CBSE Class 12

Chemistry

Previous Year Question Paper 2020

Set- 1 **Code no: 56/1/1**

- Please check that this question paper contains 21 printed pages + Maps.
- Code number given on the right-hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 31 questions.
- Please write down the Serial Number of the question in the answer-book before attempting it.
- 15-minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

CHEMISTRY

Time Allowed: **3** hours Maximum Marks: **70**

General Instructions:

- Read the following instructions very carefully and strictly follow then:
- This question paper comprises four Sections - **A, B, C** and **D**. There are 37 questions in the question paper. All questions are compulsory.
- **Section A** - Questions no. **1** to **20** a very short answer type question carrying I mark each. Answer these questions in one word or one sentence.
- **Section B** - Questions no. **21** to **27** are short answer type questions, carrying **2** marks each.

- **Section C** - Questions no. **28** to **34** are long answer type-I questions, carrying **3** marks each.
- **Section D** - Questions no. **35** to **37** are long answer type.11 questions, carrying **5** marks each.
- There is no overall choice in the question paper. However, an internal choice has been provided in 2 questions of two marks, 2 questions of three marks and all the 3 questions of five marks. You must attempt only one of the choices in such questions.
- In addition to this. separate instructions are given with each section and question, wherever necessary.
- Use of calculators and log tables is not permitted.

SECTION - A

Read the given passage and answer the questions number 1 to 5 that follow: 1x5=5 Marks

The substitution reaction of alkyl halide mainly occurs by SN1 or SN2 mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of SN1 reactions are governed by the stability of carbocation whereas for SN2 reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factors and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

1. Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes substitution reaction by SYI mechanism. 1 Mark

Ans: SN1 mechanism consists of two steps. In first step, C-X bond of tertiary alkyl halide undergoes heterolysis to form the carbocation. The carbocation formed is planar. In the second step, the attachment of carbocation to the nucleophile takes place. Thus, two products are formed as per attachment of Nu^-. Thus, if the reactant is optically active, then due to opposite attachments of Nu^- to the carbocation, racemic mixture with two opposite orientations (+ and -) is formed.

2. Name the instrument used for measuring the angle by which the plane polarised light is rotated. **1 Mark**

Ans: Polarimeter is the instrument used for measuring the angle by which the plane polarised light is rotated.

3. Predict the major product formed when $2-$Bromopentane reacts with alcoholic KOH. **1 Mark**

Ans: The major product formed when $2-$Bromopentane reacts with alcoholic KOH is Pent$-2-$ene. The following product is called Saytzeff's Product. The chemical reaction is given by:

$$CH_3CH(Br)CH_2CH_2CH_3+KOH_{(alc.)} \rightarrow CH_3CH=CHCH_2CH_3$$

4. Give one use of CHI_3. **1 Mark**

Ans: Iodoform (CHI_3), also called triiodomethane, a yellow, crystalline solid belonging to the family of organic halogen compounds, used as an antiseptic component of medications for minor skin diseases.

5. Write the structures of the products formed when anisole is treated with HI. **1 Mark**

Ans: The structures of the products formed when anisole is treated with HI is $C_6H_5OCH_3+HI \rightarrow C_6H_5OH+CH_3I$.

6. Identify which liquid will have a higher vapour pressure at $90°C$ if the boiling points of two liquids A and B are $140°C$ and $180°C$, respectively. **1 Mark**

Ans: Liquid A.

7. Out of zinc and tin, whose coating is better to protect iron objects? **1 Mark**

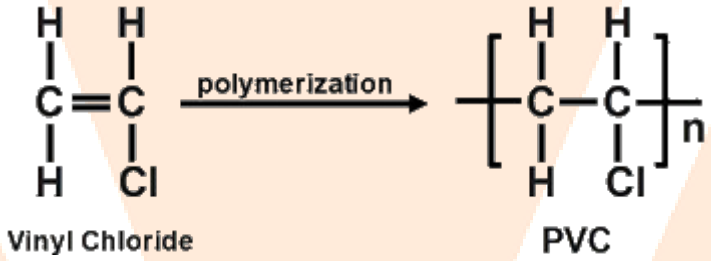
Ans: Zinc.

8. Will the rate constant of the reaction depend upon T if the E_{act}a (activation energy) of the reaction zero? 1 Mark

Ans: No, since it will not depend upon temperature.

9. Give the structure of the monomer of PVC. 1 Mark

Ans:



Vinyl Chloride PVC

10. Which structural unit present in a detergent makes it non-biodegradable? 1 Mark

Ans: Branching in the hydrocarbon part of Detergents makes it non biodegradable.

11.Out of the following, the strongest base in aqueous solution is: 1 Mark

A. Methylamine.

B. Himethylamine.

C. Thmethylamine.

D. Aniline.

Ans: Option A is the correct answer i.e., Methylamine is the strongest base in aqueous solution.

12. Iodoform test is not given by 1 Mark

A. Ethanal.

B. Ethanol.

C. Pentan-2-ono.

D. Pentan-3-one.

Ans: Option D is the correct answer i.e., Iodoform test is not given by Pent−3−one.

13. Out of the following transition elements, the maximum number of oxidation states are shown by **1 Mark**

A. $\mathbf{Sc(Z=21)}$

B. $\mathbf{Cr(Z=24)}$

C. $\mathbf{Mn(Z=25)}$

D. $\mathbf{Fe(Z=26)}$

Ans: Option C is the correct answer i.e., $Mn(Z=25)$.

14. Hardening of leather in tanning industry is based on: **1 Mark**

A. Electrophoresis.

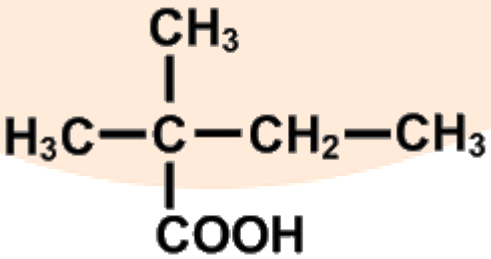
B. Electro-osmotic.

C. Mutual coagulation.

D. Tyndall effect.

Ans: Option C is the correct answer i.e., Mutual coagulation.

15. What is the correct IUPAC name of the given compound? **1 Mark**



A. 2,2 – Dimethyl butanoic acid.

B. 2 – Carboxyl –2 – methylbulane.

C. 2 – Ethyl –2 – methylpropanoic acid.

D. 3 – Methylbutane carboxylic acid.

Ans: Option A is the correct answer i.e., $2,2-$ Dimethyl butanoic acid.

For questions number 16 to 20. two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below:

1x5=5 Marks

Both Assertion and reason are correct, and reason is the correct explanation for assertion.

Both Assertion and reason are correct, but reason is not the correct explanation for assertion.

Assertion is correct but Reason is incorrect.

Both assertion and reason are incorrect.

16. Assertion (A): Au and Ag are extracted by leaching their ores with a dil. solution of NaCN.

Reason (R): Impurities associated with these ores dissolve in NaCN.

1 Mark

Ans: The process of leaching used for extraction of gold is known as the MacArthur Forrest Cyanide process. In this process, concentrated ore of gold is taken in large amounts made of cement or iron and is then treated with a dilute solution of KCN in the presence of air forming a soluble gold complex.

Therefore, the correct answer is option C i.e., assertion is correct, but reason is incorrect.

17. Assertion(A): F- F bond in F_2 the molecule is weak.

Reason (R): F atom is small. **1 Mark**

Ans: Lower value of bond dissociation energy of fluorine is due to the high interelectronic repulsions between non-bonding electrons of the 2p orbital of small sized fluorine. As a result, the Fluorine-Fluorine bond is weaker in comparison to Chlorine-Chlorine and Bromine-Bromine bonds.

Therefore, the correct answer is option C i.e., assertion is correct, but reason is incorrect.

18. Assertion (A): Linkage isomerism arises in coordination compounds because of ambidentate ligands.

Reason (R): Ambidentate ligand like NO_2 has two different donor atoms i.e., N and O. **1 Mark**

Ans: Assertion and reason both are correct, and reason is correct explanation of assertion. Linkage isomerism arises in a coordination compound which contains the ambidentate ligand since ambidentate ligands have two differ donor atoms. e.g., SCN, NO_2 etc.

Therefore, the correct answer is option A i.e., both Assertion and reason are correct, and reason is the correct explanation for assertion.

19. Assertion (A): Sucrose is a nonreducing sugar.

Reason (R): Sucrose has glycosidic linkage. **1 Mark**

Ans: Sucrose is made up of two monosaccharides: Glucose and Fructose. Since the reducing groups of glucose and fructose which are free from ketone and aldehyde groups which are involved in glycosidic formation of bonds which aren't available since sucrose is non reducing sugar.

Therefore, the correct answer is option A i.e., both assertion and reason are correct, and reason is the correct explanation for assertion.

20. Assertion (A): The molecularity of the reaction $H_2 + Br_2 \rightarrow 2HBr$ appears to be 2.

Reason (R): Two molecules of the reactants are involved in the given elementary reaction. **1 Mark**

Ans: Molecularity of reaction is the no. of molecules acting in the rate determining step while order of reaction is the sum of all powers to which concentration are raised in the rate law expression.

Therefore, the correct answer is option B i.e., both Assertion and reason are correct, but reason is not the correct explanation for assertion.

SECTION - B

21. Define the following terms:

A. Tranquilizers **1 Mark**

Ans: Tranquilizers can also refer to anti-anxiety medication. Tranquilizers are chemical compounds that are so useful for stress treatment and either for mild or severe mental diseases.

B. Antiseptic **1 Mark**

Ans: An antiseptic refers to a substance which either stops or helps in slowing down the growth of the microorganisms. Some of the antiseptics have a germicidal nature, which means that they can destroy the microbes. These kinds of antiseptics are called bactericidal antiseptics.

Or

Explain the cleansing action of soaps. **2 Marks**

Ans: Soaps can lower the surface tension of water and form an emulsion with the oily dirt present in water. When soap is added to dirty water then the hydrophobic part of the soap gets attached to the dirt while the hydrophilic part remains in contact with the water molecules. This forms a colloidal solution, and the trapped dirt can be easily rinsed off.

22. For 5% solution of urea Molar mass = 60 g / mol, calculate the osmotic pressure at 300K. $\left[\mathbf{R = 0.0821\ L\ atm\ K^{-1}mol^{-1}}\right]$ **2 Marks**

Ans: Here we have given 5% urea solution which means $5g$ urea is present in the 100ml solution. Also, Molar mass=60g/mole; T=300K and R=0.0821 L atm K^{-1} $mole^{-1}$

Now to calculate osmotic pressure we know the formula π=CRT where

$$\text{Concentration}(C)=\frac{\text{Given Mass}}{\text{Molar Mass}}=\frac{5}{60}\times\frac{1000}{100}=0.83$$

$\Rightarrow \pi=0.83\times0.0821\times300=20.44\text{atm}$

Therefore, for 5% solution of urea Molar mass =60g/mole, the osmotic pressure at 300K is 20.44atm.

Or

Visha took two aqueous solutions one containing 7.5 g of urea (Molar mass = 60g / mol) and the other containing 42.75 g of substance Z in 100 g of water, respectively. It was observed that both the solutions froze at the same temperature. Calculate the molar mass of Z. 2 Marks

Ans: Here we have given the mass of water (w_2)=100g; the mass of urea (w_1)=7.5g; the mass of Z (w_3)=42.75g; the molar mass of urea is 60g/mol.

The formula here is $\text{Molality}=\frac{\text{Moles of Solute}}{\text{Weight of Solvent}}$

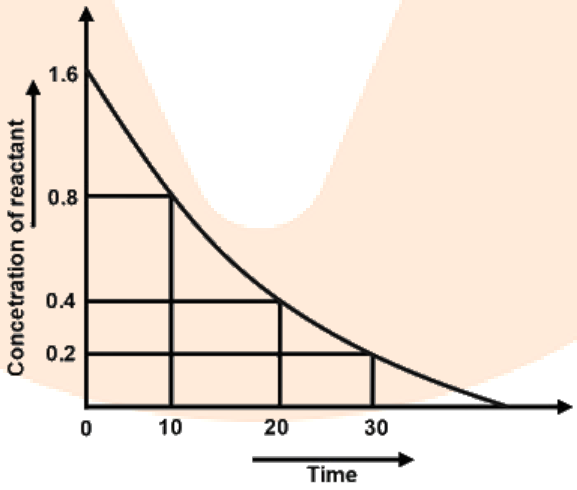
$$\Rightarrow \frac{w_1\times 1000}{Mm_1\times w_2}=\frac{w_3\times 1000}{Mm_1\times w_2}$$

On further solving we get; $Mm=\frac{w_3\times Mm_1}{w_1}$

$$\Rightarrow \frac{42.75\times 60}{7.5}=342\text{g/mol}$$

Therefore, the molar mass of Z is 342g/mol.

23. Analyze the given graph, drawn between the concentration of reactant vs. time.



A. Predict the order of the reaction. 1 Mark

Ans: We can see with an increase in time the concentration of reactant decreases exponentially so, the reaction is a first-order reaction.

B. Theoretically, can the concentration of the reactant reduce to zero after infinite time? Explain. **1 Mark**

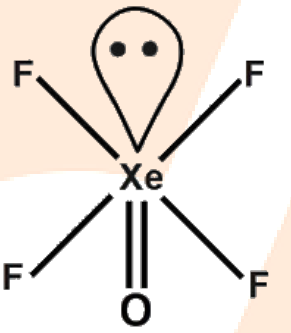
Ans: Theoretically, the concentration of reactant can reduce to zero after infinite time. Since the first-order reaction is given by: $[A]=[A]_0 e^{-kt}$ and when reaction completes, we get; $[A]=0$ but $[A]_0 \neq 0$.

When $\Rightarrow e^{-kt}=0$, t is infinite. Therefore, theoretically, the concentration of reactant can reduce to zero after infinite time.

24. Draw the shape of the following molecules:

A. $XeOF_4$ **1 Mark**

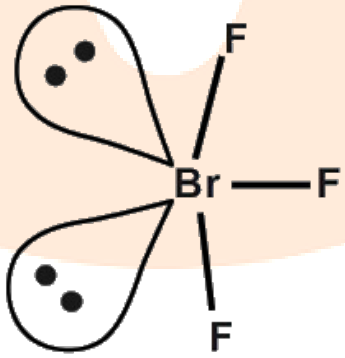
Ans: Shape/Structure of $XeOF_4$ molecule:



Square pyramidal

B. BrF_3 **1 Mark**

Ans: Shape/Structure of BrF_3 molecule:



Bent T-shaped

25. Give the formulae of the following compounds:

A. Potassium tetrahydroxidoxincate (II) **1 Mark**

Ans: The formula for Potassium tetrahydroxidoxincate

(II) i $K_2\left[Zn(OH)_4\right]^{-2}$.

B. Hexaammineplatinum (IV) chloride **1 Mark**

Ans: The formula for Hexaammineplatinum (IV) chloride is $\left[Pt(NH_3)_6\right]Cl_4$.

26. What happens when:

A. Propanone is treated with methyl magnesium iodide and then hydrolyzed, and **1 Mark**

Ans: When propanone is treated with methyl magnesium iodide and then hydrolyzed the product formed is Tert-butyl alcohol. The reaction is given by:

$$\underset{\text{Propanone}}{CH_3\text{-}CO\text{-}CH_3} + \underset{\text{Methyl Magnesium Iodide}}{CH_3MgI} \xrightarrow{\text{Hydrolyzed}(H_3O^+)} \underset{\text{Tert-butyl alcohol}}{(CH_3)_3\text{-}C\text{-}OH}$$

B. Benzene is treated with CH_3COCl in presence of anhydrous $AlCl_3$ **1 Mark**

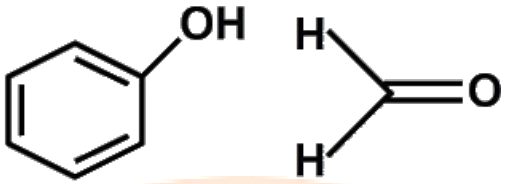
Ans: When benzene is treated with CH_3COCl in presence of anhydrous $AlCl_3$ the product formed is acetophenone. The reaction is given by

$$\underset{\text{Benzene}}{C_6H_6} + CH_3COCl \xrightarrow{\text{Anhyd.}AlCl_3} \underset{\text{Acetophenone}}{C_6H_5COCH_3} + HCl$$

27. Write the names and structures of monomers in the following polymers:

A. Bakelite. **1 Mark**

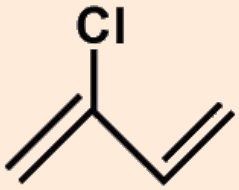
Ans: Bakelite is a phenol-formaldehyde polymer. Thus, the monomers of Bakelite are phenol and formaldehyde. The structure of monomers is given by:



Phenol Formaldehyde

B. Neoprene. **1 Mark**

Ans: Neoprene is produced by the polymerization of chloroprene. The structure of monomers is given by:



Chloroprene

SECTION - C

28. Give the structures of A and B in the following sequence of reactions:

A. $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow{NaOBr} B$ **1 Mark**

Ans: $CH_3COOH \xrightarrow[\Delta]{NH_3} \underset{(A)}{CH_3CONH_2} \xrightarrow{NaOBr} \underset{(B)}{CH_3NH_2}$

B. $C_6H_5NO_2 \xrightarrow[HCl]{Fe} A \xrightarrow[0^0-5^0C]{NaNO_2+HCl} B$ **1 Mark**

Ans: $C_6H_5NO_2 \xrightarrow[HCl]{Fe} \underset{(A)}{C_6H_5NH_2} \xrightarrow[0^0-5^0C]{NaNO_2+HCl} \underset{(B)}{C_6H_5N_2Cl}$

C. $C_6H_6N_2^+Cl^- \xrightarrow[\Delta]{CuCN} A \xrightarrow[H^+]{H_2O} B$ **1 Mark**

Ans: $C_6H_6N_2^+Cl^- \xrightarrow[\Delta]{CuCN} \underset{(A)}{C_6H_6CN} \xrightarrow[H^+]{H_2O} \underset{(B)}{C_6H_6COOH}$

Or

A. How will you distinguish between the following pairs of compounds?

(i) Aniline and Ethanamine. **1 Mark**

Ans: Both aniline and Ethanamine can be distinguished by adding of cold ice after phenol or beta naphthol are added.

Aniline: $C_6H_5\text{-}\overset{gg}{N}H_2 \xrightarrow{HNO_2} \underset{\text{Diazonium}}{C_6H_5\text{-}\overset{+}{N}_2}\ \underset{\text{Salt}}{\overset{-}{Cl}}.$

Ethanamine:

$CH_3CH_2\text{-}\overset{gg}{N}H_2 \xrightarrow{HNO_2} CH_3CH_2\text{-}\overset{+}{N}_2\overset{-}{Cl} \xrightarrow[\text{dil.NaOH}]{\text{Ph-}\overset{+}{N}_2\overset{-}{Cl}}$ Orange Dye.

(ii) Aniline and N-methylamine. **1 Mark**

Ans: $CHCl_3$ Both aniline and N-methylamine can be distinguished by adding and KOH for both compounds.

Aniline: $C_6H_5\text{-}\overset{gg}{N}H_2 \xrightarrow{HNO_2} \underset{\text{Diazonium}}{C_6H_5\text{-}\overset{+}{N}_2}\ \underset{\text{Salt}}{\overset{-}{Cl}}$

N-methylamine:

$C_6H_4\text{-}\overset{gg}{N}H\text{-}CH_3 \xrightarrow{HNO_2} C_6H_4\text{-}N(NO)\text{-}CH_3 \xrightarrow[\text{dil.NaOH}]{\text{Ph-}\overset{+}{N}_2\overset{-}{Cl}}$ Orange Dye.

B. Arrange the following compounds in decreasing order of their boiling points: Butanol, Butanamine, Butane **1 Mark**

Ans: The compounds in decreasing order of their boiling points are Butanol > Butanamine > Butane.

29. Give the plausible explanation for the following:

A. Glucose doesn't give $2,4-$DNP test. **1 Mark**

Ans: Glucose doesn't give $2,4-$DNP test since in glucose the group(-CHO) is involved in hemiacetal formation.

B. The two strands of DNA are not identical but are complementary. **1 Mark**

Ans: DNA strands are complementary due to the presence of hydrogen bonds between the specific bases. Adenine forms two hydrogen bonds with thymine while guanine forms three hydrogen bonds with cytosine.

C. Starch and cellulose both contain glucose units as monomers, yet they are structurally different. **1 Mark**

Ans: Starch is a polymer of alpha glucose while cellulose is a polymer of beta glucose.

30. Account for the following:

A. Sulphurous acid is a reducing agent. **1 Mark**

Ans: Since sulphur readily gets oxidized to achieve more stability i.e., +6 state.

B. Fluorine forms only one oxoacid. **1 Mark**

Ans: In absence of d orbital in fluorine, the fluorine forms only one oxoacid

C. The boiling point of noble gases increases from He to Rn. **1 Mark**

Ans: Size increases from He to Radon as well as dispersion along with van der Waal forces from Helium to radon.

Or

Complete the following chemical reactions:

A. $\mathbf{MnO_2 + 4HCl \rightarrow}$ **1 Mark**

Ans: $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

B. $\mathbf{XeF_6 + KF \rightarrow}$ **1 Mark**

Ans: $XeF_6 + KF \rightarrow K^+[XeF_7]^-$

C. $\mathbf{I^-_{(aq)} + H^+_{(aq)} + O_{2(g)} \rightarrow}$ **1 Mark**

Ans: $I^-_{(aq)} + H^+_{(aq)} + O_{2(g)} \rightarrow 2OH^-_{(aq)} + I_{2(s)} + O_{2(g)}$

31. Explain the role of the following:

A. NaCN in the separation of ZnS and PbS. **1 Mark**

Ans: NaCN does act as depressant for the separation of ZnS and PbS.

B. $\mathbf{SiO_2}$ **in the metallurgy of Cu containing Fe as impurity.** **1 Mark**

Ans: SiO_2 does act as flux in metallurgy of Cu containing Fe as impurity.

C. Iodine in the refining of Ti. **1 Mark**

Ans: Iodine is required to convert Titanium which turns into volatile compound in refining of Ti.

32. Give three points of difference between physisorption and chemisorption. 3 Marks

Ans: The difference between physisorption and chemisorption are:

Sr. No.	Physisorption	Chemisorption
1.	The reason behind physisorption is van der Waals forces.	The chemical bonds lead to chemisorption.
2.	The Physical adsorption is reversible in nature.	The chemical adsorption is irreversible in nature.
3.	It's not specific to nature.	Chemisorption is very specific in nature.

33.How will the rate of the reaction be affected when?

A. Surface area of the reactant is reduced 1 Mark

Ans: Decreasing since the surface area of reactant is lowered/reduced

B. Catalyst is added in a reversible reaction 1 Mark

Ans: Increasing since catalyst is added in reversible reaction.

C. Temperature of the reaction is increased 1 Mark

Ans: Increasing since temperature of the reaction is higher/increased

34. Calculate the mass of ascorbic acid (Vitamin C, $C_6H_8O_6$) to be dissolved in 75 g of acetic acid to lower its melting point by 1.5°C. $\left[K_f = 3.9\ K\ kg\ mol^{-1}\right]$. 3 Marks

Ans: Molar mass of ascorbic acid is given $= (6\times12)+(8\times1)+(6\times16)$

$\Rightarrow 176 gmol^{-1}$

We know that $\Delta T_b = \frac{K_b \times 1000 \times w_2}{M_2 \times w_1}$

Rearranging the equation, we get;

$$w_2 = \frac{\Delta T_b \times M_2 \times w_1}{K_b \times 1000} = \frac{1.5 \times 176 \times 75}{3.9 \times 1000} = 5.08g$$

Therefore, $5.08g$ if ascorbic acid is needed to be dissolved.

SECTION - D

35.

A. Calculate G^0 for reaction $Zn_{(s)} + Cu^{2+}_{(aq)} = Zn^{2+}_{(aq)} + Cu_{(s)}$;

Given: E^0 for $\frac{Zn^{2+}}{Zn} = -0.76V$ and E^0 for $\frac{Cu^{2+}}{Cu} = +0.34V$

$R = 8.314 JK^{-1}mol^{-1}$ and $F = 96500\ C\ mol^{-1}$ **3 Marks**

Ans: Here we know that $E^0_{Zn^{2+}|Zn}$ =-0.76V and $E^0_{Cu^{2+}|Cu}$ =+0.36V

Thus, $E^0_{Cell} = E^0_{Cu^{2+}|Cu} - E^0_{Zn^{2+}|Zn} = +0.34-(-0.76) = 1.10V$

Now, $\Delta G^0 = -nFE^0_{Cell}$ where n=96500 and n=2.

Thus, $\Delta G^0 = -2 \times 96500 \times 1.10 = 212300 J/mole$

$\Rightarrow \Delta G^0 = 212.3 KJ/mole$.

B. Give two advantages of fuel cells **2 Marks**

Ans: Advantages of fuel cells are

Fuel cells use fossil fuel efficiently.

Fuel Cells are less polluting since they cause less exhaust pollution.

Or

A. Out of the following pairs, predict with reason which pair will allow greater conduction of electricity:

(i) Silver wire at 30°C or silver wire at 60°C. **1 Mark**

Ans: Silver wire at 60°C will be having lower conduction of electricity since temperature increases as resistance increases and conduction decreases. Thus, lower temperature i.e., 30°C will be having greater conduction.

(ii) 0.1M CH_3COOH solution/1M CH_3COOH solution. 1 Mark

Ans: Since dilution degree of ionization increases hence conduction increases thus, 0.1M CH_3COOH will have greater conduction of electricity.

(iii) KCI solution at 20°C or KCI solution at 50°C. 1 Mark

Ans: Now at higher temperature ions mobility increases and thus, conductance increases for KCl solution at $50°C$ will have greater conduction of electricity.

B. Give two points of differences between electrochemical and electrolytic cells. 2 Marks

Ans: Electrochemical Cell: The anode is negative, and Cathode is positive. It converts chemical energy into electrical energy. Electrolytic Cell: The anode is positive, and cathode is negative. It converts electrical energy to chemical energy.

36.

A. Account for the following: 1x3=3 Marks

(i) Copper(I) compounds are whereas copper and compounds are colored.

Ans: There is absence of unpaired electrons meanwhile un Cu2+ compounds are coloured since there are unpaired electrons which acts as d-d transition.

(ii)Chromates change their colour when kept in an acidic solution.

Ans: The chromates change into dichromate ions in acidic condition thus the color is changed.

(iii) Zn, Cd, Hg are considered as d block elements but not as transition elements.

Ans: Because of a completely filled d orbital at oxidized state along with ground state whereas Zn, Cd, Hg is considered the d block element and not as transition elements.

B. Calculate the spin only moment of $CO^{2+}(Z=27)$ by writing the electronic configuration of CO and CO^{2+}. 2 Marks

Ans: $\mu=\sqrt{n(n+2)}=\sqrt{3(3+2)}=\sqrt{15}=3.2BM$

Or

A. Give three points of difference between lanthanoids and actinoids. **3 Marks**

Ans: The difference between lanthanoids and actinoids are:

Sr. No.	**Lanthanide**	**Actinoids**
1.	Most of the lanthanides aren't radioactive.	All the actinides are radioactive.
2.	Similarly, most of the lanthanide ions are colourless.	Actinoids have ions coloured and not colourless.
3.	Lanthanoids have a limited oxidation state.	Actinoids have a wide range of oxidation states.

B. Give reason and select one atom/ion which will exhibit the asked property.

(i) Sc^{3+} or Cr^{3+} (Exhibit diamagnetic behaviour). **1 Mark**

Ans: Only Sc^{3+} exhibits diamagnetic behaviour since absence of unpair electron.

(ii)Cr or Cu (High melting and boiling point). **1 Mark**

Ans: Cr having higher melting and boiling point since presence of higher intermetallic bonding.

37.

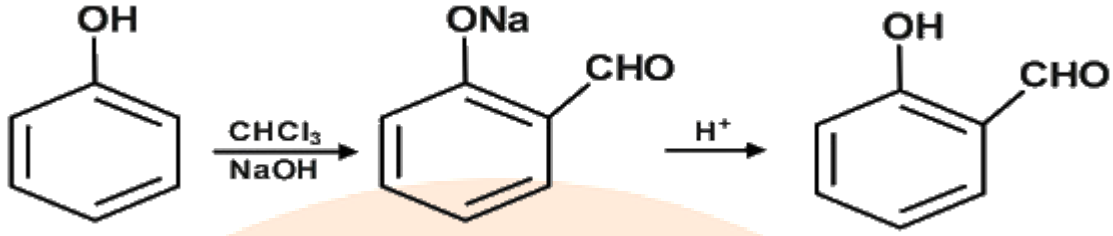
A. Out of t-butyl alcohol and n-butanol, which one will undergo acid catalyzed dehydration faster and why? **2 Marks**

Ans: t-butyl alcohol goes through acid catalyzed dehydration faster since it forms 3° carbocation more stable than 1° carbocation.

B. Carry out the following conversions:

(i) Phenol to Salicylaldehyde. **1 Mark**

Ans: Phenol to Salicylaldehyde:



(ii)t-butyl chloride to t-butyl ethyl ether. **1 Mark**

Ans:t-butyl chloride to t-butyl ethyl ether:

$$(CH_3)_3CCl + NaOH_{(aq)} \xrightarrow{C_2H5Cl} (CH_3)_3COC_2H_5$$

(iii) Propene to Propanol. **1 Mark**

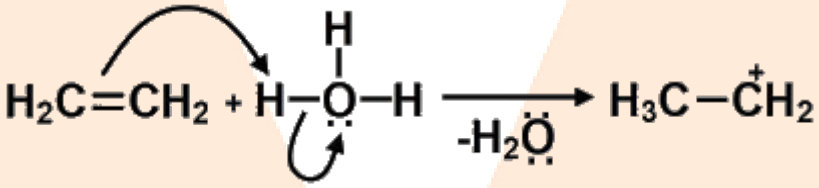
Ans: Propene to Propanol:

$$CH_3CH=CH_2 \xrightarrow[B_2H_6]{H_2O_2/OH^-} CH_3CH_2CH_2OH$$

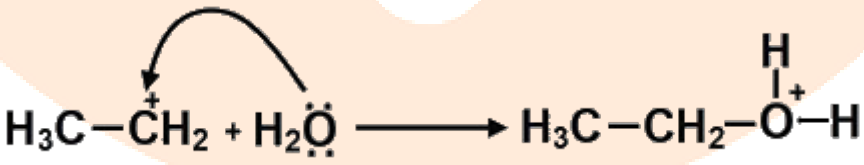
Or

A. Give the mechanism for formation of ethanol from ethene. **2 Marks**

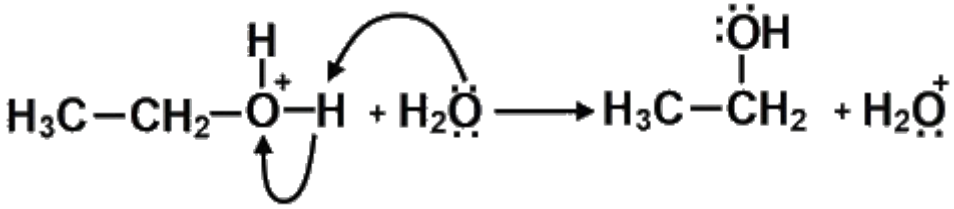
Ans: Step I: First step is protonation of ethene to form carbocation with the help of electrophilic attack of H_3O^+.



Step II: Nucleophilic attack on carbocation by water.



Step III: To form Alcohol(ethanol): Deprotonation.



B. Predict the reagent for carrying out the following conversions:

(i) Phenol to benzoquinone. **1 Mark**

Ans: The reagent for Phenol to benzoquinone is $K_2Cr_2O_7+H_2SO_4$ and $Na_2Cr_2O_7+H_2SO_4$

(ii) Anisole to p-bromoanisole. **1 Mark**

Ans: The reagent for Anisole to p-bromoanisole is Br_2 in CH_3COOH.

(iii) Phenol to $2,4,6-$ tribromophenol. **1 Mark**

Ans: The reagent for Phenol to 2,4,6- tribromophenol is $Br_{2(aq)}$ or bromine water.