ANSWERS & HINTS
for
WBJEE - 2013
SUB : CHEMISTRY

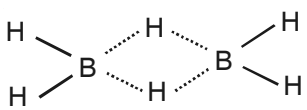
CATEGORY - I

Q. 1 – Q. 45 carry one mark each, for which only one option is correct. Any wrong answer will lead to deduction of 1/3 mark.

1. In diborane, the number of electrons that account for bonding in the bridges is

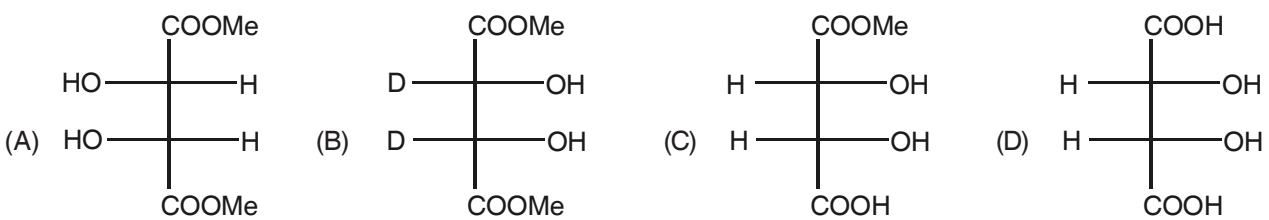
(A) Six (B) Two (C) Eight (D) Four

Ans : (D)

Hints : 

Each bridging bond is formed by two electrons. Hence four electrons account for bonding in the bridges.

2. The optically active molecule is



Ans : (C)

Hints : Others are meso ompound due to presence of plane of symmetry.

3. A van der Waals gas may behave ideally when

(A) The volume is very low

(B) The temperature is very high

(C) The pressure is very low

(D) The temperature, pressure and volume all are very high

Ans : (C)

Hints : A van der waals gas may behave ideally when pressure is very low as compressibility factor (Z) approaches 1. At high temperature Z > 1.

4. The half-life for decay of ^{14}C by -emission is 5730 years. The fraction of ^{14}C decays, in a sample that is 22,920 years old, would be

(A) 1/8 (B) 1/16 (C) 7/8 (D) 15/16

Ans : (D)

Hints : $N \quad N_0 \left(\frac{1}{2}\right)^{\frac{t}{t_{\frac{1}{2}}}} \quad N_0 \left(\frac{1}{2}\right)^{\frac{22920}{5730}} \quad N_0 \left(\frac{1}{2}\right)^4 \quad \frac{N_0}{16}$ where N_0 = initial amount, N = amount left

So fraction reacted $N_0 \quad \frac{N_0}{16} \quad \frac{15}{16}N_0$

5. 2-Methylpropane on monochlorination under photochemical condition give

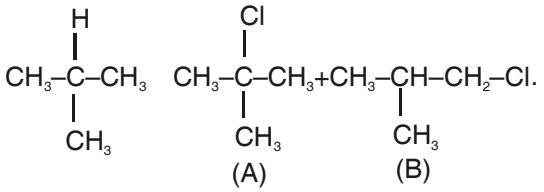
(A) 2-Chloro-2-methylpropane as major product

(B) (1:1) Mixture of 1-chloro-2-methylpropane and 2-chloro-2-methylpropane

(C) 1-Chloro-2-methylpropane as a major product

(D) (1:9) Mixture of 1-chloro-2-methylpropane and 2-chloro-2-methylpropane

Ans : (C)

Hints :  Ratio of (A) : (B) is 5 : 9.

(A) (B)

6. For a chemical reaction at 27°C, the activation energy is 600 R. The ratio of the rate constants at 327°C to that of at 27°C will be

(A) 2 (B) 40 (C) e (D) e^2

Ans : (C)

Hints : $\ln\frac{K_2}{K_1} \quad \frac{E_a}{R}\left(\frac{1}{T_1} \quad \frac{1}{T_2}\right)$ or, $\ln\frac{K_2}{K_1} \quad \frac{600R}{R}\left(\frac{1}{300} \quad \frac{1}{600}\right)$ or, $\ln\frac{K_2}{K_1} \quad \frac{600R}{R}\left(\frac{2 \quad 1}{600}\right) \quad 1$

$\ln\frac{K_2}{K_1} \quad \ln e \qquad \frac{K_2}{K_1} \quad e$

7. Chlorine gas reacts with red hot calcium oxide to give

(A) Bleaching powder and di hlorine monoxide (B) Bleaching powder and water

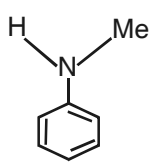
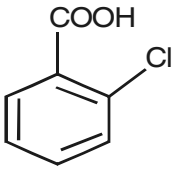
(C) Calcium chloride and chlorine dioxide (D) Calcium chloride and oxygen

Ans : (D)

Hints : $2CaO + 2Cl_2 \xrightarrow{\text{Red hot}} CaCl_2 + O_2$

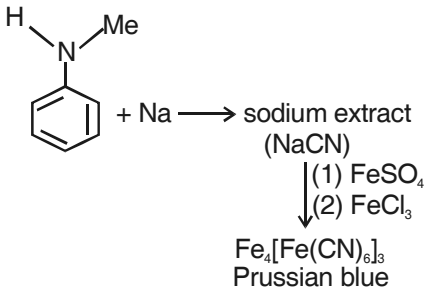
8. Correct pair of compounds which gives blue colouration/precipitate and white precipitate, respectively, when their Lassaigne's test is separately done is

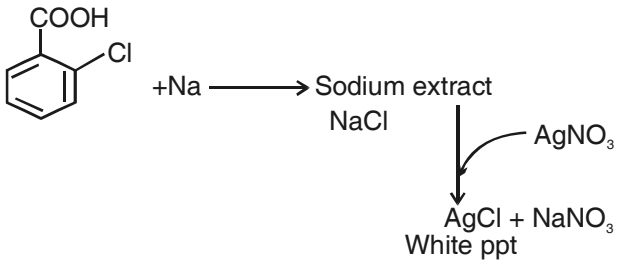
(A) $NH_2NH_2.HCl$ and $ClCH_2COOH$ (B) NH_2CSNH_2 and $PhCH_2Cl$

(C) NH_2CH_2COOH and NH_2CONH_2 (D)  and 

Ans : (D)

Hints : Organic compound





9. The change of entropy (dS) is defined as

(A) dS q / T (B) dS dH / T (C) dS q_{eqv} / T (D) dS (dH dG) / T

Ans : (C)

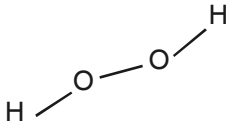
Hints : It's a fact

10. In O_2 and H_2O_2, the O–O bond lengths are 1 21 and 1.48 Å respectively. In ozone, the average O–O bond length is

(A) 1.28 Å (B) 1.18 Å (C) 1.44 Å (D) 1.52 Å

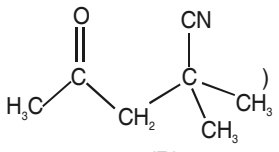
Ans : (A)

Hints : Bond length is nearly average of bond length of O – O in



1.21Å and O—O in O_2 1.48Å

Hence it is 1.28 Å

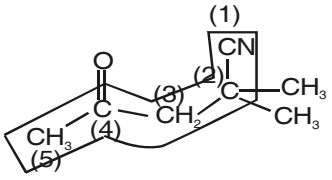
11. The IUPAC name of the compound X is (X= 

)

(A) 4-cyano-4-methyl-2-oxopentane (B) 2-cyano-2-methyl-4-oxopentane

(C) 2,2-dimethyl-4-oxopentanenitrile (D) 4-cyano-4-methyl-2-pentanone

Ans : (C)

Hints : 

2, 2-Dimethyl-4-oxopentanenitrile

12. At 25°C, the solubility product of a salt of MX_2 type is 3.2×10^{-8} in water. The solubility (in moles/lit) of MX_2 in water at the same temperature will be

(A) 1.2×10^{-3} (B) 2×10^{-3} (C) 3.2×10^{-3} (D) 1.75×10^{-3}

Ans : (B)

Hints : K_{sp} MX_2 $4s^3$ 3.2 10^{-8} s $\sqrt{\frac{3.2 \quad 10^{-8}}{4}}$

$2 \quad 10^{-3}$

13. In $SOCl_2$, the Cl–S–Cl and Cl–S–O bond angles are

(A) 130° and 115° (B) 106° and 96° (C) 107° and 108° (D) 96° and 106°

Ans : (D)

Hints : Fact

14. (+)-2-chloro-2-phenylethane in toluene racemises slowly in the pre ence of mall amount of $SbCl_5$, due to the formation of

(A) Carbanion (B) Carbene (C) Free-radical (D) Carbocation

Ans : (D)

Hints : $SbCl_5$ removes Cl^- from the substrate to generate a planar carbocation, which is then subsequently attacked by Cl^- from both top and bottom to result in a racemic mixture.

15. Acid catalysed hydrolysis of ethyl acetate follows a *pseudo*-first order kinetics with respect to ester. If the reaction is carried out with large excess of ester, the order wi h respect to ester will be

(A) 1.5 (B) 0 (C) 2 (D) 1

Ans : (B)

Hints : With large excess of ester th rate of reaction is independent of ester concentration.

16. The different colours of litmus in acidic, neutral and basic solutions are, respectively

(A) Red, orange and blue (B) Blue, violet and red

(C) Red, colourless and blue (D) Red, violet and blue

Ans : (D)

Hints :

17. Baeyer's reagent is

(A) Alkaline potassium permanganate (B) Acidified potassium permanganate

(C) Neutral potassium permanganate (D) Alkaline potassium manganate

Ans : (A)

Hints :

18. The correct order of equivalent conductances at infinite dilution in water at room temperature for H^+, K^+, CH_3COO^- and HO^- ions is

(A) $HO^->H^+>K^+>CH_3COO^-$ (B) $H^+>HO^->K^+>CH_3COO^-$

(C) $H^+>K^+>HO^->CH_3COO^-$ (D) $H^+>K^+>CH_3COO^->HO^-$

Ans : (B)

19. Nitric acid can be obtained from ammonia via the formations of the intermediate compounds

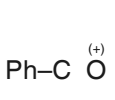
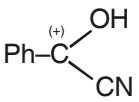
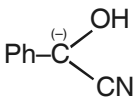
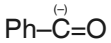
(A) Nitric oxides and nitrogen dioxides (B) Nitrogen and nitric oxides

(C) Nitric oxide and dinitrogen pentoxide (D) Nitrogen and nitrous oxide

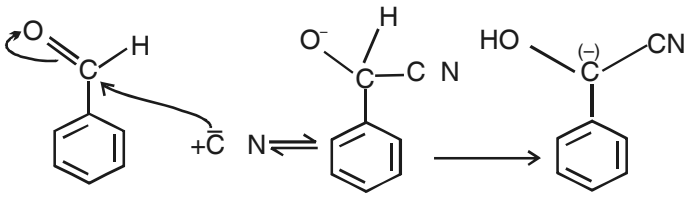
Ans : (A)

Hints :

20. In the following species, the one which is likely to be the intermediate during benzoin condensation of benzaldehyde, is

(A)  (B)  (C)  (D) 

Ans : (C)

Hints : 

21. The correct order of acid strength of the following substituted phenols in wate at 28 C is

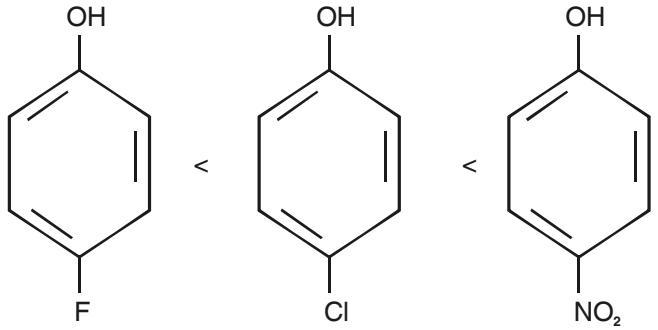
(A) p-nitrophnenol<p-fluorophenol<p-chlorophenol

(B) p-chlorophenol<p-fluorophenol<p-nitrophnenol

(C) p- fluorophenol<p-chlorophenol<p-nitrophnenol

(D) p-fluorophenol<p-nitrophnenol<p-chlorophenol

Ans : (C)

Hints : 

(Acidic strength)

As order of electron withdrawing nature from benzene ring : $-NO_2 > -Cl > -F$

22. For isothermal expansion of an ideal gas, the correct combination of the thermodynamic parameters will be

(A) U = 0, Q=0, w 0 and H 0

(B) U 0, Q 0, w 0 and H 0

(C) U = 0, Q 0, w = 0 and H 0

(D) U = 0, Q 0, w 0 and H 0

Ans : (D)

Hints : For isothermal process, T=0

$U = nC_v$ T=0

$H = nC_p$ T=0

From first law of thermodynamics

U= Q +W

As U = 0

Q = W 0

23. Addition of excess potassium iodide solution to a solution of mercuric chloride gives the halide complex

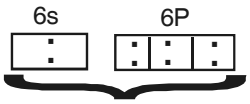
(A) tetrahedral $K_2[HgI_4]$ (B) trigonal $K[HgI_3]$

(C) linear Hg_2I_2 (D) square planar $K_2[HgCl_2I_2]$

Ans : (A)

Hints : $HgCl_2 + 4KI \longrightarrow K_2[HgI_4] + 2KCl$

Hg : [xe] $4f^{14}5d^{10}6s^2$



Hg^{2+} : [xe] $4f^{14}5d^{10}$ sp^3

(Tetrahedral)

24. Amongst the following, the one which can exist in free state as a stable compound is

(A) C_7H_9O (B) $C_8H_{12}O$ (C) $C_6H_{11}O$ (D) $C_{10}H_{17}O_2$

Ans : (B)

Hints : Degree of unsaturation = $\frac{n\ v\ \ 2}{2}$ 1

; n = no. of atoms of a particular type

v = valency of the atom

C_7H_9O ; DU = $\frac{7(4\ \ 2)\ \ 9(1\ \ 2)\ \ 1(2\ \ 2)}{2}$ 1 3.5

$C_8H_{12}O$; DU = $\frac{8(4\ \ 2)\ \ 12(1\ \ 2)\ \ 1(2\ \ 2)}{2}$ 1 3

$C_6H_{11}O$: DU = $\frac{6(4\ \ 2)\ \ 11(1\ \ 2)\ \ 1(2\ \ 2)}{2}$ 1.5

$C_{10}H_{17}O_2$: DU = $\frac{10(4\ \ 2)\ \ 17(1\ \ 2)\ \ 2(2\ \ 2)}{2}$ 1 2.5

Molecules with fractional degr e of unsaturation cannot exist with stability

25. A conducitivity cell has been calibrated with a 0.01 M 1:1 electrolyte solution (specific conductance, k=1.25 x 10^{-3} S cm^{-1}) in the cell and the measured resistance was 800 ohms at 25 C. The constant will be

(A) 1.02cm (B) 0.102cm^{-1} (C) 1.00cm^{-1} (D) 0.5cm^{-1}

Ans : (C)

Hints : K = 1.25x10^{-3} S cm^{-1} : = $\frac{1}{K}$ $\frac{1}{1.25x10^{\ 3}}$

R = $\frac{l}{A}$

800 $\frac{1}{1.25\ \ 10^{\ 3}}$ $\frac{l}{A}$, where $\frac{l}{A}$ = cell constant

$\frac{l}{A}$ 800 1.25 $10^{\ 3}$ 1

26. The orange solid on heating gives a colourless gas and a greensolid which can be reduced to metal by aluminium powder. The orange and the green solids are, respectively

(A) $(NH_4)_2Cr_2O_7$ and Cr_2O_3 (B) $Na_2Cr_2O_7$ and Cr_2O_3 (C) $K_2Cr_2O_7$ and CrO_3 (D) $(NH_4)_2Cr_2O_4$ and CrO_3

Ans : (A)

Hints : $(NH_4)_2Cr_2O_7 \longrightarrow N_2 + Cr_2O_3 + 4H_2O$

Orange solid; Colourless gas; Green solid

27. The best method for the preparationof 2,2 -dimethylbutane is via the reaction of

(A) Me_3CBr and $MeCH_2Br$ in Na/ether

(B) $(Me_3C)_2CuLi$ and $MeCH_2Br$

(C) $(MeCH_2)_2CuLi$ and Me_3CBr

(D) Me_3CMgI and $MeCH_2I$

Ans : (B)

Hints : Corey-House alkane synthesis gives the alkane in best yield

$(Me_3C)_2CuLi + MeCH_2Br \xrightarrow{S_N^2} Me_3C–CH_2CH_3$

(1)

28. The condition of spontaneity of process is

(A) lowering of entropy at constant temperature and pressure

(B) lowering of Gibbs free energy of system at constant temperature and pressure

(C) increase of entropy of system at constant temp rature and pressure

(D) increase of Gibbs free energy of the universe at constant temperature and pressure

Ans : (B)

Hints : $dG_{P,T}$ = –ve is the criterion for spontaneity

29. The increasing order of O-N-O bond angle in the species NO_2, NO_2^+ and NO_2^- is

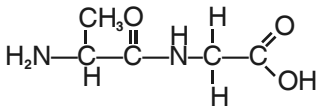
(A) $NO_2 + < NO_2 < NO_2^-$ (B) $NO_2 < NO_2^- < NO_2^+$ (C) $NO_2^+ < NO_2^- < NO_2$ (D) $NO_2 < NO_2^+ < NO_2^-$

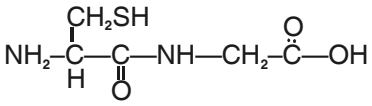
Ans : ()

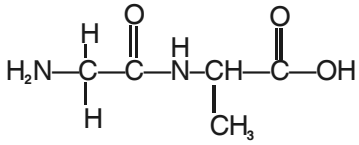
Hints : No option is correct

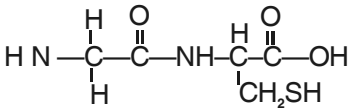
correct ans : $NO_2^+ > NO_2 > NO_2^-$

30. The correct structure of the dipeptide gly-ala is

(A) 

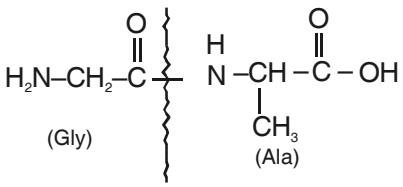
(B) 

(C) 

(D) 

Ans : (C)

Hints :



31. Equivalent conductivity at infinite dilution for sodium-potassium oxalate ($(COO^-)_2Na^+K^+$) will be [given, molar conductivities of oxalate, K^+ and Na^+ ions at infinite dilution are 148.2, 50.1, 73.5 S cm^2mol^{-1}, respectively]

(A) 271.8 S cm^2 eq^{-1} (B) 67.95 S cm^2 eq^{-1} (C) 543.6 S cm^2 eq^{-1} (D) 135.9 S cm^2 eq^{-1}

Ans : (D)

Hints : $_M = {}_M(\text{Oxa late}) + {}_M(Na^+) + {}_M(k^+)$

$_M = (148.+50.1+73.5)\text{S cm}^2\ \text{mol}^{-1}$

$_M = 271.8\text{S cm2 mol}^{-1}$

$_{Eq} = \frac{271.8}{2}$ 135.9 S cm^2 eq^{-1} ^{eq} $\frac{M}{n.factor}$

32. For BCl_3, $AlCl_3$ and $GaCl_3$ te increasing order of ionic character is

(A) $BCl_3<AlCl_3<GaCl_3$ (B) $GaCl_3<AlCl_3<BCl_3$ (C) $BCl_3<GaCl_3<AlCl_3$ (D) $AlCl_3<BCl_3<GaCl_3$

Ans : (C)

Hints : Ionic character is inversely proportional to polarising powe of cation.

$AlCl_3 > GaCl_3 > BCl_3$

33. At 25 C, pH of a 10^{-8} M aqueous KOH solution will be

(A) 6.0 (B) 7.02 (C) 8.02 (D) 9.02

Ans : (B)

Hints : $[\bar{OH}]_{Total} = (10^{-8} + 10^{-7})M$

$P^{OH} = -\log [10^{-8}+10^{-7}]$

6.98

pH = 14 – 6.98 = 7.02

34. The reaction of nitropruss de anion with sulphide ion gives purple colouration due to the formation of

(A) the tetranionic complex of iron(II) coordinating to one NOS^- ion

(B) the dianionic complex of iron (II) coordinating to one NCS^- ion

(C) the trianionic complex of (III) coordinating to one NOS^- ion

(D) the tetranionic complex of iorn (III) coordinating to one NCS^- ion

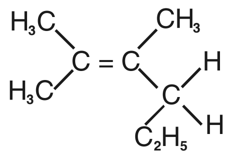
Ans : (A)

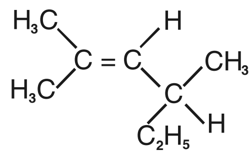
Hints : $Na_2S + Na_2[Fe(CN)_5NO]$ $Na_4[Fe(CN)_5NOS]$

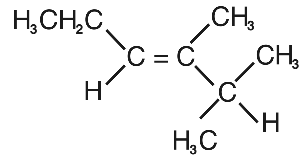
Sod. Nitroprusside Violet color

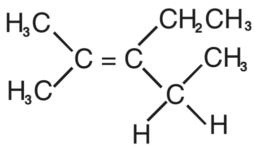
$Fe^{2}(CN)_5{}^{5}NoS^{4}$ Tetra anionic complex of iron (II) co-ordinating to one NOS^- ion

35. An optically active compound having molecular formula C_8H_{16} on ozonolysis gives acetone as one of the products. The structure of the compound is

(A) 

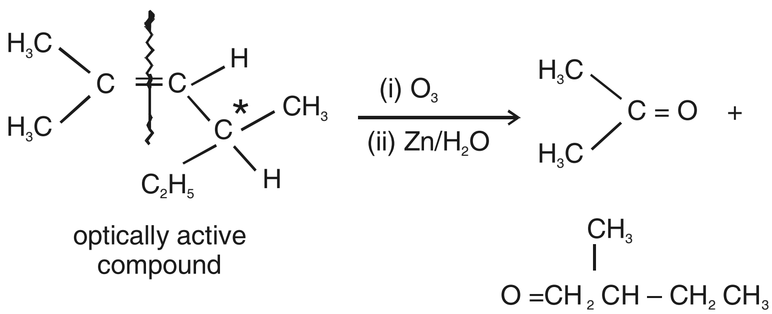
(B) 

(C) 

(D) 

Ans : (B)

Hints :



36. Mixing of two different ideal gases under istohermal reversible condition will lead to
(A) inccrease of Gibbs free energy of the system
(B) no change of entropy of the system
(C) increase of entropy of the system
(D) increase of enthalpy of the system

Ans : (C)

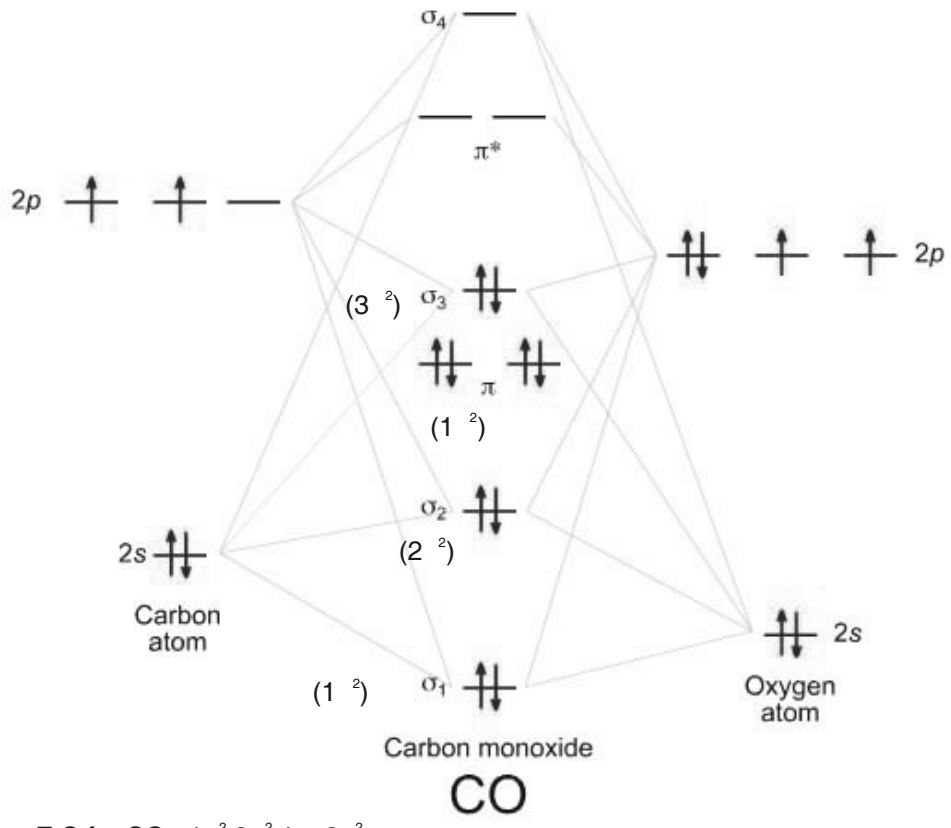
Hints : During mixing, s_{mix} is always positve

37. The ground state electronic configuration of CO molecule is

(A) 1 ^{2}2 ^{2}1 ^{4}3 ^{2} (B) 1 ^{2}2 ^{2}3 ^{2}1 ^{2}2 ^{2} (C) 1 ^{2}2 ^{2}1 ^{2}3 ^{2}2 ^{2} (D) 1 ^{2}1 ^{4}2 ^{2}3 ^{2}

Ans : (A)

Hints :



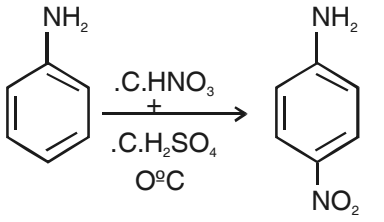
E.C for CO : 1 2 2 1 3 2

38. When aniline is nitrated with nitrating mixturte in ice cold condition, the major product obtained is

(A) p-nitroaniline (B) 2,4-dinitroaniline (C) o-nitroaniline (D) m-nitroaniline

Ans : (A)

Hints :



p-nitro amiline
(Major)

39. The measured freezing point depression for a 0.1 m aqueous CH3COOH solution is 0.19°C. The acid dissociation constant K_a at this concentration will be (Given K_f, the molal cryoscopic constant = 1.86 K kg mol^{-1})

(A) $4.76x10^{-5}$ (B) $4x10^{-5}$ (C) $8x10^{-5}$ (D) $2x10^{-5}$

Ans : (B)

Hints : $T_f \quad i \quad k_f \quad m$

$$i = \frac{0.9}{1.86 \quad 0.1} \quad 1.02$$

$$\frac{i \quad 1}{n \quad 1} \quad \frac{0.02}{1} \quad 2 \quad 10^{2}$$

$k_a \quad c^{2} \quad 1 \quad 10^{01} \quad (2 \quad 10^{2})^{2} \quad 4 \quad 10^{5}$

40. The ore chromite is

(A) $FeCr_2O_4$ (B) $CoCr_2O_3$ (C) $CrFe_2O_4$ (D) $FeCr_2O_3$

Ans : (A)

Chromite ore is $FeCr_2O_4$

41. 'Sulphan' is

(A) a mixture of SO_3 and H_2SO_5

(B) 100% conc. H_2SO_4

(C) a mixture of gypsum and conc. H_2SO_4

(D) 100% oleum (a mixture of 100% SO_3 in 100% H_2SO_4)

Ans : (D)

Hints : Sulphan is pure liquid SO_3

42. Pressure-volume (PV) work done by an ideal gaseous system at constant volume is (where E is internal energy of the system)

(A) – P/P (B) Zero (C) –V P (D) – E

Ans : (B)

Hints : From 1st law of thermodynamic

E = q+w. Now w = P V. for v = 0

w = 0

43. Amongst $[NiCl_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$,$[Ni(PPh_3)_2Cl_2]$, $[Ni(CO)_4]$ and $[Ni(CN)_4]^{2-}$, the paramagnetic species are

(A) $[NiCl_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$,$[Ni(PPh_3)_2Cl_2]$

(B) $[Ni(CO)_4]$,$[Ni(PPh_3)_2Cl_2]$,$[NiCl_4]^{2-}$

(C) $[Ni(CN)_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$,$[NiCl_4]^{2-}$

(D) $[Ni(PPh_3)_2Cl_2]$, $[Ni(CO)_4]$,$[Ni(CN)_4]^{2-}$

Ans : (A)

Hints : $Ni^{+2} = 3d^8\ 4s^0$

(i) $[NiCl_4]^{2-}Cl^-$ weak l gand (spectrochemical series), so no pairing possible CFSE < Pairing energy)

(ii) $[Ni(H_2O)_6]^{2+}$ H O weak field ligand. So no pairing possible. CFSE < pairing energy)

(iii) $[Ni(PPh_3)_2Cl_2]$ alough. PPh_3 has d-acceptance but presence of Cl makes complex t ahedral.

44. Number of hydrogen ions present in 10 millionth part of 1.33 cm^3 of pure water at 25 C is

(A) 6.023 million (B) 60 milli n (C) 8.01 million (D) 80.23 million

Ans : (C)

Hints :

Now $[H^+] = 10^{-7}$ mole / litre

Now 1000 ml contains 10^{-7} mole.H

1ml " " $\frac{10^{-7}}{1000}$ mole H

$1.33\ \ 10^{-7}$ ml — "$1.33\ \ 10^{-17}$

10 million 10^{-7}

so,10 millionth part of 1.33cm^3

$1.33\ \ 10^{-7}$ ml

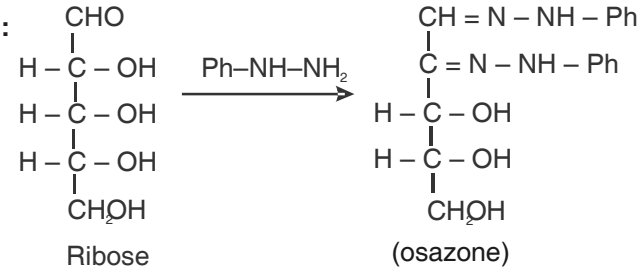
so, no of H^+ ions = $1.33 \times 10^{-17} \times N_A$

45. Ribose and 2-deoxyribose can be differentiated by

(A) Fehling's reagent (B) Tollens's reagent (C) Barfoed's reagent (D) Osazone formation

Ans : (D)

Hints :



Ribose (osazone)

In deoxyribose, one –OH group is missing, which will prevent the formation of osazone.

CATEGORY - II

Q. 46 – Q. 55 carry two marks each, for which only one option is correct. Any wrong answer will lead to deduction of 2/3 mark

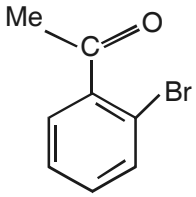
46. The standard Gibbs free energy change (G^0) at 25 C for the dissociation of $N_2O_4(g)$ to $NO_2(g)$ is (given, equilibrium constant = 0.15, R=8.314 JK/mol)

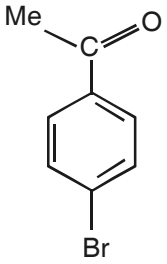
(A) 1.1 kj (B) 4.7 kj (C) 8.1 kj (D) 38.2 kj

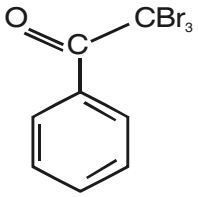
Ans : (B)

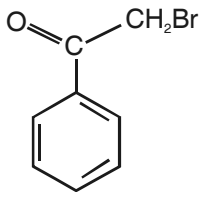
Hints : $G^0 = -RT\ln k$

47. Bromination of PhCOMe in acetic acid medium produces mainly

(A) 

(B) 

(C) 

(D) 

Ans : (D)

Hints : Reaction in acid media proceeds upto m nob omination stage.

48. Silicone oil is obtained from the hydrolysis and polymerisation of

(A) trimethylchlorosilane and dimethydich orosilane

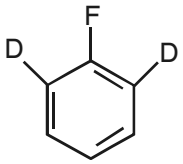
(B) trimethylchlorosilane and methyl richlorosilane

(C) methyltrichlorosilane and dime hy dichlorosilane

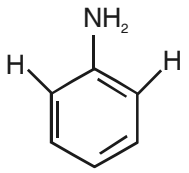
(D) triethylchlorosiland and diethyldichl rosilane

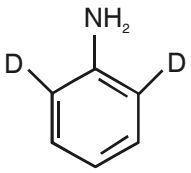
Ans : (A)

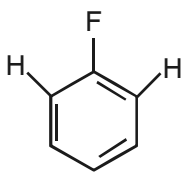
Hints : Silicone oils are formed on low degree of polymerisation

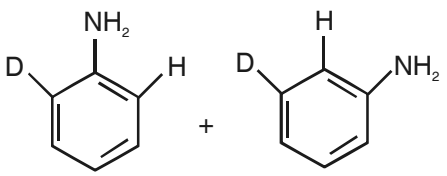
49. Treatment of 

with $NaNH_2$/liq. NH_3 gives

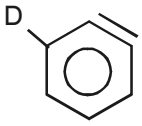
(A) 

(B) 

(C) 

(D) 

Ans : (D)

Hints : Reaction proceeds via benzyne mechanism with intermediate as 

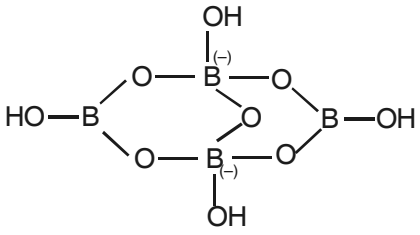
50. Identify the CORRECT statement
    (A) Quantum numbers (n,l,m,s) are obtained arbitrarily
    (B) All the Quantum numbers (n,l,m,s) for any pair of electrons in an atom can be idential under special circum stance
    (C) all the quantum numbers (n,l,m,s) may not be required to described an electron of an atom completely
    (D) All the quantum numbers (n,l,m,s) are required to describe an electron of an atom completely

    Ans : (D)

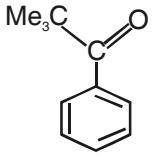
    Hints : Fact

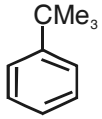
51. In borax the number of B–O–B links and B–OH bonds present are, respectively,
    (A) Five and four (B) Four and five (C) Three and four (D) Five and five

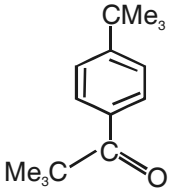
    Ans : (A)

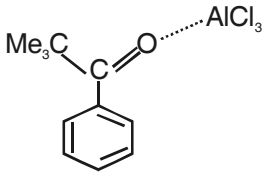
    Hints : 

52. Reaction of benzene with Me_3COCl in the presence of anhydrous $AlCl_3$ gives

    (A) 

    (B) 

    (C) 

    (D) 

    Ans : (B)

    Hints : It is because of rearrangemen during which initially formed acyl cation loses CO to form stable tertiary butyl cation

53. 1×10^{-3} mole of HCl is added t a buffer solution made up of 0.01 M acetic and 0.01 M sodium acetate. The final pH of the buffer will be (given, pK_a of acetic acid is 4.75 at 25°C)
    (A) 4.60 (B) 4.66 (C) 4.75 (D) 4.8

    Ans : (B)

    Hints :

CH_3COO^-	+	H^+	CH_3COOH
0.01		0.001	0.01
0.01–0.001			0.01+0.001
=0.009			=0.011

$$pH \quad pKa \quad \log\frac{[salt]}{[acid]} \quad 4.75 \quad \log\frac{0.009}{0.011} \quad 4.66$$

54. The best method for preparation of Me_3CCN is
    (A) To react Me_3COH with HCN (B) To react Me_3CBr with NaCN
    (C) To react Me_3CMgBr with ClCN (D) To react Me_3CLi with NH_2CN

    Ans : (C)

    Hints : It's a S_N^2 reaction where $Me_3C–MgBr + Cl – CN \quad Me_3C – CN + Mg\,(Cl)Br$

55. On heating, chloric acid decompose to

(A) $HClO_4$, Cl_2, O_2 and H_2O (B) $HClO_2$, Cl_2, O_2 and H_2O

(C) HClO, Cl_2O and H_2O_2 (D) HCl, HClO, Cl_2O and H_2O

Ans : (A)

Hints : Fact

CATEGORY - III

Q. 56 – Q. 60 carry two marks each, for which one or more than one options may be correct. Marking of correct options will lead to a maximum mark of two on pro rata basis. There will be no negative marking for these questions. However, any marking of wrong option will lead to award of zero mark against the respective question-irrespective of the number of correct options marked.

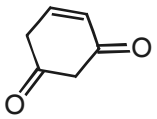
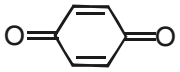
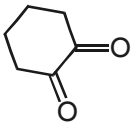
56. Consider the following reaction for $2NO_2(g) + F_2(g)$ $2NO_2F(g)$. The expression for the rate of reaction interms of the rate of change of partial pressures of reactant and product is/are

(A) rate = $-½[dp(NO_2)/dt]$ (B) rate = $½[dp(NO_2)/dt]$ (C) rate = $-½[dp(NO_2F)/dt]$ (D) rate = $½[dp(NO_2F)/dt]$

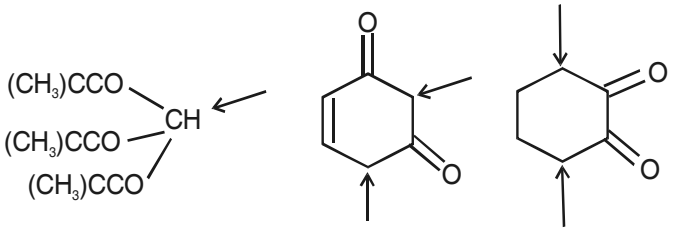
Ans : (A, D)

Hints : Fact

57. Tautomerism is exhibited by

(A) $(Me_3CCO)_3CH$ (B)  (C)  (D) 

Ans : (A, B, D)

Hints : 

Availability of acidic H-atoms at these positions(shown by arrow marks) enable the compounds to show keto-enol tautomerism

58. The important advantage(s) of Lintz and Donawitz (L.D.) process for the manufacture of steel is (are)

(A) The process is very quick (B) Operating costs are low

(C) Better quality steel is obtained (D) Scrap iron can be used

Ans : (A, C, D)

Hints : Fact

59. In basic medium the amount of Ni^{2+} in a solution can be estimated with the dimethylglyoxime reagent. The correct statement(s) about the reaction and the product is(are)

(A) In ammoniacal solution Ni^{2+} salts give cherry-red precipitate of nickel (II) dimethylglyoximate

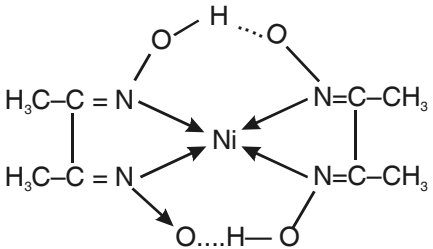
(B) Two dimethylglyoximate units are bound to one Ni^{2+}

(C) In the complex two dimethylglyoximate units are hydrogen bonded to each other

(D) Each dimethylglyoximate unit forms a six-membered chelate ring with Ni^{2+}

Ans : (A, B, C)

Hints :



60. Correct statement(s) in cases of n-butanol and t-butanol is (are)

(A) Both are having equal solubility in water
(B) t-butanol is more soluble in water than n-butanol
(C) Boiling point of t-butanol is lower than n-butanol
(D) Boiling point of n-butanol is lower than t-butanol

Ans : (B, C)

Hints : More branching means less boiling point and high solubility