136. The reason for greater range for oxidation states in actinoids is attributed to:
(1) the radioactive nature of actinoids
(2) actinoid contraction
(3) 5f, 6d and 7s levels having comparable energies
(4) 4f and 5d levels being close in energies
Ans. (3)
Sol. Theory based

137. An example of a sigma bonded organometallic compound is:
(1) Ruthenocene (2) Grignard's reagent (3) Ferrocene (4) Cobaltocene
Ans. (2)
Sol. R—MgX

138. Which one is the wrong statement?
(1) de-Broglie's wavelength is given by $\lambda = \frac{h}{mv}$, where m = mass of the particle, v = group velocity of particle
(2) The uncertainty principle is $\Delta E \times \Delta t \geq \frac{h}{4\pi}$.
(3) Half filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement.
(4) The energy of 2s orbital is less than the energy of 2p orbital in case of Hydrogen like atoms.
Ans. (4)
Sol. n = 2 for 2s and 2p for single electron species
$E = -13.6 \frac{z^2}{n^2} eV$
$\therefore$ Same energy

139. Mixture of chloroxylenol and tarpineol acts as:
(1) analgesic (2) antiseptic (3) antipyretic (4) antibiotic
Ans. (2)
Sol. Theory based

140. The element Z = 114 has been discovered recently. It will belong to which of the following family / group and electronic configuration?
(1) Halogen family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2\ 7p^5$ (2) Carbon family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2\ 7p^2$
(3) Oxygen family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2\ 7p^4$ (4) Nitrogen family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2\ 7p^6$
Ans. (2)
Sol. Thoery based

141. A 20 litre container at 400 K contains $CO_2(g)$ at pressure 0.4 atm and an excess of SrO (neglect the volume of solid SrO). The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value, will be :
(Given that : $SrCO_3(s) \rightleftharpoons SrO(s) + CO_2(g)$, Kp = 1.6 atm)
(1) 5 litre (2) 10 litre (3) 4 litre (4) 2 litre

Ans. (1)

Sol. $SrCO_3(s) \rightleftharpoons SrO(s) + CO_2$

$K_P = P_{CO_2} = 1.6$ atm

$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$

$0.4 \times 20 = 1.6 \times V_2$

$V_2 = 5L$

142. Predict the correct intermediate and product in the following reaction:

$$H_3C-C\equiv CH \xrightarrow[HgSO_4]{H_2O,H_2SO_4} \underset{(A)}{\text{intermediate}} \longrightarrow \underset{(B)}{\text{product}}$$

(1) A: $H_3C-\underset{\displaystyle SO_4}{\underset{|}{C}}=CH_2$ B: $H_3C-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$ (2) A: $H_3C-\underset{\displaystyle OH}{\underset{|}{C}}=CH_2$ B: $H_3C-\underset{\displaystyle SO_4}{\underset{|}{C}}=CH_2$

(3) A: $H_3C-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$ B: $H_3C-C\equiv CH$ (4) A: $H_3C-\underset{\displaystyle OH}{\underset{|}{C}}=CH_2$ B: $H_3C-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$

Ans. (4)

Sol.

$$CH_3-C\equiv CH \xrightarrow[HgSO_4]{H_2O,H_2SO_4} CH_3-\underset{\displaystyle Hg}{\underset{\diagdown\ \diagup}{C}}=CH \xrightarrow{H\ \ H\ \ O} CH_3-\underset{\displaystyle OH}{\underset{|}{C}}=\underset{\displaystyle H}{\underset{|}{CH}} \rightleftharpoons CH_3-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$$

143. Which of the following is sink for CO?

(1) Haemoglobin (2) Micro organisms present in the soil

(3) Oceans (4) Plants

Ans. (2)

Sol. Soil is a natural sink for CO due to activity of soil microorganism.

144. Which of the following reactions is appropriate for converting acetamide to methanamine?

(1) Carbylamine reaction (2) Hoffmann hypobromamide reaction

(3) Stephens reaction (4) Gabriels phthalimide synthesis

Ans. (2)

Sol. $CH_3-\underset{\displaystyle O}{\underset{\|}{C}}-NH_2 \xrightarrow{Br_2/KOH} CH_3NH_2$

Hoffmann bromide degradation

145. The species having bond angle of 120° is:

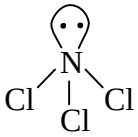
(1) PH_3 (2) ClF_3 (3) NCl_3 (4) BCl_3

Ans. (4)

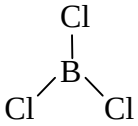
Sol. PH_3 93°

$F-\underset{\displaystyle F}{\underset{|}{Cl}}-F$ T Shape

sp^3d



Pyramidal
sp^3



Trigonal Planner
sp^2

146. The correct order of stoichiometries of AgCl formed when $AgNO_3$ in excess is treated with the complexes: $CoCl_3.6NH_3$, $CoCl_3.5NH_3$, $CoCl_3.NO_3$ respectively is:
(1) 1 AgCl, 3 AgCl, 2 AgCl (2) 3 AgCl, 1 AgCl, 2 AgCl
(3) 3 AgCl, 2 AgCl, 1 AgCl (4) 2 AgCl, 3 AgCl, 1 AgCl

Ans. (3)

Sol. C.N. of Co = 6

$[Co(NH_3)_6]Cl_3 \xrightarrow{AgNO_3} 3AgCl$

$[Co(NH_3)_5Cl]Cl_2 \xrightarrow{AgNO_3} 2AgCl$

$[Co(NH_3)_4Cl_2]Cl \xrightarrow{AgNO_3} 1AgCl$

147. For a given reaction, $\Delta H = 35.5$ kJ mol^{-1} and $\Delta S = 83.6$ JK^{-1} mol^{-1}. The reaction is spontaneous at : (Assuming that ΔH and ΔS do not vary with temperature)
(1) T < 425 K (2) T > 425 K (3) all temperatures (4) T > 298 K

Ans. (2)

Sol. for spontaniety of reaction
ΔG should be negative
$\Delta G = \Delta H - T\Delta S$
or $|T\Delta S| > \Delta H$
$T \times 83.6 > 35.5 \times 1000$
$T > 424.64$

148. Match the interhalogen compounds of column I with the geometry is column II and assign the correct code.

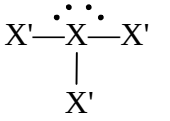
	Column I		Column II
(a)	XX'	(i)	T-shape
(b)	XX'_3	(ii)	Pentagonal bipyramidal
(c)	XX'_5	(iii)	Linear
(d)	XX'_7	(iv)	Square-pyramidal
		(v)	Tetrahedral

Code :

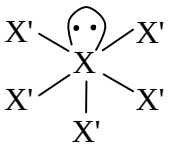
	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(i)	(ii)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(v)	(iv)	(iii)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

Ans. (2)

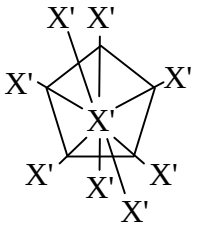
Sol. X — X Linear



T shape
(sp^3d)

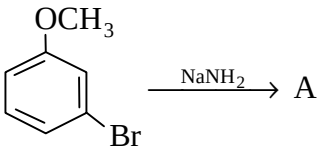


Square pyramidal
(sp^3d^2)



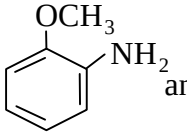
Pentagonal bipyramidal
(sp^3d^3)

149. Indentify A and product the type of reaction



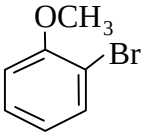
and substitution reaction

(1)



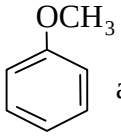
(2) and elemination addition reaction

(3)



and cine substitution reaction

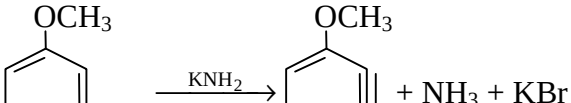
(4)

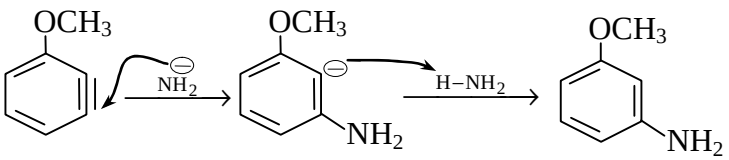


and cine substitution reaction

Ans. (1)

Sol.





150. Which one of the following statements is not correct?
(1) Catalyst does not initiate any reaction.
(2) The value of equilibrium constant is changed in the presence of a catalyst in the reaction at equilibrium.
(3) Enzymes catalyse mainly bio-chemical reactions.
(4) Coenzymes increase the catalytic activity of enzyme.

Ans. (2)

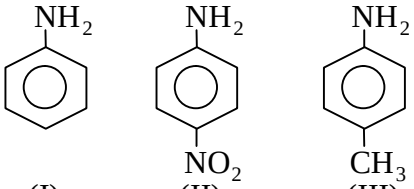
Sol. K_{eq} and ΔH not affected by catalyst.

151. Name the gas that can readily decolourise acidified $KMnO_4$ solution:
(1) CO_2 (2) SO_2 (3) NO_2 (4) P_2O_5

Ans. (2)

Sol. $SO_2 + MnO_4^- + H^+ \longrightarrow SO_4^{-2} + Mn^{+2}$

152. The correct increasing order of basic strength for the following compounds is:

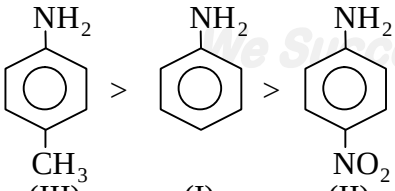


(I) (II) (III)

(1) II < III < I (2) III < I < II (3) III < II < I (4) II < I < III

Ans. (4)

Sol.



(III) (I) (II)

153. If molaity of the dilute solution is doubled, the value of molal depression constant (K_f) will be:
(1) doubled (2) halved (3) tripled (4) unchanged

Ans. (4)

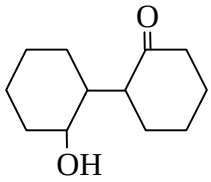
Sol. K_f is the property of solvent since

$$K_f = \frac{R(T^\circ)^2}{1000\,\Delta H_f}$$

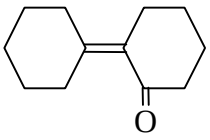
T° = Freezing point of solvent.

$\therefore$ Unchanged

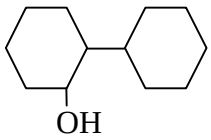
154. Of the following, which is the product formed when cyclohexanone undergoes aldol condensation followed by heating?



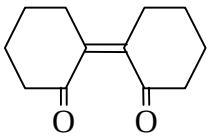
(1)



(2)



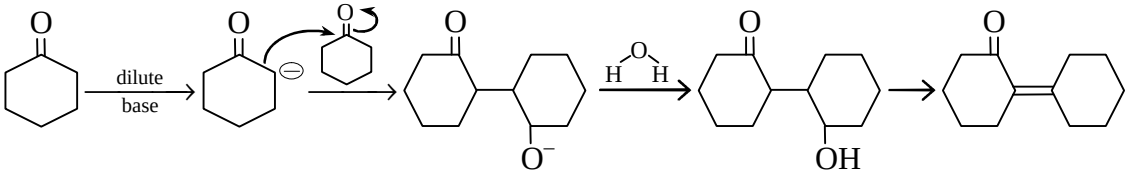
(3)



(4)

Ans. (2)

Sol.



155. The equilibrium constant of the following are :

$N_2 + 3H_2 \rightleftharpoons 2NH_3$ K_1

$N_2 + O_2 \rightleftharpoons 2NO$ K_2

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$ K_3

The equilibrium constant (K) of the reaction:

$2NH_3 + \frac{5}{2}O_2 \overset{K}{\rightleftharpoons} 2NO + 3H_2O$, will be:

(1) $K_1K_3^3/K_2$ (2) $K_2K_3^3/K_1$ (3) K_2K_3/K_1 (4) $K_2^3K_3/K_1$

Ans. (2)

Sol. $N_2 + 3H_2 \rightleftharpoons 2NH_3$ K_1 ....(i)

$N_2 + O_2 \rightleftharpoons 2NO$ K_2 ....(ii)

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$ K_3 ....(iii)

3 × (iii) + (ii) – (i) give

$2NH_3 + \frac{5}{2}O_2 \overset{K}{\rightleftharpoons} 2NO + 3H_2O$

$K = K_3^3 \times K_2 \times \frac{1}{K_1}$

156. The correct statement regarding electrophile is:

(1) Electrophile is negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile

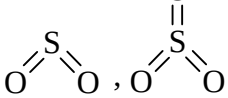
(2) Electrophile is negatively charged species and can form a bond by accepting a pair of electrons from another electrophile

(3) Electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile

(4) Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile

Ans. (4)

Sol. NO^+, NO_2^+, Cl^+ positively charged electrophile

O = C = O,  neutral electrophile

157. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy ΔU of the gas is joules will be:
(1) 1136.25 J (2) – 500 J (3) – 505 J (4) + 505 J

Ans. (3)

Sol. $\Delta U = q + W$
$W = - P_{ext} [V_2 - V_1] = -2.5 [4.5 - 2.5] = - 5$ atm litre $= - 505$ J

158. Which of the following pairs of components is isoelectronic and isostructural?
(1) $BeCl_2$, XeF_2 (2) TeI_2, XeF_2 (3) IBr_2^-, XeF_2 (4) IF_3, XeF_2

Ans. (3)

Sol. 

Central atom have same hybridisation shape and geometry.

159. Which is incorrect statement?
(1) $FeO_{0.98}$ has non stoichiometric metal deficiency defect.
(2) Density decreases in case of crystals with Schottky's defect.
(3) NaCl(s) is insulator, silicon is semiconductor, siver is conductor, quartz is piezo electric crystal.
(4) Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions are almost equal.

Ans. (4)

Sol. In Frankel defect only cation leave their position
e.N. should be less
$\therefore$ size of cation < size of anion

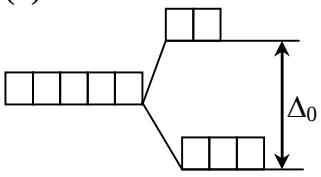
160. The heating of phenyl-methyl ethers with HI produces.
(1) ethyl chlorides (2) iodobenzene (3) phenol (4) benzene

Ans. (3)

Sol. $Ph–O–CH_3 \xrightarrow{HI} Ph–OH + CH_3I$

161. Correct increasing order for the wavelengths of absorption in the visible region for the complexes of Co^{3+} is:
(1) $[Co(en)_3]^{3+}$, $[Co(NH_3)_6]^{3+}$, $[Co(H_2O)_6]^{3+}$ (2) $[Co(H_2O)_6]^{3+}$, $[Co(en)_3]^{3+}$, $[Co(NH_3)_6]^{3+}$
(3) $[Co(H_2O)_6]^{3+}$, $[Co(NH_3)_6]^{3+}$, $[Co(en)_3]^{3+}$ (4) $[Co(NH_3)_6]^{3+}$, $[Co(en)_3]^{3+}$, $[Co(H_2O)_6]^{3+}$

Ans. (1)

Sol. 

$\Delta_0 \propto h\nu$ or $\frac{hc}{\lambda}$

$\Delta_0 \propto \frac{1}{\lambda}$

$\Delta_0 \propto$ Donating nature of ligand (spectrochemical series)

en > NH_3 > H_2O

Order of wavelength en < NH_3 < H_2O

162. Pick out the correct statement with respect to $[Mn(CN)_6]^{3-}$:

(1) It is sp^3d^2 hybridised and octahedral (2) It is sp^3d^2 hybridised and tetrahedral

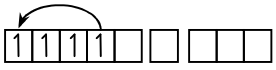
(3) It is d^2sp^3 hybridised and octahedral (4) It is dsp^2 hybridised and square planar

Ans. (3)

Sol. CN^- SFL

M_n exist in Mn^{+3} state

$M_n = 3d^5 4s^2$

$Mn^{+3} = 3d^4$ 

$\therefore$ hybridisation d^2sp^3 octahedral

163. With respect to the conformers of ethane, which of the following statements is true?

(1) Bond angle remains same but bond length changes.

(2) Bond angle changes but bond length remains same.

(3) Both bond angle and bond length change.

(4) Both bond angles and bond length remains same.

Ans. (4)

Sol. Theory based

164. Which of the following is dependent on temperature?

(1) Molality (2) Molarity (3) Mole fraction (4) Weight percentage

Ans. (2)

Sol. $M = \frac{\text{Number of moles of solute}}{\text{volume in L}}$

$M \propto \frac{1}{V}$

and $V \propto T$

$\therefore \quad M \propto \frac{1}{T}$

165. Which of the following statements is not correct?

(1) Insulin maintains sugar level in the blood of a human body.

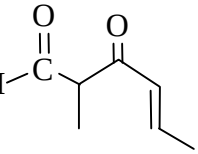
(2) Ovalbumin is a simple food reserve in egg-white.

(3) Blood proteins thrombins and fibrinogen are involved in blood clotting.

(4) Denaturation makes the proteins more active.

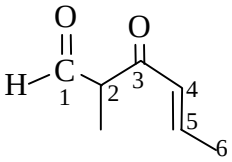
Ans. (4)

Sol. Denaturation causes breaking in tertiary and secondary structure of protein making them less active or inactive.

166. The IUPAC name of the compound  is _____.

(1) 3-keto-2-methylhex-4-enal (2) 5-formylhex-2en-5-al
(3) 5-methyl-4-oxohex-2-en-5-al (4) 3-keto-2-methylhex-5-enal

Ans. (1)

Sol. 

3-keto-2-methylhex-4-enal

167. $HgCl_2$ and I_2 both when dissolved in water containing I^- ions the pair of species formed is:
(1) HgI_2, I_3^- (2) HgI_2, I^- (3) HgI_4^{2-}, I_3^- (4) Hg_2I_2, I^-

Ans. (3)

Sol. $HgCl_2 + 2KI \rightarrow 2KCl + HgI_2$
$HgI_2 + 2KI \rightarrow K_2[HgI_4]$ or $[HgI_4]^{-2}$
$I_2 + KI \rightarrow KI_3$ or $[I_3^-]$

168. It is because of inability of ns^2 electrons of the valence shell to participate in bonding that:
(1) Sn^{2+} is reducing while Pb^{4+} is oxidising
(2) Sn^{2+} is oxidising while Pb^{4+} is reducing
(3) Sn^{2+} and Pb^{4+} are both oxidising and reducing
(4) Sn^{4+} is reducing while Pb^{4+} is oxidising

Ans. (1)

Sol. Due to inert pair effect. ns e^- of valence shell does not take part in bond formation due to high $z_{eff.}$ of 5^{th} period element.
$Sn^{+2} + Pb^{+4} \rightarrow Sn^{+4} + Pb^{+2}$

169. Mechanism of a hypothetical reaction $X_2 + Y_2 \rightarrow 2XY$ is given below:
(i) $X_2 \rightarrow X + X$ (fast)
(ii) $X + Y_2 \rightleftharpoons XY + Y$ (slow)
(iii) $X + Y \rightarrow XY$ (fast)
(1) 1 (2) 2 (3) 0 (4) 1.5

Ans. (4)

Sol. Rate depend upon slowest step
$\therefore$ Rate = $K[X]\,[Y_2] = KK'[X_2]^{1/2}\,[Y_2]$
$\therefore$ order 1.5

170. Concentration of the Ag+ ions is a saturated solution of $Ag_2C_2O_4$ is 2.2×10^{-4} mol L^{-1}. Solubility product of $Ag_2C_2O_4$ is:
(1) 2.42×10^{-8} (2) 2.66×10^{-12} (3) 4.5×10^{-11} (4) 5.3×10^{-12}

Ans. (4)

Sol. $Ag_2C_2O_4 \rightleftharpoons 2Ag^+ + C_2O_4^{2-}$

$2s \quad s$

$2s = 2.2 \times 10^{-4}$

$\therefore s = 1.1 \times 10^{-4}$

$K_{sp} = 4s^3 = 4[1.1 \times 10^{-4}]^3 = 5.324 \times 10^{-12}$

171. Extraction of gold and silver involves leaching with CN^- ion. Silver is later recovered by:
(1) liquation (2) distillation (3) zone refining (4) displacement with Zn

Ans. (4)

Sol. Hydrometallurgy

$Ag + NaCN + O_2(air) \rightarrow [Ag(CN)_2]^- \xrightarrow{Zn} Ag\downarrow$

172. Which one of the correct order of acidity?
(1) $CH_2{=}CH_2 > CH_3{-}CH{=}CH_2 > CH_3{-}C{\equiv}CH > CH{\equiv}CH$
(2) $CH{\equiv}CH > CH_3{-}C{\equiv}CH > CH_2{=}CH_2 > CH_3{-}CH_3$
(3) $CH{\equiv}CH > CH_2{=}CH_2 > CH_3{-}C{\equiv}CH > CH_3{-}CH_3$
(4) $CH_3{-}CH_3 > CH_2{=}CH_2 > CH_3{-}C{\equiv}CH > CH{\equiv}CH$

Ans. (2)

Sol. En of $\overset{3.25}{\underset{sp}{C}} > \overset{2.75}{\underset{sp^2}{C}} > \overset{2.5}{\underset{sp^3}{C}}$

acidic strength $\propto$ EN

and acidic strength $\propto \frac{1}{+I}$

$\therefore$ correct order of acidic strength

$CH{\equiv}CH > CH_3{-}C{\equiv}CH > CH_2{=}CH_2 > CH_3{-}C{=}CH_2 > CH_3{-}CH_3$

$+I \qquad +I$

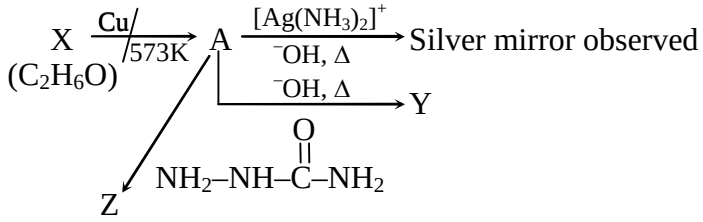
173. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?
(1) Na (2) K (3) Rb (4) Li

Ans. (4)

Sol. Ionic mobility $\propto \frac{1}{\text{Hydrated size}}$

Hydration $\propto \frac{\text{Charge}}{\text{size}}$

174. Consider the reactions:



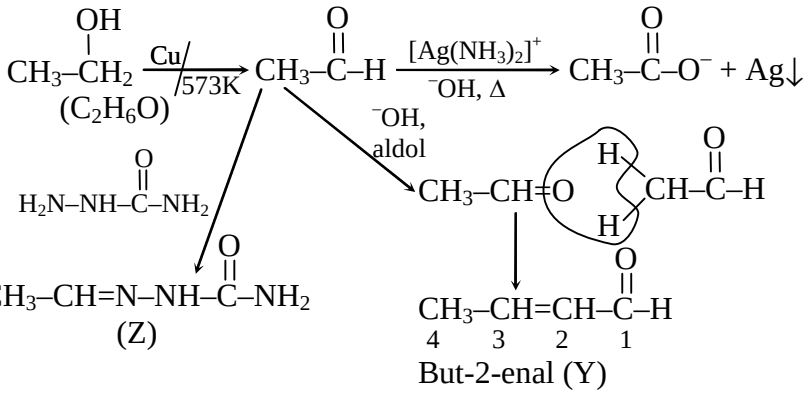
Identify A, X, Y and Z
(1) A-Methoxymethane, X-Ethanoic acid, Y-Acetate ion, Z-hydrazine
(2) A-Methoxymethane, X-Ethanol, Y-Ethanoic acid, Z-Semicarbazide

(3) A-Ethanal, X-Ethanol, Y-But-2-enal, Z-Semicarbazone

(4) A-Ethanol, X-Acetaldehyde, Y-Butanone, Z-Hydrazone

Ans. (3)

Sol. A-Ethanal, X-Ethanol, Y-But-2-enal, Z-Semicarbazone



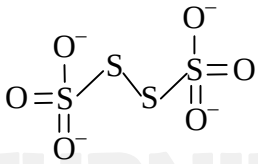
175. In which pair of ions both the species contain S—S bond?

(1) $S_2O_7^{2-}$, $S_2O_3^{2-}$ (2) $S_4O_6^{2-}$, $S_2O_3^{2-}$ (3) $S_2O_7^{2-}$, $S_2O_8^{2-}$ (4) $S_4O_6^{2-}$, $S_2O_7^{2-}$

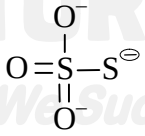
Ans. (2)

Sol. S – S bond present in

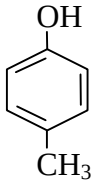
$S_4O_6^{--}$

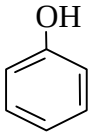


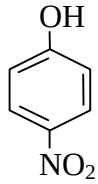
$S_2O_3^{-2}$

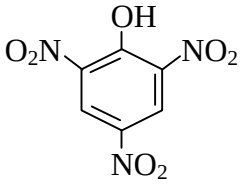


176. Which one is the most acidic compound?

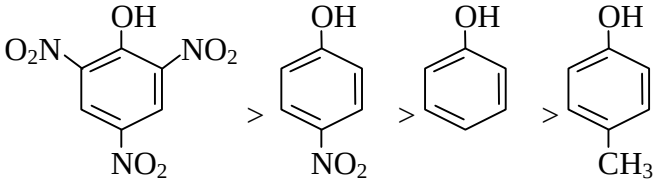
(1) 

(2) 

(3) 

(4) 

Ans. (4)

Sol. 

acidic strength ∝ – R or – M.

177. In the electrochemical cell:
$Zn|ZnSO_4(0.01\ M)||\ CuSO_4\ (1.0\ M)|Cu$, the emf of this Daniel cell is E_1. When the concentration of $ZnSO_4$ is changed to 1.0 M and that of $CuSO_4$ changed to 0.01 M, the emf changes to E_2. From the followings, which one is the relationship between E_1 and E_2? (Given, RT/F = 0.059)
(1) $E_1 = E_2$ (2) $E_1 < E_2$ (3) $E_1 > E_2$ (4) $E_2 = 0 \neq E_1$

Ans. (3)

Sol. $Zn(s) + \underset{1.0\ M}{Cu^{+2}}(aq) \rightarrow Cu(s) + \underset{0.01\,M}{Zn^{+2}}$

$$E = E° - \frac{0.059}{2}\log\frac{[Zn^{+2}]}{[Cu^{+2}]}$$

$$E_1 = E° - \frac{0.059}{2}\log\frac{0.01}{1.0}$$

$$E_1 = E° - \frac{0.059}{2}\times 10^{-2}$$

$$E_1 = (E° + 0.059)V$$

Now, $$E_2 = E° - \frac{0.059}{2}\log\frac{[Zn^{+2}]}{[Cu^{+2}]}$$

$$E_2 = E° - \frac{0.059}{2}\log\frac{1.0}{[0.01]}$$

$$E_2 = E° - \frac{0.059}{2}\log 10^2$$

$$E_2 = (E° - 0.059)V$$

$\therefore$ $E_1 > E_2$

178. A first order reaction has a specific reaction rate of 10^{-2} sec^{-1}. How much time will it take for 20g of the reactant of reduce to 5g?
(1) 238.6 sec (2) 138.6 sec (3) 346.5 sec (4) 693.0 sec

Ans. (2)

Sol. $K = 10^{-2}\ sec^{-1}$

$$K = \frac{2.303}{t}\log\frac{a}{a-x}$$

$$10^{-2} = \frac{2.303}{t}\log\frac{20}{5}$$

$$10^{-2} = \frac{2.303}{t}\times\log 4$$

$$t = \frac{2.303}{10^{-2}}\times 0.6020$$

$$t = \frac{2.303}{0.01}\times 0.6020\ \text{sec}$$

$$t = 138.64\ \text{sec}$$

179. The most suitable method of separation of 1 : 1 mixture of ortho and para – nitrophenols is:
(1) Sublimation (2) Chromatography (3) Crystallisation (4) Steam distillation

Ans. (4)

Sol. Ortho and para nitrophenol can be separated by steam distillation steam distillation is a technique usually used to purity liquids that are immiscible with water.

180. Which one of the following pairs of species have the same bond order?
(1) CO, NO (2) O_2, NO^+ (3) CN^-, CO (4) N_2, O_2^-

Ans. (3)

Sol.

Molecule / Ions	Bond Order	Total electron
$C \equiv O$	3.0	14
NO	2.5	15
O_2	2.0	16
NO^+	3.0	14
CN^-	3.0	14
N_2	3.0	14
O_2^-	1.5	17