NEET 2018

Chemistry

1. The correct order of N-compounds in its decreasing order of oxidation states is
   (1) HNO_3, NH_4Cl, NO, N_2
   (2) HNO_3, NO, NH_4Cl, N_2
   (3) HNO_3, NO, N_2, NH_4Cl
   (4) NH_4Cl, N_2, NO, HNO_3
   Answer (3)
   Sol.
   HNO_3, NO, N_2, NH_4Cl
   +5 +2 0 -3
   Hence, the correct option is (3).

2. Which one of the following elements is unable to form MF_6^{3-} ion?
   (1) B
   (2) Al
   (3) Ga
   (4) In
   Answer (1)
   Sol.
   ∵ 'B' has no vacant d-orbitals in its valence shell, so it can't extend its covalency beyond 4. i.e. 'B' cannot form the ion like $MF_6^{3(-)}$ i.e. $BF_6^{3(-)}$. Hence, the correct option is (1).

3. Considering Ellingham diagram, which of the following metals can be used to reduce alumina?
   (1) Mg
   (2) Zn
   (3) Fe
   (4) Cu
   Answer (1)

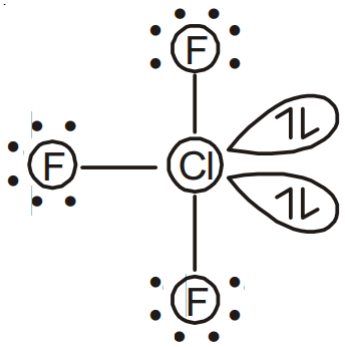
Sol. The metal which is more reactive than 'Al' can reduce alumina i.e. 'Mg' should be the correct option.

4. The correct order of atomic radii in group 13 elements is
   (1) B < Ga < Al < Tl < In
   (2) B < Al < Ga < In < Tl
   (3) B < Al < In < Ga < Tl
   (4) B < Ga < Al < In < Tl
   Answer (4)
   Sol.

Elements	B	Ga	Al	In	Tl
Atomic radii (pm)	85	135	143	167	170

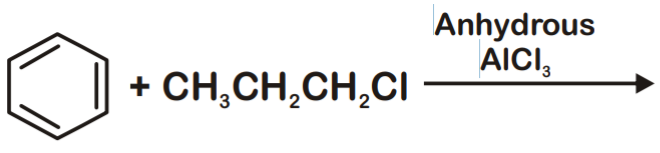
5. Which of the following statements is not true for halogens?
   (1) All but fluorine show positive oxidation states
   (2) All are oxidizing agents
   (3) All form monobasic oxyacids
   (4) Chlorine has the highest electron-gain enthalpy
   Answer (1)
   Sol. Due to high electronegativity and small size, F forms only one oxoacid, HOF known as Fluoric (I) acid. Oxidation number of F is +1 in HOF.

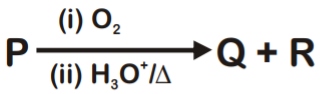
6. In the structure of ClF_3, the number of lone pair of electrons on central atom 'Cl' is
   (1) Four
   (2) Two
   (3) One
   (4) Three
   Answer (2)
   Sol. The structure of ClF_3



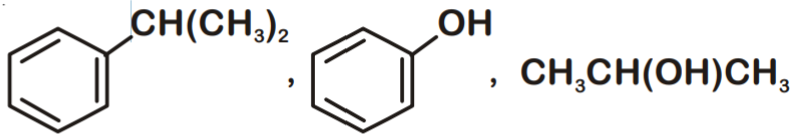
The number of lone pair of electrons on central Cl is 2.

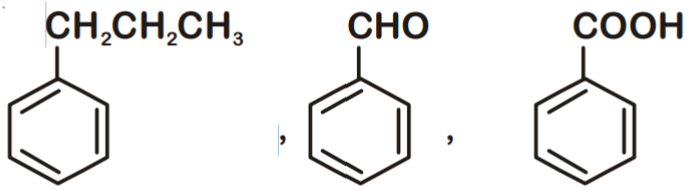
7. Identify the major products P, Q and R in the following sequence of reactions:

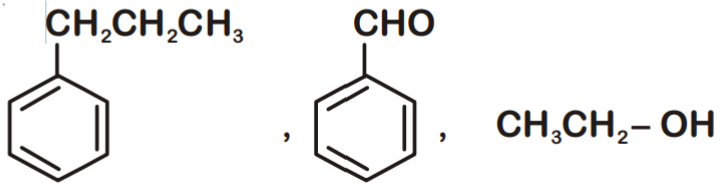


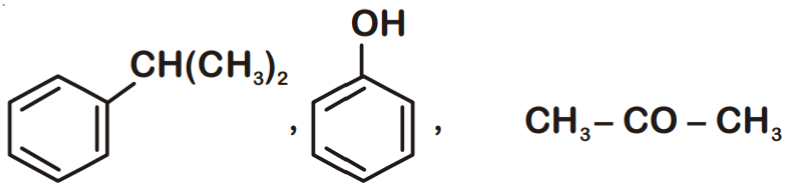


P Q R

(1) 

(2) 

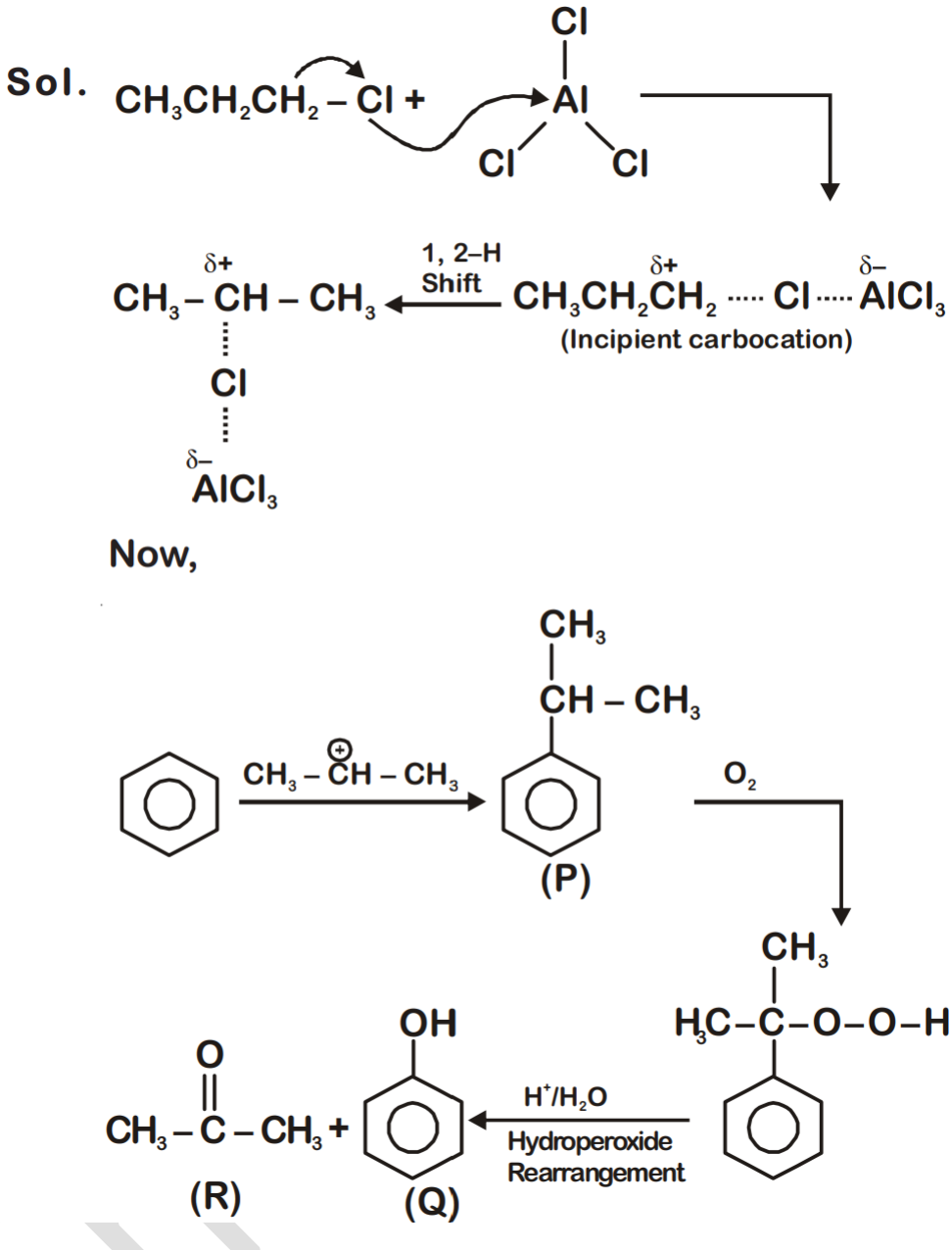
(3) 

(4) 

Answer: (2)

Solution:

Sol.



8. Which of the following compounds can form a zwitterion?

(1) Benzoic acid

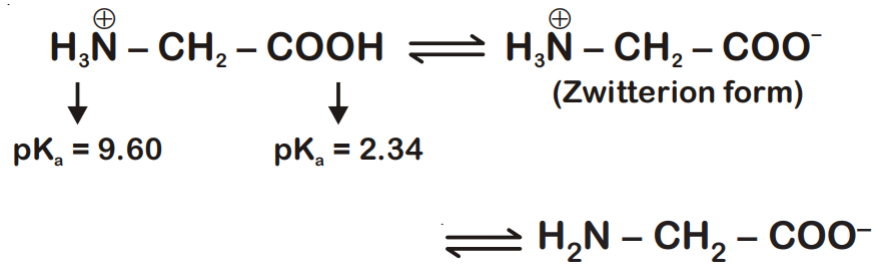
(2) Acetanilide

(3) Aniline

(4) Glycine

Answer (4)

Solution:



9. Regarding cross-linked or network polymers, which of the following statements is incorrect?

(1) Examples are bakelite and melamine.

(2) They are formed from bi- and tri-functional monomers.

(3) They contain covalent bonds between various linear polymer chains.

(4) They contain strong covalents bonds in their polymer chains

Answer (4)

Solution:

Cross linked or network polymers are formed from bi-functional and tri-functional monomers and contain strong covalent bonds between various linear polymer chains, e.g. bakelite, melamine etc. Option (4) is not related to cross-linking.

So option (4) should be the correct option.

10. Nitration of aniline in strong acidic medium also gives m-nitroaniline because

(1) In absence of substituents nitro group always goes to m-position.

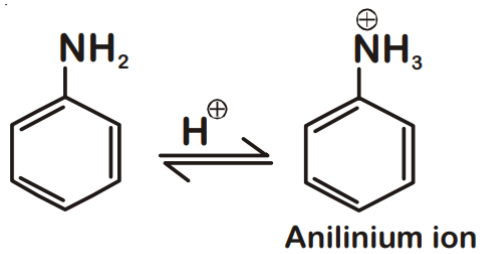
(2) In electrophilic substitution reactions amino group is meta directive.

(3) Inspite of substituents nitro group always goes to only m-position.

(4) In acidic (strong) medium aniline is present as anilinium ion.

Answer (4)

Solution:



Anilinium ion

$-NH_3$ is m-directing, hence besides para (51%) and ortho (2%), meta product (47%) is also formed in significant yield.

11. The difference between amylose and amylopectin is

(1) Amylopectin have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ β-linkage

(2) Amylose have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ β-linkage

(3) Amylopectin have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ α-linkage

(4) Amylose is made up of glucose and galactose

Answer (3)

Sol. Amylose and Amylopectin are polymers of α- D-glucose, so β-link is not possible. Amylose is linear with $1 \rightarrow 4$ α-linkage whereas Amylopectin is branched and has both $1 \rightarrow 4$ and $1 \rightarrow 6$ α-linkages.

So option (3) should be the correct option.

12. A mixture of 2.3 g formic acid and 4.5 g oxalic acid is treated with conc. H2SO4. The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be

(1) 2.8

(2) 3.0

(3) 1.4

(4) 4.4

Answer (1)

Sol. $\underset{2.3\,g\ or\ \left(\frac{1}{20}\,mol\right)}{HCOOH} \xrightarrow{Conc.H_2SO_4} \underset{\frac{1}{20}\,mol}{CO(g)} + H_2O(l)$

$\underset{4.5\,g\ or\ \left(\frac{1}{20}\,mol\right)}{\begin{matrix}COOH\\|\\COOH\end{matrix}} \xrightarrow{Conc.H_2SO_4} \underset{\frac{1}{20}\,mol}{CO(g)} + \underset{\frac{1}{20}\,mol}{CO_2(g)} + H_2O(l)$

Gaseous mixture formed is CO and CO2 when it is passed through KOH, only CO2 is absorbed. So the remaining gas is CO.

So, weight of remaining gaseous product CO is

2/20 x 28 = 2.8 g

So the correct option is (1)

13. Which of the following oxides is most acidic in nature?

(1) BaO

(2) BeO

(3) MgO

(4) CaO

Answer (2)

Sol. BeO < MgO < CaO < BaO =>Basic character increases.

So, the most acidic should be BeO. In fact, BeO is amphoteric oxide while other given oxides are basic.

14. Which oxide of nitrogen is not a common pollutant introduced into the atmosphere both due to natural and human activity?

(1) N_2O

(2) NO_2

(3) N_2O_5

(4) NO

Answer (3)

Sol .

N_2O_5 is not a common pollutant

15. The compound A on treatment with Na gives B, and with PCl_5 gives C. B and C react together to give diethyl ether. A, B and C are in the order

(1) C_2H_5Cl, C_2H_6, C_2H_5OH

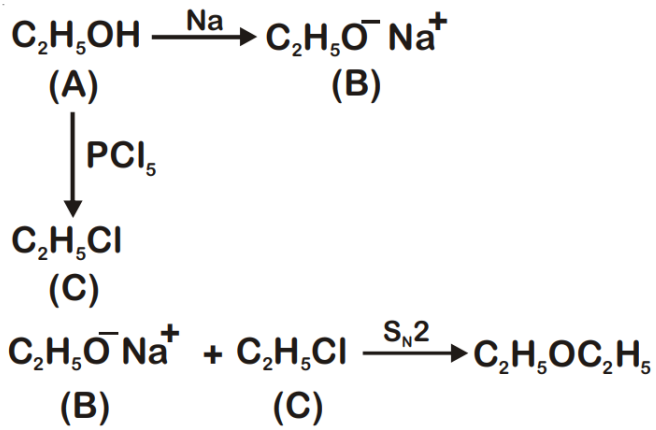
(2) C_2H_5OH, C_2H_5Cl, C_2H_5ONa

(3) C_2H_5OH, C_2H_6, C_2H_5Cl

(4) C_2H_5OH, C_2H_5ONa, C_2H_5Cl

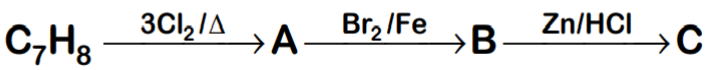
Answer (4)

Solution:



So the correct option is (4)

16. The compound C7H8 undergoes the following reactions:



The product 'C' is

(1) 3-bromo-2,4,6-trichlorotoluene

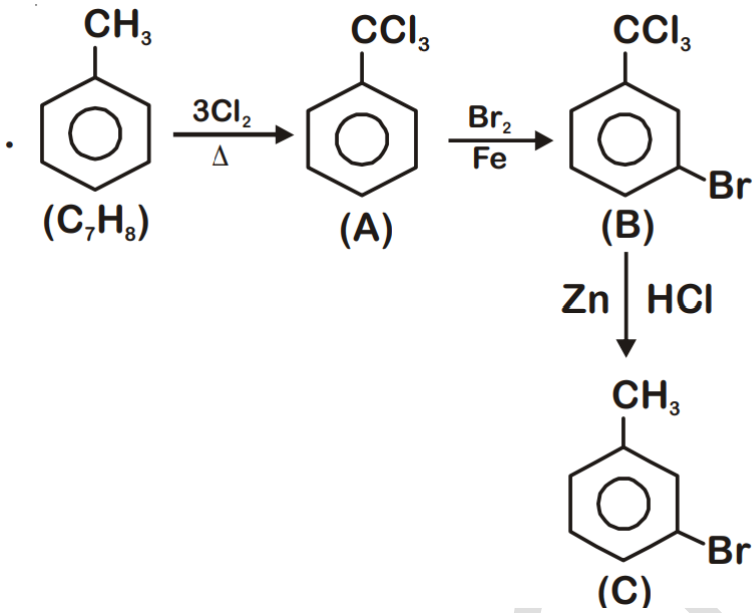
(2) o-bromotoluene

(3) m-bromotoluene

(4) p-bromotoluene

Answer (3)

Solution:



So the correct answer is option C

17. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is

(1) $CH_3 - CH_3$

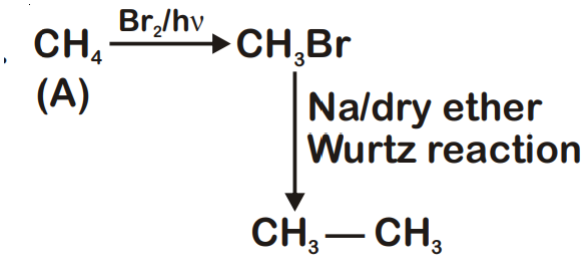
(2) $CH_2 = CH_2$

(3) $CH \equiv CH$

(4) CH_4

Answer (4)

Solution:



So the correct answer is option (4)

18. Which of the following molecules represents the order of hybridisation sp^2, sp^2, sp, sp from left to right atoms?

(1) $CH_2 = CH - CH = CH_2$

(2) $CH_2 = CH - C \equiv CH$

(3) $HC \equiv C - C \equiv CH$

(4) $CH_3 - CH = CH - CH_3$

Answer (2)

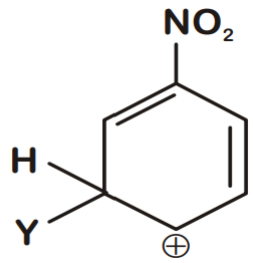
Sol.

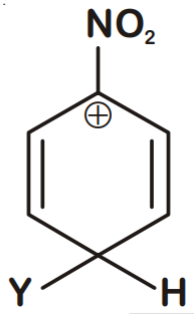
sp^2 sp^2 sp sp

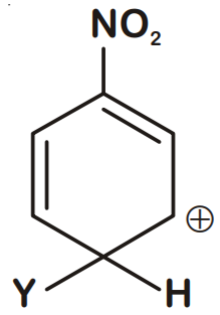
$CH_2 = CH - C \equiv CH$

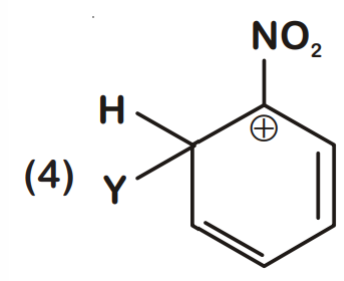
Number of orbital require in hybridization = Number of σ-bonds around each carbon atom.

19. Which of the following carbocations is expected to be most Stable

(1)


(2)


(3)


(4) 

Answer (1)

$-NO_2$ group exhibit –I effect and it decreases with increase in distance. In option (1) positive charge present on C-atom at maximum distance so –I effect reaching to it is minimum and stability is maximum.

20. Which of the following is correct with respect to – I effect of the substituents? (R = alkyl)

(1) – NH2 > – OR > – F

(2) – NR2 < – OR < – F

(3) – NH2 < – OR < – F

(4) – NR2 > – OR > – F

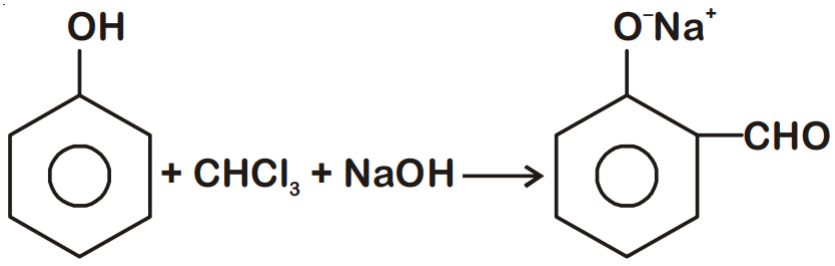
Answer (3*)

Sol.

–I effect increases on increasing electronegativity of atom. So, correct order of –I effect is $-NH_2$ < – OR < – F.

*Most appropriate Answer is option (3), however option (2) may also be correct answer.

21. In the reaction



The electrophile involved is

(1) Dichloromethyl anion $^{+}CHCl_2$

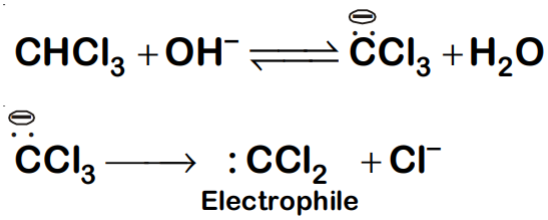
(2) Formyl cation ^{+}CHO

(3) Dichloromethyl cation $^{+}CHCl_2$

(4) Dichlorocarbene $:CCl_2$

Answer (4)

Sol. It is Reimer-Tiemann reaction. The electrophile formed is $:CCl_2$ (Dichlorocarbene) according to the following reaction



22. Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their

(1) More extensive association of carboxylic acid via van der Waals force of attraction

(2) Formation of carboxylate ion

(3) Formation of intramolecular H-bonding

(4) Formation of intermolecular H-bonding

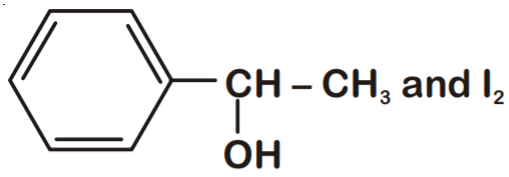
Answer (4)

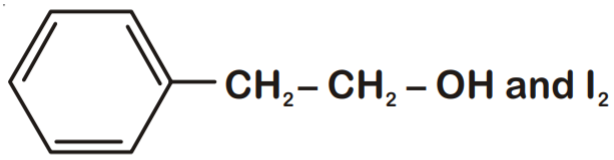
Solution:

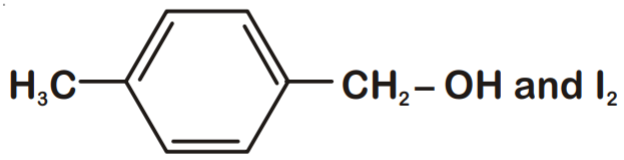
Due to formation of intermolecular H-bonding in carboxylic acid, association occurs. Hence boiling point increases and become more than the boiling point of aldehydes, ketones and alcohols of comparable molecular masses.

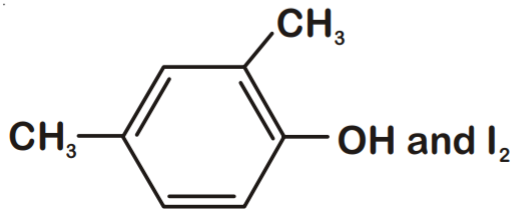
23. Compound A, $C_8H_{10}O$, is found to react with NaOI (produced by reacting Y with NaOH) and yields a yellow precipitate with characteristic smell.

A and Y are respectively

(1) 

(2) 

(3) 

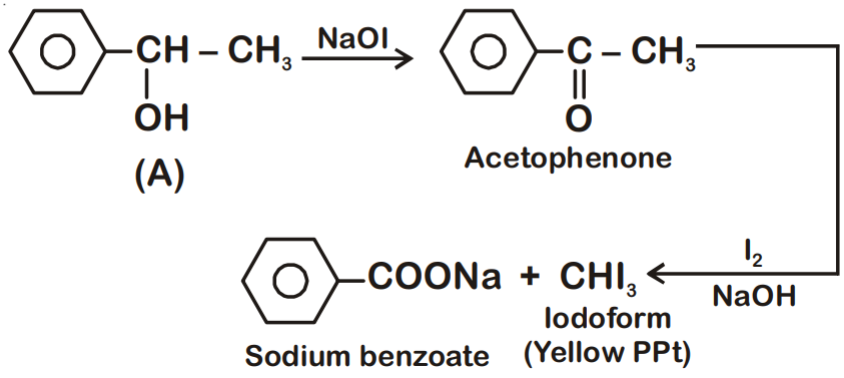
(4) 

Answer (1)

Sol.

Option (1) is secondary alcohol which on oxidation gives phenylmethyl ketone (Acetophenone). This on reaction with I_2 and NaOH form iodoform and sodium benzoate.

$$2NaOH + I_2 \rightarrow NaOI + NaI + H_2O$$



24. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the correct code :

	Column I		Column II
a.	Co^{3+}	i.	$\sqrt{8}$ BM
b.	Cr^{3+}	ii.	$\sqrt{35}$ BM
c.	Fe^{3+}	iii.	$\sqrt{3}$ BM
d.	Ni^{2+}	iv.	$\sqrt{24}$ BM
		v.	$\sqrt{15}$ BM

A b c d
(1) iv i ii iii
(2) i ii iii iv
(3) iv v ii i
(4) iii v i ii

Answer (3)

Solution:

Co^{3+} = [Ar] $3d^6$, Unpaired e^-(n) = 4

Spin magnetic moment = $\sqrt{4(4+2)} = \sqrt{24}$ BM

Cr^{3+} = [Ar] $3d^3$, Unpaired e^-(n) = 3

Spin magnetic moment = $\sqrt{3(3+2)} = \sqrt{15}$ BM

Fe^{3+} = [Ar] $3d^5$, Unpaired e^-(n) = 5

Spin magnetic moment = $\sqrt{5(5+2)} = \sqrt{35}$ BM

Ni^{2+} = [Ar] $3d^8$, Unpaired e^-(n) = 2

Spin magnetic moment = $\sqrt{2(2+2)} = \sqrt{8}$ BM

25. Which one of the following ions exhibits d-d transition and paramagnetism as well?
(1) MnO_4^-
(2) $Cr_2O_7^{2-}$
(3) CrO_4^{2-}
(4) MnO_4^{2-}
Answer (4)
Sol.
$CrO_4^{2-} \Rightarrow Cr^{6+}$ = [Ar] Unpaired electron (n) = 0; Diamagnetic
$Cr_2O_7^{2-} \Rightarrow Cr^{6+}$ = [Ar] Unpaired electron (n) = 0; Diamagnetic
$MnO_4^{2-} = Mn^{6+}$ = [Ar] $3d^1$ Unpaired electron (n) = 1; Paramagnetic
$MnO_4^- = Mn^{7+}$ = [Ar] Unpaired electron (n) = 0; Diamagnetic

26. Iron carbonyl, $Fe(CO)_5$ is
(1) Trinuclear
(2) Mononuclear
(3) Tetranuclear
(4) Dinuclear
Answer (2)
Solution:
Based on the number of metal atoms present in a complex, they are classified into mononuclear, dinuclear, trinuclear and so on.
eg: $Fe(CO)_5$: mononuclear
$Co_2(CO)_8$: dinuclear
$Fe_3(CO)_{12}$: trinuclear
Hence, option (2) should be the right answer.

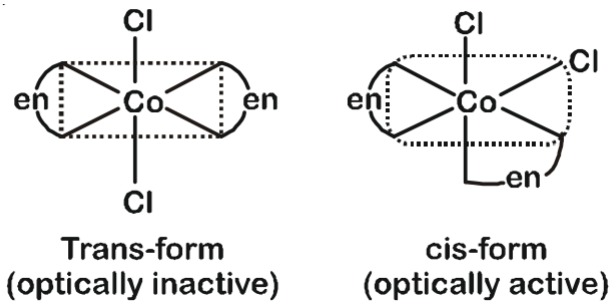
27. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is
(1) Ionization isomerism
(2) Coordination isomerism
(3) Geometrical isomerism

(4) Linkage isomerism

Answer (3)

Sol.

In $[CoCl_2(en)_2]$, Coordination number of Co is 6 and this compound has octahedral geometry. As per given option, type of isomerism is geometrical isomerism.



28. The geometry and magnetic behaviour of the complex $[Ni(CO)_4]$ are

(1) Square planar geometry and paramagnetic

(2) Tetrahedral geometry and diamagnetic

(3) Square planar geometry and diamagnetic

(4) Tetrahedral geometry and paramagnetic

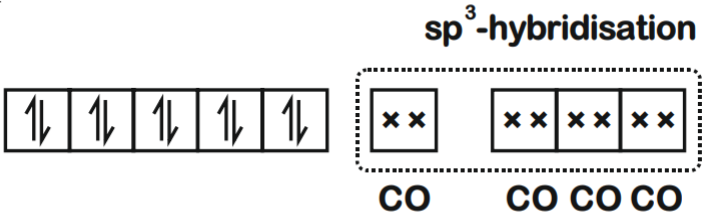
Answer (2)

Sol.

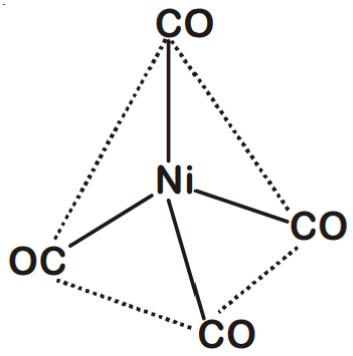
Ni(28) : $[Ar]3d^8\ 4s^2$

∵CO is a strong field ligand

Configuration would be :



For, four 'CO'-ligands hybridisation would be sp^3 and thus the complex would be diamagnetic and of tetrahedral geometry.



29. Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations :

a. 60 mL M /10 HCl + 40 mL M/10 NaOH

b. 55 mL M/10 HCl + 45 mL M/10 NaOH

c. 75 mL M/5 HCl + 25 mL M/ 5 NaOH

d. 100 mL M/10 HCl + 100 mL M/10 NaOH

pH of which one of them will be equal to 1?

(1) d

(2) a

(3) b

(4) c

Answer (4)

Solution:

- **Meq of HCl = $75\times\frac{1}{5}\times1 = 15$**
- **Meq of NaOH = $25\times\frac{1}{5}\times1 = 5$**
- **Meq of HCl in resulting solution = 10**
- **Molarity of $[H^+]$ in resulting mixture**

$$= \frac{10}{100} = \frac{1}{10}$$

$$pH = -\log[H^+] = -\log\left[\frac{1}{10}\right] = 1.0$$

30. On which of the following properties does the coagulating power of an ion depend?

(1) Both magnitude and sign of the charge on the ion

(2) Size of the ion alone

(3) The magnitude of the charge on the ion alone

(4) The sign of charge on the ion alone

Answer (1)

Sol.

Coagulation of colloidal solution by using an electrolyte depends on the charge present (positive or negative) on colloidal particles as well as on its size. Coagulating power of an electrolyte depends on the magnitude of charge present on effective ion of electrolyte.

31. Given van der Waals constant for NH_3, H_2, O_2 and CO_2 are respectively 4.17, 0.244, 1.36 and 3.59, which one of the following gases is most easily liquefied?

(1) O_2

(2) H_2

(3) NH_3

(4) CO_2

Answer (3)

Sol.

van der waal constant 'a', signifies intermolecular forces of attraction.Higher is the value of 'a', easier will be the liquefaction of gas.

32. The solubility of $BaSO_4$ in water is 2.42×10^{-3} gL^{-1} at 298 K. The value of its solubility product (Ksp) will be

(Given molar mass of BaSO4 = 233 g mol^{-1})

(1) 1.08×10^{-14} mol^2L^{-2}

(2) 1.08×10^{-12} mol^2L^{-2}

(3) 1.08×10^{-10} mol^2L^{-2}

(4) 1.08×10^{-8} mol^2L^{-2}

Answer (3)

Solution:

$$\text{Solubility of } BaSO_4,\ s = \frac{2.42\times10^{-3}}{233}\ (\text{mol } L^{-1})$$

$$= 1.04 \times 10^{-5}\ (\text{mol } L^{-1})$$

$$BaSO_4(s) \rightleftharpoons \underset{s}{Ba^{2+}}(aq) + \underset{s}{SO_4^{2-}}(aq)$$

$$K_{sp} = [Ba^{2+}]\,[SO_4^{2-}] = s^2$$

$$= (1.04 \times 10^{-5})^2$$

$$= 1.08 \times 10^{-10}\ mol^2\ L^{-2}$$

33. In which case is number of molecules of water maximum?

(1) 0.00224 L of water vapours at 1 atm and 273 K

(2) 0.18 g of water

(3) 18 mL of water

(4) 10^{-3} mol of water

Answer (3)

Solution:

. (1) $\text{Moles of water} = \frac{0.00224}{22.4} = 10^{-4}$

$\text{Molecules of water} = \text{mole} \times N_A = 10^{-4}\ N_A$

(2) $\text{Molecules of water} = \text{mole} \times N_A = \frac{0.18}{18}N_A$

$= 10^{-2}\ N_A$

(3) $\text{Mass of water} = 18 \times 1 = 18\ g$

$\text{Molecules of water} = \text{mole} \times N_A = \frac{18}{18}N_A$

$= N_A$

(4) $\text{Molecules of water} = \text{mole} \times N_A = 10^{-3}\ N_A$

34. The correct difference between first and second order reactions is that

(1) A first-order reaction can catalyzed; a second-order reaction cannot be catalyzed

(2) The half-life of a first-order reaction does not depend on $[A]_0$; the half-life of a second-order reaction does depend on $[A]_0$

(3) The rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations

(4) The rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations

Answer (2)

Sol.

- For first order reaction, $t_{1/2} = \frac{0.693}{k}$,

  which is independent of initial concentration of reactant.

- For second order reaction, $t_{1/2} = \frac{1}{k[A_0]}$,

  which depends on initial concentration of reactant.

35. Among CaH_2, BeH_2, BaH_2, the order of ionic character is

(1) $BeH_2 < BaH_2 < CaH_2$

(2) $CaH_2 < BeH_2 < BaH_2$

(3) $BeH_2 < CaH_2 < BaH_2$

(4) $BaH_2 < BeH_2 < CaH_2$

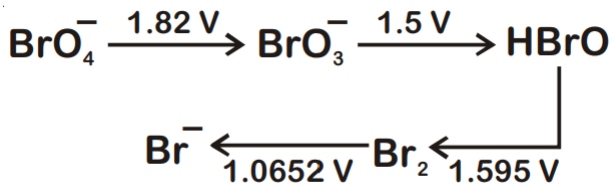
Answer (3)

Sol.

For 2nd group hydrides, on moving down the group metallic character of metals increases so ionic character of metal hydride increases.

Hence the option (3) should be correct option.

36. Consider the change in oxidation state of Bromine corresponding to different emf values as shown in the diagram below :



Then the species undergoing disproportionation is

(1) Br_2

(2) BrO_4^-

(3) BrO_3

(4) HBrO

Answer (4)

Sol.

$$\overset{+1}{HBrO} \longrightarrow \overset{0}{Br_2},\ E^o_{HBrO/Br_2} = 1.595\ V$$

$$\overset{+1}{HBrO} \longrightarrow \overset{+5}{BrO_3^-},\ E^o_{BrO_3^-/HBrO} = 1.5\ V$$

E^o_{cell} for the disproportionation of HBrO,

$$E^o_{cell} = E^o_{HBrO/Br_2} - E^o_{BrO_3^-/HBrO}$$

$= 1.595 - 1.5$

$= 0.095\ V = +ve$

Hence, option (3) is correct answer.

37. For the redox reaction

$$MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$$

The correct coefficients of the reactants for the balanced equation are –

	MnO_4^-	$C_2O_4^{2-}$	H^+
(1)	2	16	5
(2)	2	5	16
(3)	16	5	2
(4)	5	16	2

Answer (2)

Sol.

Sol. $\overset{+7}{MnO_4^-} + \overset{+3}{C_2O_4^{2-}} + H^+ \longrightarrow Mn^{2+} + \overset{+4}{CO_2} + H_2O$

Reduction

Oxidation

n-factor of $MnO_4^- \Rightarrow 5$

n-factor of $C_2O_4^{2-} \Rightarrow 2$

Ratio of n-factors of MnO_4^- and $C_2O_4^-$ is 5 : 2

So, molar ratio in balanced reaction is 2 : 5 $\therefore$

The balanced equation is

$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$

38. Which one of the following conditions will favour maximum formation of the product in the reaction,

$$A_2(g) + B_2(g) \rightleftharpoons X_2(g)\ \Delta_r H = -X\ kJ?$$

(1) High temperature and high pressure

(2) Low temperature and low pressure

(3) Low temperature and high pressure

(4) High temperature and low pressure

Answer (3)

Sol.

$$A_2(g) + B_2(g) \rightleftharpoons X_2(g)\ \Delta_r H = -X\ kJ$$

On increasing pressure equilibrium shifts in a direction where pressure decreases i.e. forward direction.

On decreasing temperature, equilibrium shifts in exothermic direction i.e., forward direction. So, high pressure and low temperature favours maximum formation of product.

39. When initial concentration of the reactant is doubled, the half-life period of a zero order reaction

(1) Is tripled

(2) Is doubled

(3) Is halved

(4) Remains unchanged

Answer (2)

Sol. Half life of zero order

$$t_{1/2} = \frac{[A_0]}{2K}$$

$t_{1/2}$ will be doubled on doubling the initial concentration.

40. The bond dissociation energies of X_2, Y_2 and XY are in the ratio of 1 : 0.5 : 1. ΔH for the formation of XY is –200 kJ mol^{-1}. The bond dissociation energy of X_2 will be

(1) 800 kJ mol^{-1}

(2) 100 kJ mol^{-1}

(3) 200 kJ mol^{-1}

(4) 400 kJ mol^{-1}

Answer (1)

Solution:

I. The reaction for $\Delta_f H°(XY)$

$$\frac{1}{2}X_2(g)+\frac{1}{2}Y_2(g)\longrightarrow XY(g)$$

Bond energies of X_2, Y_2 and XY are X, $\frac{X}{2}$, X respectively

$$\therefore \quad \Delta H=\left(\frac{X}{2}+\frac{X}{4}\right)-X=-200$$

On solving, we get

$$\Rightarrow -\frac{X}{2}+\frac{X}{4}=-200$$

$\Rightarrow$ X = 800 kJ/mole

41. The correction factor 'a' to the ideal gas equation corresponds to

(1) Electric field present between the gas molecules

(2) Volume of the gas molecules

(3) Density of the gas molecules

(4) Forces of attraction between the gas molecules

Answer (4)

Sol.

In real gas equation, $\left(P+\frac{an^2}{V^2}\right)(V-nb)=nRT$

van der Waal's constant, 'a' signifies intermolecular forces of attraction.

42. Consider the following species :

CN^+, CN^-, NO and CN

Which one of these will have the highest bond order?

(1) CN^+

(2) CN^-

(3) NO

(4) CN

Answer (2)

Sol

$NO : (\sigma 1s)^2, (\sigma^* 1s)^2, (\sigma 2s)^2, (\sigma^* 2s)^2, (\sigma 2p_z)^2, (\pi 2p_x)^2 = (\pi 2p_y)^2, (\pi^* 2p_x)^1 = (\pi^* 2p_y)^0$

$BO = \frac{10-5}{2} = 2.5$

$CN^- : (\sigma 1s)^2, (\sigma^* 1s)^2, (\sigma 2s)^2, (\sigma^* 2s)^2, (\pi 2p_x)^2 = (\pi 2p_y)^2, (\sigma 2p_z)^2$

$BO = \frac{10-4}{2} = 3$

$CN : (\sigma 1s)^2, (\sigma^* 1s)^2, (\sigma 2s)^2, (\sigma^* 2s)^2, (\pi 2p_x)^2 = (\pi 2p_y)^2, (\sigma 2p_z)^1$

$BO = \frac{9-4}{2} = 2.5$

$CN^+ : (\sigma 1s)^2, (\sigma^* 1s)^2, (\sigma 2s)^2, (\sigma^* 2s)^2, (\pi 2p_x)^2 = (\pi 2p_y)^2$

$BO = \frac{8-4}{2} = 2$

43. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is

(1) Mg_2X (2) MgX_2

(3) Mg_2X_3 (4) Mg_3X_2

Answer (4)

Sol.

Element (X) electronic configuration

$1s^2\ 2s^2\ 2p^3$

So, valency of X will be 3. Valency of Mg is 2. Formula of compound formed by Mg and X will be Mg_3X_2.

44. Iron exhibits bcc structure at room temperature. Above 900°C, it transforms to fcc structure. The ratio of density of iron at room temperature to that at 900°C (assuming molar mass and atomic radii of iron remains constant with temperature) is

(1) $\frac{3\sqrt{3}}{4\sqrt{2}}$ (2) $\frac{4\sqrt{3}}{3\sqrt{2}}$

(3) $\frac{\sqrt{3}}{\sqrt{2}}$ (4) $\frac{1}{2}$

Answer (1)

Sol. For BCC lattice : Z = 2, $a = \frac{4r}{\sqrt{3}}$

For FCC lattice : Z = 4, $a = 2\sqrt{2}\,r$

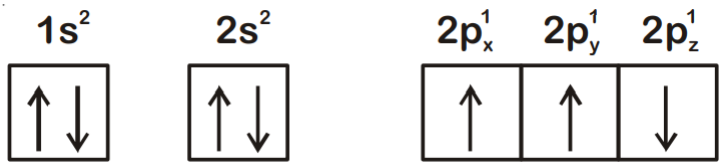
$$\therefore \quad \frac{d_{25^\circ C}}{d_{900^\circ C}} = \frac{\left(\frac{ZM}{N_A a^3}\right)_{BCC}}{\left(\frac{ZM}{N_A a^3}\right)_{FCC}}$$

$$= \frac{2}{4}\left(\frac{2\sqrt{2}\,r}{\frac{4r}{\sqrt{3}}}\right)^3$$

$$= \left(\frac{3\sqrt{3}}{4\sqrt{2}}\right)$$

45. Which one is a wrong statement?

(1) The electronic configuration of N atom is



(2) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers

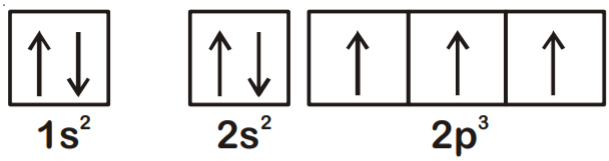
(3) Total orbital angular momentum of electron in 's' orbital is equal to zero

(4) The value of m for dz^2 is zero

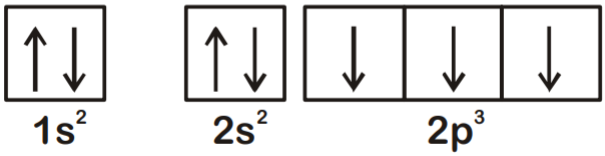
Answer (1)

Sol.

According to Hund's Rule of maximum multiplicity, the correct electronic configuration of N-atom is



OR



∴ Option (1) violates Hund's Rule.