Solution

CHEMISTRY

NEET-UG - Chemistry

CHEMISTRY (Section-A)

1.

(b) all of these

Explanation:

No. of atoms of $N_2O = \frac{6.023\times10^{23}}{22400} \times 3$

No. of molecule of $N_2O = \frac{6.02\times10^{23}}{22400}$

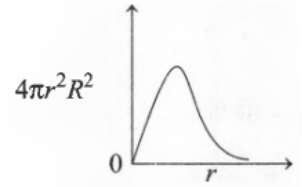
No. of electrons in $N_2O = \frac{6.02\times10^{23}}{22400} \times 22$

2.

(d)

Explanation:

For 1s electron in H-atom, plot of radial probability function ($4\pi r^2R^2$) versus r is given as



3.

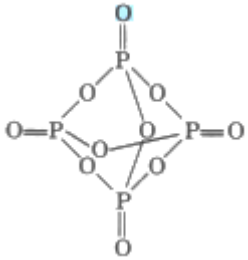
(c) Halogens (F—I)

Explanation:

Halogens (F—I)

4. **(a)** 4:3

Explanation:



P4O10 $\rightarrow \sigma$ = 16

P4O6 $\rightarrow \sigma$ = 12

5.

(c) CN^-

Explanation:

Species	Bond order
NO	$\frac{1}{2}$(10 - 5) = 2.5
	$\frac{1}{2}$(10 - 4) = 3

CN^-	
CN^+	$\frac{1}{2}(8 - 4) = 2$
CN	$\frac{1}{2}(9 - 4) = 2.5$

6.

(d) Both sp_z, p_zd_z2 and sp^3,d^3s

Explanation:

Both sp_z, p_zd_z2 and sp^3,d^3s

7. **(a)** +434.8 kJ

Explanation:

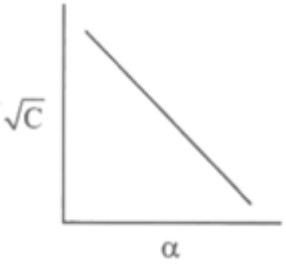
$4H(g) \rightarrow 2H_2(g)$; ΔH = -869.6 kJ

$2H_2(g) \rightarrow 4H(g)$; ΔH = +869.6 kJ

$\therefore H_2(g) \rightarrow 2H(g)$

Dissociation energy of H - H bond = $\frac{869.6}{2}$ = 434.8 kJ

8. **(a)**



Explanation:

The degree of dissociation (α) is inversely proportional to the square root of the molar concentration of the solution.

i.e., $\alpha = \sqrt{\frac{K}{C}}$ or $\alpha \propto \frac{1}{\sqrt{C}}$

9.

(c) 3 : 5

Explanation:

$\underset{-3}{4}NH_3 + 5O_2 \longrightarrow \underset{+2}{4}NO + 6H_2O$,

So, eq. wt. of NH_3 = $\frac{17}{5}$

$\underset{-3}{2}NH_3 \longrightarrow \underset{0}{N_2} + 3H_2$

So, eq. wt. of NH_3 = $\frac{17}{3}$

So, their ratio is 3 : 5

10.

(d) +2

Explanation:

Isomorphous substances are substances capable of crystallizing in a form similar to that of another compound or mineral.

V forms VSO_4 which is isomorphous with $FeSO_4.(NH_4)_2SO_4.6H_2O$.

Hence, the oxidation state of V in V SO_4 is +2.

11.

(b) all of these

Explanation:

all of these

12.

(d) Feldspars are not aluminosilicates.

Explanation:

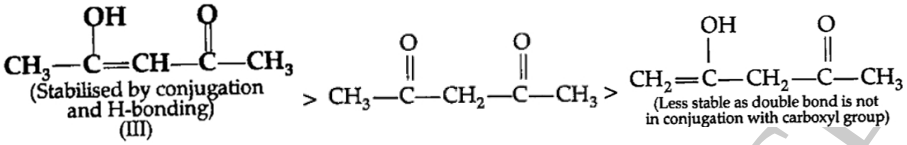
Feldspars are three-dimensional aluminosilicates.

13.

(d) III > II > I

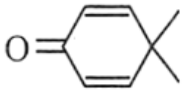
Explanation:

The enols of β-dicarboxyl compounds are more stable because of conjugation and intramolecular H-bonding. Thus, the order of stability is

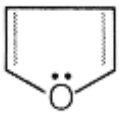
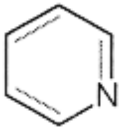
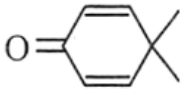


14.

(d)



Explanation:

Molecules in option  ,  and  are aromatic and are stabilized by resonance. Molecule in option  is non-aromatic and hence, it is least stabilized by resonance.

15.

(b) 3

Explanation:

3

16.

(b) 210.0 g mol^{-1}

Explanation:

For two non-electrolytic solution if isotonic $c_1 = c_2$,

$\therefore \frac{5.25\times1000}{m\times100} = \frac{1.50\times1000}{60\times100}$

$\therefore$ m = 210 g mol^{-1}

17.

(d) 868.06 g

Explanation:

$\Delta T_f = K_f m$

where m = molality

$273 - 268 = 1.86 \times \frac{w}{M\times V}$

$5 = 1.86 \times \frac{w}{32\times10} \Rightarrow w = \frac{5\times32\times10}{1.86} = 860.2 \approx 868.06$ g

18.

(c) increase in ionic mobility of ions

Explanation:

Equivalent conductance increases on dilution for a strong electrolyte as interionic attraction also decreases along with dilution. So ionic mobility increases which in turn increases the equivalent conductance.

19.

(b) activation energy + normal energy of reactants

Explanation:

Activation energy = (Threshold energy) - (Average energy of the reactants).

Activation energy is the minimum increase in potential energy of a system required for molecules to react and threshold energy is the minimum kinetic energy required to convert kinetic energy into activation energy during the formation of the activated complex.

20.

(d) 434.2 K

Explanation:

434.2 K

21.

(d) Option (iii)

Explanation:

Actinoids are placed in group 3 and period 7 of the periodic table.

22.

(c) SO_2

Explanation:

SO_2

23.

(d) X = $K_2Cr_2O_7$, C = H_2O, D = I_2, E = ICl_3, F = ICl, Iodic acid = HIO_3

Explanation:

$\underset{(X)}{K_2Cr_2O_7}$ + 6KI + 7$H_2SO_4 \rightarrow \underset{(A)}{4K_2SO_4} + \underset{(B)}{Cr_2(SO_4)_3}$ + $\underset{(C)}{7H_2O} + \underset{(D)}{3I_2}$

$I_2 + \underset{(Excess)}{3Cl_2} \rightarrow \underset{\substack{Iodine\ trichloride \\ (E)}}{2ICl_3}$

$\underset{(Equimolar)}{I_2 + Cl_2} \rightarrow \underset{Iodine\ monochloride}{2ICl}$

$\underset{(E)}{2ICl_3} + 3H_2O \rightleftharpoons \underset{(F)}{ICl} + \underset{Iodic\ acid}{HIO_3} + 5HCl$

24. **(a)** H^-

Explanation:

Lithium tetrahydridoaluminate is $Li[Al(H)_4]$. So, H^- is the ligand.

25.

(c) i - a, ii - d, iii - b, iv - c

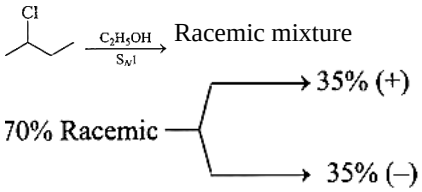
Explanation:

i - a, ii - d, iii - b, iv - c

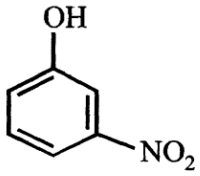
26.

(d) 65

Explanation:

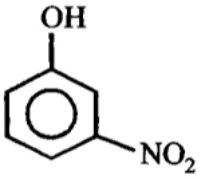


Total inverted product = 35 + 30 = 65%

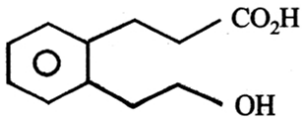
27. **(a)** 

Explanation:

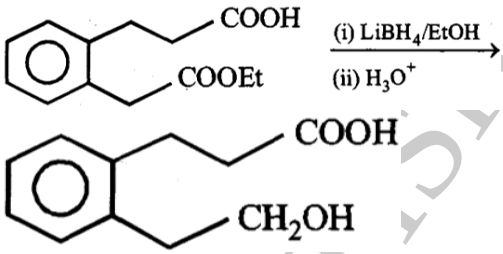
Strongest acid from the following is



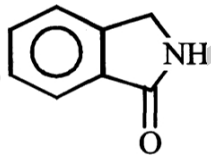
-NO_2 group has more EWG nature which makes the compound more acidic.

28. **(b)** 

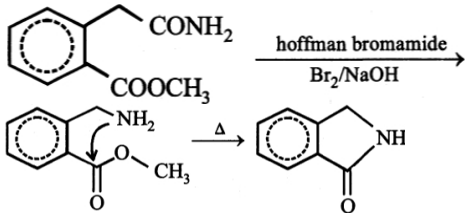
Explanation:



$LiBH_4$ can reduce ester selectively but not carboxylic acids.

29. **(a)** 

Explanation:



30. **(a)** Fats > Carbohydrates > Proteins

Explanation:

Calorific value: The amount of heat released by a unit weight or unit volume of a substance during complete combustion.

Protein and carbohydrates both contain 4 calories per gram, while fat provides 9 calories per gram.

31. **(a)** α- amino acids

Explanation:

Amino acids and proteins are the building blocks of life. Amino acids are organic compounds that combine to form proteins. When proteins are digested or broken down, amino acids are left.

Zymogenic cell or peptic cell in the stomach releases pepsinogen and chymosin.

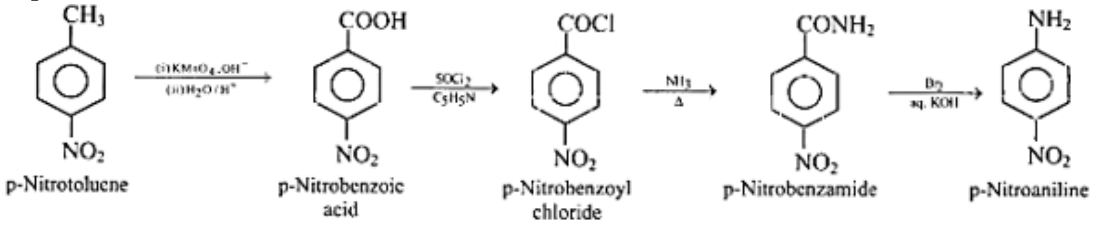
This inactive pepsinogen, on exposure to hydrochloric acid, gets converted to the active enzyme pepsin.

Pepsin is produced in the stomach and is one of the main digestive enzymes, which helps in the digestion of the proteins to polypeptide chains. The end product of protein is it must be broken down into amino acids. Hence, the end product of protein digestion is amino acids.

32.

(d) p-Nitrobenzoic acid, p-Nitrobenzoyl chloride, p-Nitrobenzamide

Explanation:



33.

(b) $\Lambda^{\circ}_{m(NH_4Cl)} + \Lambda^{\circ}_{m(NaOH)} - \Lambda^{\circ}_{m(NaCl)}$

Explanation:

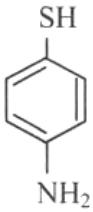
$\Lambda^{\circ}_{mNH_4OH} = \Lambda^{\circ}_{mNH_4^+} + \Lambda^{\circ}_{mCl^-} = \Lambda^{\circ}_{mNH_4Cl} + \Lambda^{\circ}_{mNaOH} - \Lambda^{\circ}_{mNaCl}$

34.

(d) NaCN and Na_2S

Explanation:

p-aminothiophenol is,



It contains N and S. Hence, sodium thiocyanate is formed. However, if Lassaigne's extract is prepared by treating the organic compound with excess sodium, thiocyanate decomposes to give cyanide and sulphide ions.

$NaSCN + 2Na \longrightarrow NaCN + Na_2S$

35.

(d) 1

Explanation:

$2KMnO_4 + 3H_2SO_4 + 5 \begin{matrix} CO\ OH \\ | \\ COOH \end{matrix} \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 10CO_2$

$\frac{M_1\ V_1}{n_1}\ (KMnO_4) = \frac{M_2\ V_2}{n_2} \left[\begin{matrix} CO\ OH \\ | \\ COOH \end{matrix} \right]$

$\frac{0.05 \times 20}{2} = \frac{x \times 45}{5}$

x = 0.05 M

$[H^+] = 2 \times 0.05 = 0.1$ M

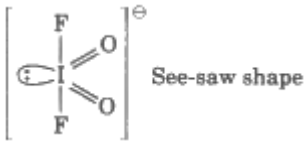
$pH = -\log(H^+) = -\log(0.1) = 1$

CHEMISTRY (Section-B)

36.

(d) Both (i) and (iii)

Explanation:



See-saw shape

37.

(c) Cl^-

Explanation:

Spectator ions are the ions which do not take part in the reaction.

$Na + 2HCl \longrightarrow 2NaCl + H_2$

So, ionic reaction is,

$2Na + 2H^+ \rightarrow 2Na^+ + H_2$

Only for chloride ions, oxidation state doesn't change, so they are spectator here.

38. **(a)** +4

Explanation:

$2Al + \underset{(conc.)}{6H_2SO_4} \xrightarrow{\Delta} Al(SO_4)_3 + \underset{(X)}{3SO_2} + 6H_2O$

39. **(a)** F < Cl > Br > I

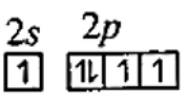
Explanation:

Electron affinity for halogens

Cl > F > Br > I

E.A. of F is lower due to its very small size.

40.

(c) 

Explanation:

According to Aufbau's principle, electrons cannot be filled in 2p orbital till 2s orbital is incomplete.

41.

(b) Anion is made of two tetrahedra units, sharing one comer.

Explanation:

Anion is made of two tetrahedra units, sharing one comer.

42.

(d) 0.08 M/s

Explanation:

$2N_2O_{5(g)} \longrightarrow 4NO_{2(g)} + O_{2(g)}$

Rate = $\frac{1}{2}\frac{d[N_2O_5]}{dt} = \frac{1}{4}\frac{d[NO_2]}{dt} = \frac{d[O_2]}{dt}$

$\therefore \frac{d[NO_2]}{dt} = \frac{4}{2}\left(-\frac{d[N_2O_5]}{dt}\right) = \frac{4}{2} \times 0.04 = 0.08$ M/s

43.

(b) 390.71 Ω^{-1} cm^2

Explanation:

From Kohlrausch's Law,

λ_∞ for NaCl = $\lambda_{Na^+} + \lambda_{Cl^-}$ ...(1)

λ_∞ for HCl = $\lambda_{H^+} + \lambda Cl^-$ ...(2)

λ_∞ for $C_2H_5COONa = \lambda_{Na^+} + \lambda_{C_2H_5COO^-}$ ...(3)

Thus λ_∞ for C_2H_5COOH,

Adding on (2) + (3) + (1), we get

λ_∞ for CH_3CH_2COOH

$\lambda_{\infty(C_2H_5COONa)} + \lambda_{\infty(HCl)} - \lambda_{\infty(NaCl)}$

= (91 + 426.16 - 126.45) S cm^2 = 390.71 S cm^2

44.

(b) 8.1×10^4 g

Explanation:

Al_2O_3 ionises as

$Al_2O_3 \rightleftharpoons \underset{(Cathode)}{Al^{3+}} + \underset{Anode}{AlO_3^{3-}}$

So, the reaction at cathode will be

$Al^{+3} + \underset{(3F)}{3e^-} \rightarrow \underset{(27g)}{Al}$

Mass of Al deposited by 3 F of electricity = 27 g

Mass of Al deposited by $4.0 \times 10^4 \times 6 \times 3600$ C of electricity

$= \frac{27 \times 4 \times 10^4 \times 6 \times 3600}{3\ F}$ g

$= 8.1 \times 10^4$ g

45.

(c) 53.49 min

Explanation:

Given that,

$[A]_0$ = 2m, t = 200 min, [A] = 0.15 m

For first order reaction,

Rate constant, $k = \frac{2.303}{t}\log\frac{[A]_0}{[A]}$

$k = \frac{2.303}{t}\log\frac{2}{0.15}$

$\Rightarrow$ k = 0.01295 min^{-1}

Now $t_{\frac{1}{2}} = \frac{0.693}{K}$

$t_{\frac{1}{2}} = \frac{0.693}{0.01295}$ = 53.50 min

46.

(d) Ammonium sulphate

Explanation:

Ammonium sulphate is a salt of a strong acid (H_2SO_4) and weak base (NH_4OH). Therefore, repeated use of ammonium sulphate would increase the concentration of sulphuric acid, while ammonia from NH_4OH is used up by the plant. Hence, the acidity of soil will increase.

47. **(a)** dehydrating agent

Explanation:

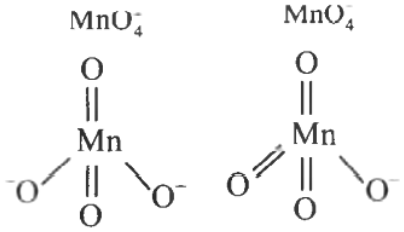
dehydrating agent

48.

(b) the π-bonding involves overlap of p-orbitals of oxygen with d-orbials of manganese

Explanation:

The structures of manganate and permanganate ions are



In manganate and permanganate ions, the π-bonding involves the overlap of p-orbitals of oxygen with d-orbitals of manganese.

49.

(c) both magnetic moment and structure

Explanation:

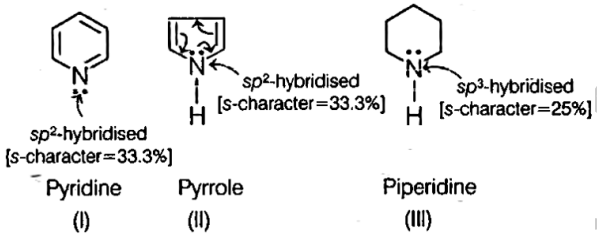
both magnetic moment and structure

50.

(b) III > I > II

Explanation:

The % of 5-character in the given amines are as follows:



Therefore, piperidine (III) having minimum % s-character is most basic. Among the rest, pyridine (I) and pyrrole (II) the lone pair of electrons of N in pyrrole (II) is involved in delocalisation and follows (4n + 2) n aromatic (n = 1) system. So, the N-atom of pyrrole (II) will show least basicity. Thus, the order of basicity is as follows:

(III) > (I) > (II)