SOLVED PAPER with CBSE Marking Scheme	C.B.S.E. 2018 Class–XII Delhi / Outside Delhi	Chemistry

Time allowed : 3 Hours **Max. Marks : 70**

General Instructions :

(i) ***All*** *questions are compulsory.*
(ii) *Questions number* ***1*** *to* ***5*** *are very short answer questions and carry* ***1*** *mark each.*
(iii) *Questions number* ***6*** *to* ***10*** *are short answer questions and carry* ***2*** *marks each.*
(iv) *Questions number* ***11*** *to* ***22*** *are also short answer questions and carry* ***3*** *marks each.*
(v) *Question number* ***23*** *is a value based question and carries* ***4*** *marks.*
(vi) *Questions number* ***24*** *to* ***26*** *are long answer questions and carry* ***5*** *marks each.*
(vii) *Use log tables, if necessary. Use of calculators is* ***not*** *allowed.*

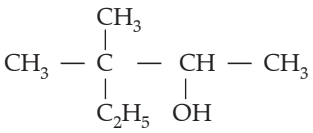
1. Analysis shows that FeO has a non-stoichiometric composition with formula $Fe_{0.95}O$. Give reason. **1**

2. CO (g) and H_2 (g) react to give different products in the presence of different catalysts. Which ability of the catalyst is shown by these reactions ? **1**

3. Write the coordination number and oxidation state of Platinum in the complex $[Pt(en)_2Cl_2]$. **1**

4. Out of chlorobenzene and benzyl chloride, which one gets easily hydrolysed by aqueous NaOH and why ? **1**

5. Write the IUPAC name of the following :



1

6. Calculate the freezing point of a solution containing 60 g of glucose (Molar mass = 180 g mol^{-1}) in 250 g of water. (K_f of water = 1.86 K kg mol^{-1}) **2**

7. For the reaction

$$2N_2O_5\,(g) \longrightarrow 4NO_2\,(g) + O_2\,(g),$$

the rate of formation of NO_2 (g) is 2.8×10^{-3} M s^{-1}. Calculate the rate of disappearance of N_2O_5 (g). **2**

8. Among the hydrides of Group-15 elements, which have the

(a) lowest boiling point ?
(b) maximum basic character ?
(c) highest bond angle ?
(d) maximum reducing character ? **2**

9. How do you convert the following ?

(a) Ethanal to Propanone
(b) Toluene to Benzoic acid **2**

OR

Account for the following :

(a) Aromatic carboxylic acids do not undergo Friedel-Crafts reaction.
(b) pK_a value of 4-nitrobenzoic acid is lower than that of benzoic acid. **2**

10. Complete and balance the following chemical equations :

(a) $Fe^{2+} + MnO_4^- + H^+ \longrightarrow$

(b) $MnO_4^- + H_2O + I^- \longrightarrow$ **2**

11. Give reasons for the following :

(a) Measurement of osmotic pressure method is preferred for the determination of molar masses of macromolecules such as proteins and polymers.

(b) Aquatic animals are more comfortable in cold water than in warm water.

(c) Elevation of boiling point of 1 M KCl solution is nearly double than that of 1 M sugar solution. **3**

12. An element 'X' (At. mass = 40 g mol^{-1}) having f.c.c. structure, has unit cell edge length of 400 pm. Calculate the density of 'X' and the number of unit cells in 4 g of 'X'. ($N_A = 6.022 \times 10^{23}$ mol^{-1}) **3**

13. A first order reaction is 50% completed in 40 minutes at 300 K and in 20 minutes at 320 K. Calculate the activation energy of the reaction. (Given : log 2 = 0.3010, log 4 = 0.6021, R = 8.314 $JK^{-1}mol^{-1}$) **3**

14. What happens when

(a) a freshly prepared precipitate of $Fe(OH)_3$ is shaken with a small amount of $FeCl_3$ solution ?

(b) persistent dialysis of a colloidal solution is carried out ?

(c) an emulsion is centrifuged ? **3**

15. Write the chemical reactions involved in the process of extraction of Gold. Explain the role of dilute NaCN and Zn in this process. **3**

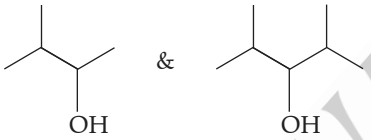
16. Give reasons :

(a) E° value for Mn^{3+}/Mn^{2+} couple is much more positive than that for Fe^{3+}/Fe^{2+}.

(b) Iron has higher enthalpy of atomization than that of copper.

(c) Sc^{3+} is colourless in aqueous solution whereas Ti^{3+} is coloured. **3**

17. **(a)** Identify the chiral molecule in the following pair :



(i) **(ii)**

(b) Write the structure of the product when chlorobenzene is treated with methyl chloride in the presence of sodium metal and dry ether.

(c) Write the structure of the alkene formed by dehydrohalogenation of 1-bromo-1-methylcyclohexane with alcoholic KOH. **3**

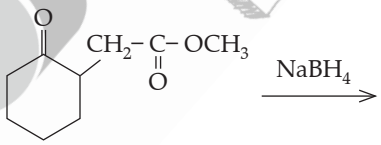
18. (A), (B) and (C) are three non-cyclic functional isomers of a carbonyl compound with molecular formula C_4H_8O. Isomers (A) and (C) give positive Tollens' test whereas isomer (B) does not give Tollens' test but gives positive Iodoform test. Isomers (A) and (B) on reduction with Zn(Hg)/conc. HCl give the same product (D).

(a) Write the structures of (A), (B), (C) and (D).

(b) Out of (A), (B) and (C) isomers, which one is least reactive towards addition of HCN ? **3**

19. Write the structures of the main products in the following reactions : **3**

(i)



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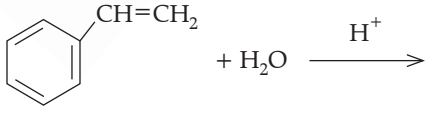

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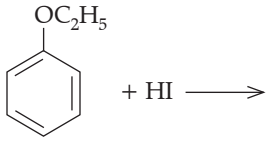


20. **(a)** Why is bithional added to soap ?

(b) What is tincture of iodine ? Write its one use.

(c) Among the following, which one acts as a food preservative ?

Aspartame, Aspirin, Sodium Benzoate, Paracetamol **3**

21. Define the following with an example of each :

(a) Polysaccharides

(b) Denatured protein

(c) Essential amino acids **3**

OR

(a) Write the product when D-glucose reacts with conc. HNO_3.

(b) Amino acids show amphoteric behaviour. Why ?

(c) Write one difference between α-helix and β-pleated structures of proteins. **3**

22. **(a)** Write the formula of the following coordination compound :

Iron(III) hexacyanoferrate(II)

(b) What type of isomerism is exhibited by the complex $[Co(NH_3)_5Cl]SO_4$?

(c) Write the hybridisation and number of unpaired electrons in the complex $[CoF_6]^{3-}$. (Atomic No. of Co = 27) **3**

23. Shyam went to a grocery shop to purchase some food items. The shopkeeper packed all the items in polythene bags and gave them to Shyam. But Shyam refused to accept the polythene bags and asked the shopkeeper to pack the items in paper bags. He informed the shopkeeper about the heavy penalty imposed by the government for using polythene bags. The shopkeeper promised that he would use paper bags in future in place of polythene bags.

Answer the following :

(a) Write the values (at least two) shown by Shyam.

(b) Write one structural difference between low-density polythene and high-density polythene.

(c) Why did Shyam refuse to accept the items in polythene bags ?

(d) What is a biodegradable polymer ? Give an example. **4**

24. **(a)** Give reasons :

(i) H_3PO_3 undergoes disproportionation reaction but H_3PO_4 does not.

(ii) When Cl_2 reacts with excess of F_2, ClF_3 is formed and not FCl_3.

(iii) Dioxygen is a gas while Sulphur is a solid at room temperature.

(b) Draw the structures of the following :

(i) XeF_4

(ii) $HClO_3$ **5**

OR

(a) When concentrated sulphuric acid was added to an unknown salt present in a test tube a brown gas (A) was evolved. This gas intensified when copper turnings were added to this test tube. On cooling, the gas (A) changed into a colourless solid (B).

(i) Identify (A) and (B).

(ii) Write the structures of (A) and (B).

(iii) Why does gas (A) change to solid on cooling ?

(b) Arrange the following in the decreasing order of their reducing character :

HF, HCL, HBr, HI

(c) Complete the following reaction :

$XeF_4 + SbF_5 \longrightarrow$ **5**

25. **(a)** Write the cell reaction and calculate the e.m.f. of the following cell at 298 K :

Sn (s) | Sn^{2+} (0.004 M) || H^+ (0.020 M) | H_2 (g) (1 bar) | Pt (s)

(Given : $E^\circ_{Sn^{2+}/Sn} = -0.14V$)

(b) Give reasons :

(i) On the basis of E° values, O_2 gas should be liberated at anode but it is Cl_2 gas which is liberated in the electrolysis of aqueous NaCl.

(ii) Conductivity of CH_3COOH decreases on dilution. **5**

OR

(a) For the reaction

$2AgCl(s) + H_2(g)\ (1\ atm) \longrightarrow 2Ag(s) + 2H^+\ (0.1\ M) + 2Cl^-(0.1\ M)$,

$\Delta G^\circ = -43600$ J at 25°C.

Calculate the e.m.f. of the cell.

$[\log 10^{-n} = -n]$

(b) Define fuel cell and write its two advantages. **5**

26. **(a)** Write the reactions involved in the following :

(i) Hofmann bromamide degradation reaction

(ii) Diazotisation

(iii) Gabriel phthalimide synthesis

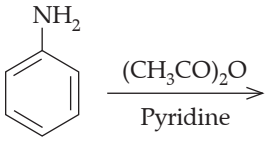
(b) Give reasons :

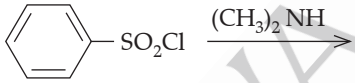
(i) $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution.

(ii) Aromatic diazonium salts are more stable than aliphatic diazonium salts. **3+2=5**

OR

(a) Write the structures of the main products of the following reactions :

(i) 

(ii) 

(iii) 

(b) Give a simple chemical test to distinguish between Aniline and N,N-dimethylaniline.

(c) Arrange the following in the increasing order of their pK_b values :

$C_6H_5NH_2$, $C_2H_5NH_2$, $C_6H_5NHCH_3$ **5**

●●

CBSE Marking Scheme (Issued by Board)

1. Shows metal deficiency defect / It is a mixture of Fe^{2+} and Fe^{3+}/Some Fe^{2+} ions are replaced by Fe^{3+} / Some of the ferrous ions get oxidised to ferric ions. **1**

2. Selectivity of the catalyst. **1**

3. Coordination Number = 6 , Oxidation State = +2 **[CBSE Marking Scheme, 2018]** ½, ½

Detailed Answer :

Coordination number = Denticity × Number of ligand

= 2×2 + 2×1 = 6

Charge on complex = 0

Therefore, [x+(0×2) + (–1×2)] = 0

x = +2

Oxidation state of Pt = +2 ½ + ½

4. Benzyl chloride ;

Due to resonance, stable benzyl carbocation is formed. **1**

5. 3,3 - Dimethylpentan-2-ol **1**

6. $\Delta T_f = K_f m$

$= K_{fx} \times \frac{w_2 \times 1000}{M_2 \times w_1}$

$= \frac{1.86 \times 60 \times 1000}{180 \times 250}$

= 2.48 K

$\Delta Tf = T_f^o - T_f$

2.48 = 273.15 - T_f

T_f = 273.15 – 2.48 = 270.67 K **2**

7. $\text{Rate} = \frac{1}{4}\frac{\Delta NO_2}{\Delta(t)} = \frac{1}{2}\frac{\Delta(N_2O_5)}{\Delta(t)}$

$\frac{1}{4}\left(2.8\times10^{-3}\right) = -\frac{1}{2}\frac{\Delta(N_2O_5)}{\Delta(t)}$

Rate of disappearance of N_2O_5 $\left(-\frac{\Delta N_2O_5}{\Delta(t)}\right)$ 1.4×10^{-3} M/s

(Deduct half mark if unit is wrong or not written) **2**

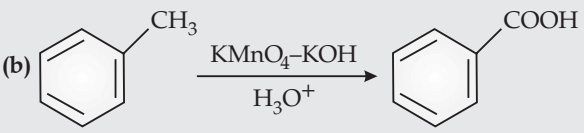
8. **(a)** PH_3

(b) NH_3

(c) NH_3

(d) BiH_3 ½ + ½ + ½ + ½

9. **(a)** $CH_3CHO \xrightarrow{(i)CH_3MgBr,\,Dry\,ether\,(ii)H_2O/H^+} CH_3CH(OH)CH_3\,\underline{CrO_3}\,CH_3COCH_3$ **1**

(b) 

1

(or any other correct method) [CBSE Marking Scheme, 2018]

OR

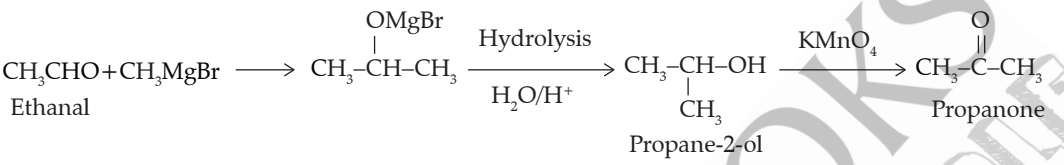
(a) because the carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group **1**

(b) Nitro group is an electron withdrawing group (-I effect) so it stabilises the carboxylate anion and strengthens the acid / Due to the presence of an electron withdrawing Nitro group (-I effect). **1**

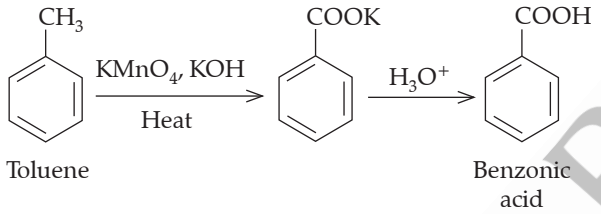
[CBSE Marking Scheme, 2018]

Detailed Answer :

(a) Ethanal to Propanone



(b) Toluene to Benzonic acid



1+1

OR

(a) Because –COOH group present in aromatic carboxylic acids is an electron withdrawing group causing deactivation of benzene ring. This results in the bonding of anhydrous $AlCl_3$ with carboxyl group. Hence, electrophillic substitution i.e., Friedel-Crafts reaction does not occur in aromatic carboxylic acids.

(b) As 4-nitrobenzoic acid contains $-NO_2$ group which is an electron withdrawing group resulting in higher acidity than benzoic acid. Greater is the acidic character lower is the pK_a value. Thus, pK_a value of 4-nitrobenzoic acid is lower than that of benzoic acid. **1+1**

10. **(a)** $5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O + 5Fe^{3+}$ **1**

(b) $2MnO_4^- + H_2O + I^- \rightarrow 2MnO_2 + 2OH^- + IO_3^-$ **1**

(Half mark to be deducted in each equation for not balancing) **[CBSE Marking Scheme, 2018]**

Detailed Answer :

(a)
$$8H^+ + MnO_4^- + 5e^- \rightarrow Mn^{2+} + 4H_2O$$
$$5(Fe^{2+} \rightarrow Fe^{3+} + 1e^-)$$
$$8H^+ + MnO_4^- + 5Fe^{2+} \rightarrow Mn^{2+} + 5Fe^{3+} + 4H_2O$$

(b)
$$(3e^- + 4H^+ + MnO_4^- \rightarrow MnO_2 + 2H_2O)2$$
$$3H_2O + I^- \rightarrow IO_3^- + 6H^+ + 6e^-$$
$$2MnO_4^- + H_2O + I^- \rightarrow 2MnO_2 + 2OH^- + IO_3^-$$

1+1

11. **(a)** As compared to other colligative properties, its magnitude is large even for very dilute solutions / macromolecules are generally not stable at higher temperatures and polymers have poor solubility / pressure measurement is around the room temperature and the molarity of the solution is used instead of molality. **1**

(b) Because oxygen is more soluble in cold water or at low temperature. **1**

(c) Due to dissociation of KCl / KCl (aq) $\rightarrow$ K^+ + Cl^-, i is nearly equal to 2 **[CBSE Marking Scheme, 2018] 1**

Detailed Answer :

(a) In osmotic pressure method, pressure is measured at room temperature and instead of molality, molarity of the solution is used. It is preferred for the macromolecules like proteins as they are unstable at high temperature

and polymers have poor solubility. Also, due to their high molecular mass, the only colligative property which has a measurable magnitude is osmotic pressure. Therefore, osmotic pressure method is preferred. **1+1+1**

12. $d = \frac{zM}{a^3 N_A}$ ½

$\frac{4 \times 40}{\left(4 \times 10^{-8}\right)^3 \times 6.022 \times 10^{23}}$ ½

½

$= 4.15$ g/cm3 ½

No of unit cells = total no of atoms /4 ½

$= \left[\frac{4}{40} \times 6.022 \times 10^{23}\right] / 4$

$= 1.5 \times 10^{22}$ ½

(Or any other correct method)

13. $k_2 = 0.693 / 20$,

$k_1 = 0.693/40$

$\log \frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$

$k_2/k_1 = 2$

$\log 2 = \frac{E_a}{2.303 \times 8.314}\left[\frac{320-300}{320 \times 300}\right]$

Ea = 27663.8 J/mol or 27.66 kJ/ mol **3**

14. **(a)** Peptisation occurs / Colloidal solution of Fe(OH)3 is formed

(b) Coagulation occurs

(c) Demulsification or breaks into constituent liquids **1+1+1**

15. $4Au(s) + 8CN^-(aq) + 2H_2O(aq) + O_2(g) \rightarrow 4[Au(CN)_2]^-(aq) + 4OH^-(aq)$

$2[Au(CN)_2]^-(aq) + Zn(s) \rightarrow [Zn(CN)_4]^{2-}(aq) + 2Au(s)$

(No marks will be deducted for not balancing)

NaCN leaches gold/NaCN acts as a leacing agent / complexing agent

Zn acts as reducing agent / Zn displaces gold. ½+½

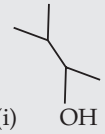
16. **(a)** The comparatively high value for Mn shows that $Mn^{2+}(d^5)$ is particularly stable / Much larger third ionisation energy of Mn (where the required change is from d^5 to d^4) **1**

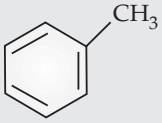
(b) Due to higher number of unpaired electrons. **1**

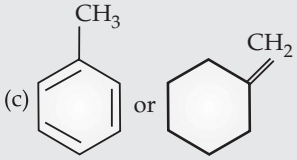
(c) Absence of unpaired d- electron in Sc^{3+} whereas in Ti^{3+} there is one unpaired electron or Ti^{3+}shows d-d transition. **[CBSE Marking Scheme, 2018] 1**

Detailed Answer :

(a) Because Mn^{2+} is more stable than Mn^{3+} due to half-filled d^5 configuration whereas Fe^{2+} becomes unstable after loosing an electron from half filled orbital. **1**

17. **(a)** (i) 

(b) 

(c) 

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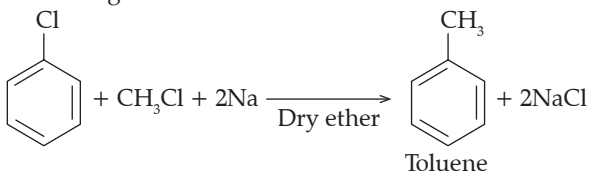
[CBSE Marking Scheme, 2018] 1+1

Detailed Answer :

(b) Wurtz-Fittig reaction



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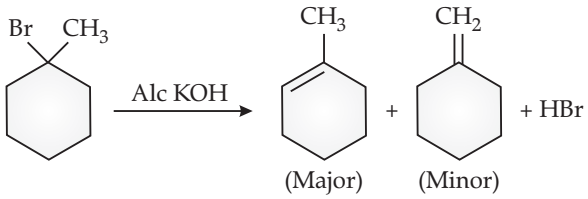


1+1+1

18. **(a)** A= $CH_3CH_2CH_2CHO$ ½

B = $CH_3COCH_2CH_3$ ½

C= $(CH_3)_2CHCHO$ ½

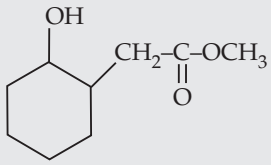
D= $CH_3CH_2CH_2CH_3$ ½

(b) B **[CBSE Marking Scheme, 2018] 1**

Detailed Answer :

(b) (B) as ketones are less reactive towards addition of HCN than aldehydes and alkane due to higher hinderance caused by steric effect and inductive effect. **1**

19. **(i)**



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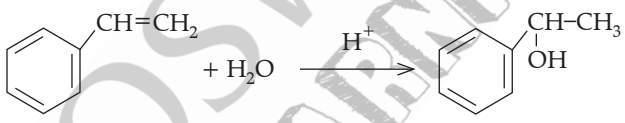
(ii) $C_6H_5CH(OH)CH_3$ **1**

(iii) $C_2H_5I + C_6H_5OH$ (No splitting of marks) **[CBSE Marking Scheme, 2018] 1**

Detailed Answer :

(ii)



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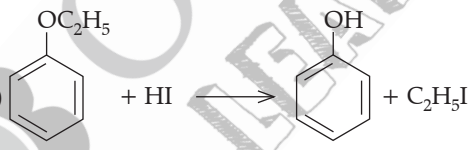


1+1+1

20. **(a)** To impart antiseptic properties

(b) 2-3% solution of iodine in alcohol – water mixture / iodine dissolved in alcohol , used as an antiseptic/ applied on wounds.

(c) Sodium benzoate / Aspartame **1+½+½+1**

21. **(a)** Carbohydrates that give large number of monosaccharide units on hydrolysis / large number of monosaccharides units joined together by glycosidic linkage Starch/ glycogen/ cellulose (or any other) ½

(b) Proteins that lose their biological activity / proteins in which secondary and tertiary structures are destroyed Curdling of milk (or any other) ½

(c) Amino acids which cannot be synthesised in the body. ½

Valine / Leucine (or any other) **[CBSE Marking Scheme, 2018]** ½

OR

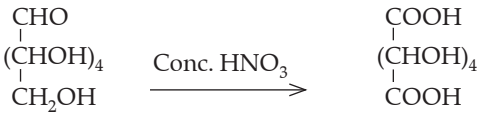
(a) Saccharic acid / COOH-$(CHOH)_4$-COOH **1**

(b) Due to the presence of carboxyl and amino group in the same molecule / due to formation of zwitter ion or dipolar ion. **1**

(c) α- helix has intramolecular hydrogen bonding while β pleated has intermolecular hydrogen bonding / α-helix results due to regular coiling of polypeptide chains while in β pleated all polypeptide chains are stretched and arranged side by side. **[CBSE Marking Scheme, 2018] 1**

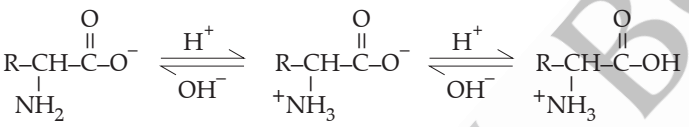
Detailed Answer :

(a) When D-glucose reacts with conc. HNO_3 it forms saccharic acid.



D-glucose D-saccharic acid

(b) In aqueous solution, the carboxyl group present in amino acid can lose a proton and the amino group can accept a proton to form Zwitter ion. This Zwitter ion, can act both as an acid and a base showing amphoteric behaviour.



1

22. **(a)** $Fe_4[Fe(CN)_6]_3$ **1**

(b) Ionisation isomerism **1**

(c) sp^3d^2, 4 **[CBSE Marking Scheme, 2018] ½+½**

Detailed Answer :

(b) Ionization isomerism.

$[Co(NH_3)_5 SO_4]Cl$ and $[Co(NH_3)_5 Cl] SO_4$ **1+1+1**

23. **(a)** Concerned about environment, caring, socially alert, law abiding citizen (or any other 2 values) ½ , ½

(b) Low density polythene is highly branched while high density polythene is linear. **1**

(c) As it is non-biodegradable . **1**

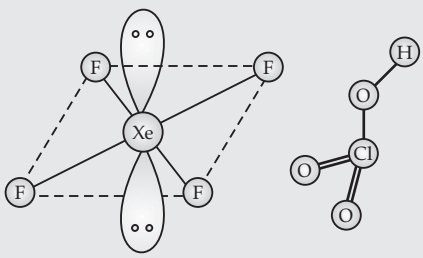
(d) Which can be degraded by microorganisms, eg PHBV(or any other correct example) ½+½

24. **(a)** **(i)** In +3 oxidation state of phosphorus tends to disproportionate to higher and lower oxidation states / Oxidation state of P in H_3PO_3 is +3 so it undergoes disproportionation but in H_3PO_4 it is +5 which is the highest oxidation state, so it cannot. **1**

(ii) F cannot show positive oxidation state as it has highest electronegativity/ Because Fluorine cannot expand its covalency / As Fluorine is a small sized atom, it cannot pack three large sized Cl atoms around it. **1**

(iii) Oxygen has multiple bonding whereas sulphur shows catenation / Due to $p\pi$-$p\pi$ bonding in oxygen whereas sulphur does not / Oxygen is diatomic therefore held by weak intermolecular force while sulphur is polyatomic held by strong intermolecular forces. **1**

(b) **(i)**

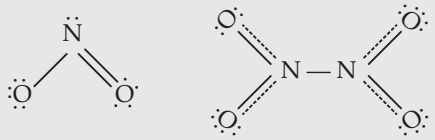


1+1

OR

(a) (i) A = NO_2, B = N_2O_4 ½+½

(ii)



½+½

(iii) Because NO_2 dimerises to N_2O_4 / NO_2 is an odd electron species. **1**

(b) HI > HBr > HCl > HF **1**

(c) $XeF_4 + SbF_5 \rightarrow [XeF_3]^+ [SbF_6]^-$ **[CBSE Marking Scheme, 2018] 1**

Detailed Answer :

(a) (i) $H_2SO_4 + NaNO_2 \rightarrow Na_2SO_4 + NO + NO_2 + H_2O$

(A)

Brown colour

$2NO_2 \rightleftharpoons N_2O_4$

(B)

Colourless

25. **(a)** $Sn + 2H^+ \rightarrow Sn^{2+} + H_2$ (Equation must be balanced) **1**

$$E = E^o - \frac{0.059}{2}\log\frac{\left[Sn^{2+}\right]}{\left[H^+\right]^2}$$ ½

$$0 = [0 - (-0.14)] - 0.0295 \log \frac{(0.004)}{(0.02)^2}$$ ½

$= 0.14 - 0.0295 \log 10 = 0.11$ V / 0.1105 V **1**

(b) (i) Due to overpotential/ Overvoltage of O_2 **1**

(ii) The number of ions per unit volume decreases. **1**

OR

(a) $\Delta G^o = -nFE^o$ ½

$-43600 = -2 \times 96500 \times E^o$

$E^o = 0.226$ V

$E = E^o - 0.059/2 \log ([H^+]^2 [Cl^-]^2 / [H_2])$ ½

$= 0.226 - 0.059/2 \log[(0.1)^2 \times (0.1)^2] / 1$ ½

$= 0.226 - 0.059/2 \log 10^{-4}$ ½

$= 0.226 + 0.118 = 0.344$ V (Deduct half mark if unit is wrong or not written) **1**

(b) Cells that convert the energy of combustion of fuels (like hydrogen, methane, methanol, etc.) directly into electrical energy are called fuel cells. **1**

Advantages : High efficiency, non polluting (or any other suitable advantage)

[CBSE Marking Scheme, 2018] ½+½

Detailed Answer :

(a) $Sn(s) | Sn^{2+}(0.004\,M) || H^+(0.020\,M) | H_2(g)(1\,bar) | Pt(s)$

$E^\circ_{cell} = E^\circ_{(H^+/H_2)} - E^\circ_{(Sn^{2+}/Sn)}$

$= 0.00 - (-0.14)$

$= +0.14V$

$Sn(s) \rightarrow Sn^{2+}(aq) + 2e^-$

$2H^+(aq) + 2e^- \rightarrow H_2(g)$

$Sn(s) + 2H^+(aq) \rightarrow Sn^{2+}(aq) + H_2(g)$

$$E_{cell} = E^{\circ}_{cell} - \frac{0.0591}{n} \log \frac{[Sn^{2+}]}{[H^+]^2}$$

$$= 0.14 - \frac{0.0591}{2} \log \frac{(4 \times 10^{-3})}{(2 \times 10^{-2})^2}$$

$$= 0.14 - 0.0295 \log 10$$

$$= 0.14 - 0.0295$$

$$= 0.1105 \text{ V}$$

(b) (i) $NaCl \rightarrow Na^+ + Cl^-$

$H_2O \rightleftharpoons H^+ + OH^-$

The value of E° of O_2 is higher than Cl_2 but O_2 is evolved from H_2O only when the higher voltage is applied. So, because of this Cl_2 is evolved instead of O_2.

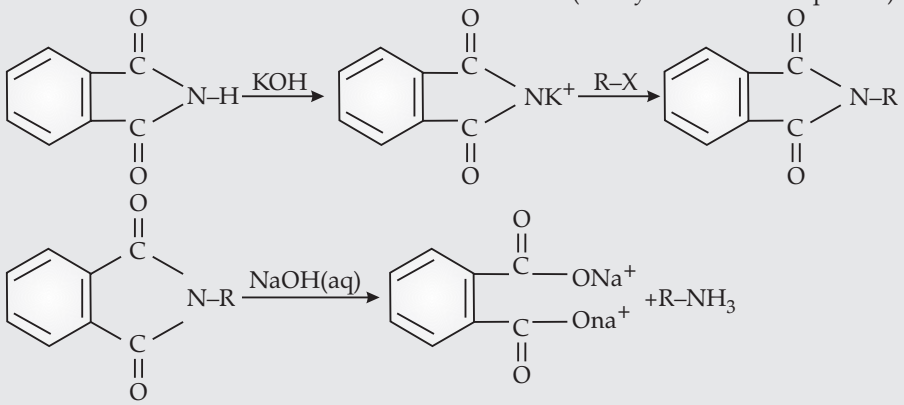
(ii) Conductivity varies with the change in the concentration of the electrolyte. The number of ions per unit volume decreases on dilution. So, conductivity decreases with decrease in concentration. Therefore, conductivity of CH_3COOH decreases on dilution. **3+2**

26. **(a)(i)** $Ar/\ R\text{-}CONH_2 + Br_2 + 4\,NaOH \rightarrow Ar/\ R\text{-}NH_2 + 2NaBr + Na_2CO_3 + 2\,H_2O$ **1**

(ii) $C_6H_5NH_2 + NaNO_2 + 2HCl \xrightarrow{273-278K} C_6H_5N_2^+Cl^- + NaCl + 2H_2O$ **1**

(or any other correct equation)

(iii)



1

(b)(i) Because of the combined factors of inductive effect and solvation or hydration effect **1**

(ii) Due to resonance stabilisation or structural representation / resonating structures. **1**

OR

(a) (i) $C_6H_5NHCOCH_3$ **1**

(ii) $C_6H_5SO_2N(CH_3)_2$ **1**

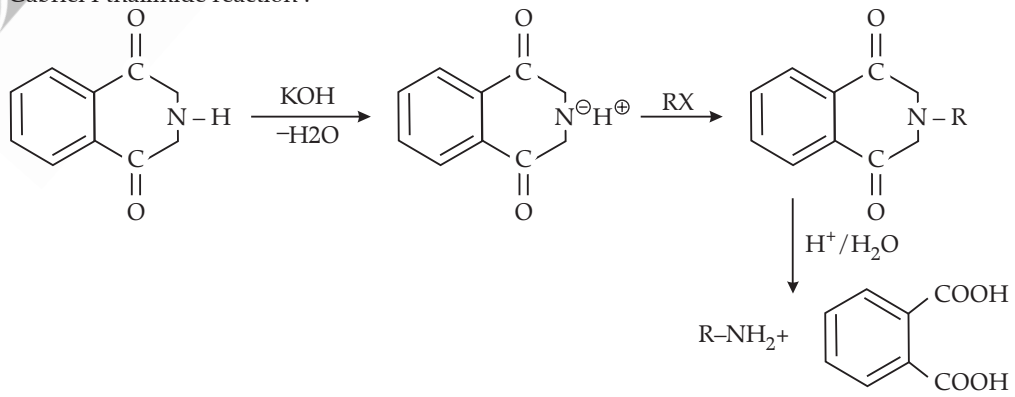
(iii) C_6H_6 **1**

(b) Add chloroform in the presence of KOH and heat , Aniline gives a offensive smell while N,N dimethylaniline does not. (or any other correct test) **1**

(c) $C_2H_5NH_2 < C_6H_5NHCH_3 < C_6H_5NH_2$ **[CBSE Marking Scheme, 2018] 1**

Detailed Answer :

(iii) Gabriel Pthalimide reaction :



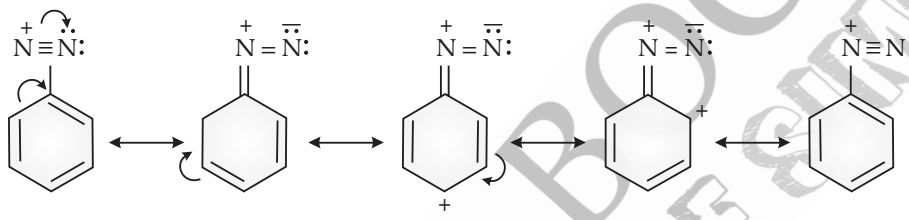
(b) (i)

(2° amine) (acidic) (Salt)
More stable

(3° amine) (acidic) (Salt)
Less stable

2° amine salt form are more stable than 3° amine due to inductive effect and higher degree of hydration. Therefore, higher the stability of salt greater will be the reactivity of corresponding compound.

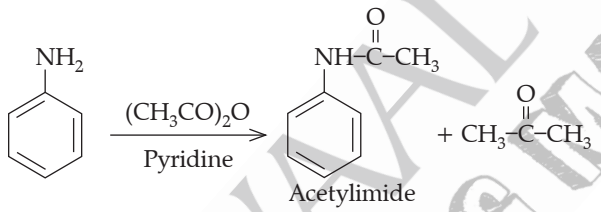
(ii) Aromatic diazonium salts are more stable than aliphatic diazonium salts due to dispersion of positive charge over the benzene ring caused by resonance. This is not found in aliphatic diazonium salts.



3+2

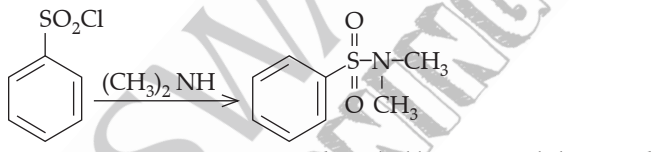
OR

(a) (i)



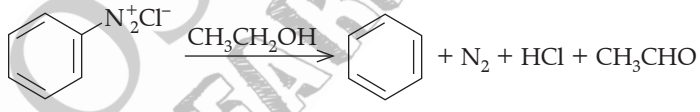
Acetylimide

(ii)



N–N-dimethyl benzene sulphonamide

(iii)



Benzene

3

❑❑