with CH3MgBr in the presence of dry ether and the product is hydrolysed?

Answer: isopropyl alcohol/2-hydroxypropane

iii). Write balanced chemical reaction for preparation of acetic anhydride using acetic acid ?
Answer:



iv). Write the chemical reaction involved in the formation of ethyl amine using acetal doxime.
Answer:



v). What is electrometallurgy?

Answer: Electrometallurgy is a method that uses electrical energy goes into electrolytic reduction of molten(fused) metallic compounds to produce metals.

vi).
vii).

The rate constant for zero order reaction,

$$k = \frac{[A]_o - [A]_t}{t}$$

at time $t = t_{1/2}$ (half life), $[A]_t = \frac{[A]_o}{2}$

then,

$$t_{1/2} = \frac{[A]_o - \frac{[A]_o}{2}}{k} = \frac{[A]_o}{2k}$$

viii).

$$t_{1/2} = \frac{[A]_o}{2k}.$$

SECTION – B (HSC Chemistry Board Paper Solution 2020)

Q3. State and explain Hess's law of constant heat summation.

Answer: The law states that the change in enthalpy for a reaction is the same whether the raction takes place in one or
series of steps./ The enthalpy change for a chemical reaction is the same regardless of the path by which reaction occurs.

The conversion of A ->C can directly takes place in one step

A –> C $\Delta H0 = \Delta H1$

The reaction can also takes place in two different steps

Step 1 A -> B $\Delta H0 = \Delta H2$

Step 2 B -> C $\Delta H0 = \Delta H3$

Overall A -> C $\Delta H0 = \Delta H2 + \Delta H$

Q4.

Q5). Distinguish between order and molecularity of a reaction.

Order	Molecularity
It is the sum of powers of the concentrations in the rate law expressions.	It is the number of molecules of the reactants taking part in the elementary reactions.
It is an experimentally determined value.	It is a theoretical concept.
Order corresponds to the overall reaction.	Molecularity is for elementary reaction.
It can have fractional value.	It is always a whole number.

Q6). Write two uses of each of the following

1. **Helium**
2. **Neon**

Answer: Uses of Helium-

i) It is used for filling balloons and air ships as it is light and non combustible.

ii) It is used in producing inert in metallurgical operations and welding of metals.

Neon Uses-:

i) It is also used in television sets, spark plug, warning signals etc.
ii) It is also used in safety devices, electrical instruments like voltage stabilizer and rectifier's

Q7). Write the name and chemical formulae of one ore of zinc.? Define Quaternary ammonium salt.
Answer: Zinc belnde ZnS, calamine ZnCO3, Zincite ZnO, willemite ZnSO4.
Tetraalkylammonium halide are called quaternary ammonium salt.

Q8).

$$K_2Cr_2O_7 + 6KI + 7H_2SO_4 \longrightarrow 4K_2SO_4 + Cr_2(SO_4)_3 + 7H_2O + 3I_2$$

$$K_2Cr_2O_7 + 4H_2SO_4 + 3H_2S \longrightarrow K_2SO_4 + Cr_2(SO_4)_3 + 7H_2O + 3S$$

Q9) .
The property or phenomenon of certain organic substances to rotate the plane of plane polarized light towards right(clockwise) or left(anti-clockwise) through a certain angle is called optical activity.
Number of optical isomer of glucose is 24 = 16. As glucose has 4 asymmetric carbon atom.

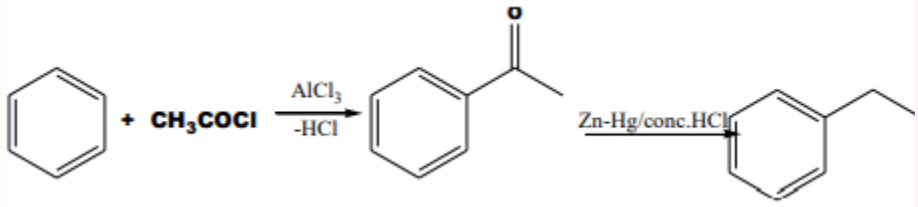
Q 10)

$$C_2H_5OH + H_2SO_4 \longrightarrow C_2H_5\text{-}O\text{-}SO_3H + H_2O$$

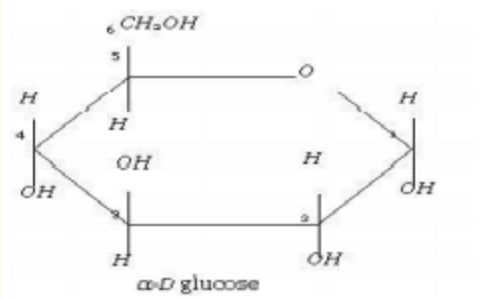
$$C_2H_5\text{-}O\text{-}SO_3H + C_2H_5OH \longrightarrow C_2H_5\text{-}O\text{-}C_2H_5 + H_2SO_4$$

As per the reaction above
Sulphuric acid regenerated in the second step is reused in the first step. Thus the small amount of sulphuric acid converts a large amount of ethyl alcohol into diethyl ether and the process becomes continuous. Hence it is called a continuous etherification process.

Q 11)



Q 12).



Hormones are chemicals released by the endocrine glands to control and regulate the activity of certain cells
and organs.

Q13)
. Silver- Metallic solid
P4 –Molecular solid
Diamond-Covalent solid ,
NaCl – Ionic solid

Q14.)
Molality-The number of moles of solute dissolved in 1 kg of a solvent is known as molarity.
Osmotic pressure- The excess of pressure on the side of the solution that stops the net flow of solvent into solution through a semipermeable membrane is called osmotic pressure.

Q.15. Flux:
In chemistry, flux refers to a substance that facilitates a chemical reaction by lowering the activation energy required for the reaction to occur. Fluxes are commonly used in metallurgy and welding, where they help in removing impurities and aiding in the fusion of materials. They can act as cleaning agents, promoting the removal of oxides and other contaminants from metal surfaces. Fluxes can also help in controlling the viscosity of molten materials and improving wetting between surfaces. Overall, fluxes play a crucial role in various industrial processes by enhancing the efficiency and quality of reactions.

Leaching Process:
Leaching is a process in which a solvent, often water or a leaching agent, is used to extract a substance from a solid material. This process is commonly employed

in hydrometallurgical extraction processes to recover metals from ores. In leaching, the solid material containing the desired substance is contacted with the solvent, allowing the target component to dissolve and form a solution. The solution, containing the dissolved substance, is then separated from the solid residue, which typically consists of the remaining insoluble materials and impurities. Leaching can be conducted through various methods such as heap leaching, in situ leaching, and agitation leaching, depending on the specific requirements of the extraction process and the characteristics of the solid material.

Q.16. Sulphurous Acid:
Sulphurous acid (\(H_2SO_3\)) is a weak acid that forms when sulphur dioxide (\(SO_2\)) dissolves in water. However, it is unstable in aqueous solution and exists predominantly as sulfite ions (\(SO_3^{2-}\)). Here's the structure of sulphurous acid:

```plaintext
      O
      |
  H - S - OH
      |
      OH
```

Nitrogen Pentahalides:
Nitrogen does not form pentahalides due to its inability to expand its valence shell beyond eight electrons. Nitrogen, in its ground state, has three unpaired electrons in its 2p orbitals. To form pentahalides, nitrogen would have to utilize its d orbitals for bonding, which it cannot do because it lacks d orbitals in its valence shell. As a result, nitrogen primarily forms compounds with a maximum coordination number of four.

Q.17. Lanthanoids and Transition Metals:
The general electronic configuration of lanthanoids is \([Xe] 4f^n 5d^1 6s^2\) where \(n\) varies from 1 to 14.

Most compounds of transition metals are colored due to the presence of partially filled d orbitals in their electronic configuration. When light strikes these compounds, it causes electrons in the d orbitals to transition between energy levels. This transition of electrons absorbs certain wavelengths of light, resulting in the complementary color being observed. The specific color depends on the arrangement of d electrons in the transition metal ion and the ligands surrounding it.

Q.18. Effective Atomic Number (e.a.n) and Ionisation Isomerism:
The effective atomic number (e.a.n) is the sum of the atomic number of the metal and the number of electrons donated by ligands to the metal ion in a complex.

For $[Cu(NH_3)_4]^{2+}$:
- Atomic number of Cu = 29
- Each ammonia (NH_3) molecule donates one electron pair to copper, so the number of electrons donated by four ammonia molecules is 4 * 2 = 8.
- Therefore, the effective atomic number of copper in the complex is $29 + 8 = 37$.

Ionisation isomerism occurs in coordination compounds when the same ligands can be bonded to the metal atom either through the ligand's donor atom or through its counter ion. For example, in the complex $[Co(NH_3)_5SO_4]Br$, the ligand can be SO4^2- in one isomer and NH3 in the other.

Q.19. Chemical Reactions of Chlorobenzene:
a. **Sulphonation:** $C_6H_5Cl + H_2SO_4 \rightarrow C_6H_5SO_3H + HCl$
b. **Acetylation:** $C_6H_5Cl + CH_3COOH \rightarrow C_6H_5COCH_3 + HCl$
c. **Nitration:** $C_6H_5Cl + HNO_3 \rightarrow C_6H_5NO_2 + HCl$

Q.20. Preparation of Ethanol:
a. From Ethanal: Ethanol can be prepared by reducing ethanal using reducing agents like sodium borohydride ($NaBH_4$) or lithium aluminum hydride ($LiAlH_4$).
b. From Ethene: Ethanol can be prepared by the hydration of ethene in the presence of an acid catalyst, such as concentrated sulfuric acid or phosphoric acid.

c. From Bromoethane: Ethanol can be prepared by the reaction of bromoethane with a strong base like sodium hydroxide, followed by hydrolysis of the intermediate ether formed.

Q.21. **Distinguishing Nitroalkanes using HNO2:**
Primary nitroalkanes react with HNO2 to form alcohols. Secondary nitroalkanes react with HNO2 to form ketones. Tertiary nitroalkanes do not react with HNO2 under normal conditions.

Q.22. **Monosaccharides and Denaturation of Proteins:**
Monosaccharides are the simplest form of carbohydrates, consisting of a single sugar molecule. They cannot be hydrolyzed to simpler sugars.

Denaturation of proteins refers to the disruption of the protein's native structure, leading to loss of its biological activity. This can be caused by various factors such as heat, pH changes, or the presence of denaturing agents like urea or guanidine hydrochloride. Denaturation typically involves the unfolding of the protein's secondary, tertiary, and quaternary structures while leaving the primary structure intact.

Q.23. **Non-Biodegradable Polymer and Preparation of Terylene:**
Non-biodegradable polymers are synthetic polymers that cannot be broken down by natural processes into simpler compounds. They persist in the environment for long periods, causing pollution.

Terylene, a type of polyester, is prepared by the condensation polymerization of ethylene glycol and terephthalic acid.

Q.24. **Soaps, Preparation of Soaps, and Antiseptic:**
Soaps are sodium or potassium salts of fatty acids. They are prepared by the saponification of fats or oils with a strong base, such as sodium hydroxide or potassium hydroxide.

Antiseptics are chemical substances that are applied to living tissues to prevent infection by inhibiting the growth of microorganisms. They are often used topically to clean wounds or disinfect skin surfaces.

Q.25. **Type of Crystal Lattice:**

Given:

Given:

Edge length (a) = 288 pm = 288×10^{-10} m

Density (ρ) = 7.86 g/cm³ = 7.86×10^{3} kg/m³

Atomic mass (M) = 56 g/mol

The formula to calculate the number of atoms per unit cell (n) is given by:

$$n = \frac{\text{Density} \times N_A}{\text{Atomic mass} \times \text{Volume of unit cell}}$$

Where N_A is Avogadro's number and the volume of the unit cell (V) is calculated using a as $V = a^3$.

Once n is determined, it helps to identify the crystal lattice type.

Q.26. **Instantaneous Rate of Reaction and Pseudo First Order Reaction:**

Instantaneous rate of reaction refers to the rate of reaction at a specific moment in time, usually at the beginning of the reaction when the reactants are in excess and the rate is highest.

A pseudo first-order reaction is a reaction that appears to be first-order with respect to one of the reactants, even though the overall reaction may not be first-order. This can occur when one reactant is present in large excess compared to the other reactant(s), causing its concentration to remain approximately constant throughout the reaction. As a result, the rate of the reaction appears to depend only on the concentration of the other reactant(s), leading to a pseudo first-order kinetics. An example of a pseudo first-order reaction is the hydrolysis of esters in the presence of excess water.