NEET-UG – 2013 TEST PAPER WITH SOLUTIONS (HELD ON SUNDAY 05th MAY, 2013)

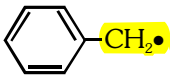
136. The value of Planck's constant is 6.63×10^{-34} Js. The speed of light is 3×10^{17} nm s^{-1}. Which value is closest to the wavelength in nanometer of a quantum of light with frequency of 6×10^{15} s^{-1} ?

(1) 75 (2) 10

(3) 25 (4) 50

Ans. (4)

Sol. $\lambda = \frac{C}{\nu} = \frac{3 \times 10^{17} \text{nms}^{-1}}{6 \times 10^{15} \text{s}^{-1}} = 50 \text{ nm}$

137. The radical,  is aromatic because it has :-

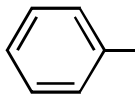
(1) 6p–orbitals and 7 unpaired electrons

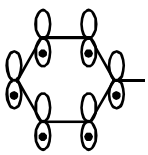
(2) 6p–orbitals and 6 unpaired electrons

(3) 7p–orbitals and 6 unpaired electrons

(4) 7p–orbitals and 7 unpaired electrons

Ans. (2)

Sol.  , Benzyl free radical is aromatic as per Huckel's rule it has 6π electreons present in p-orbital of carbon atoms involved in formation of benzene ring (Aromatic nature).

 , 6π electrons and 6 p orbitals

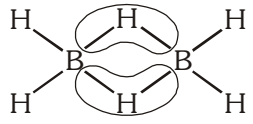
138. Which of the following is electron-deficient ?

(1) PH_3 (2) $(CH_3)_2$

(3) $(SiH_3)_2$ (4) $(BH_3)_2$

Ans. (4)

Sol. $(BH_3)_2 \longrightarrow B_2H_6$



(3 centre-2 e^- bond / electron deficient)

139. Which of the following statements about the interstitial compounds is **incorrect** ?

(1) They have higher melting points than the pure metal

(2) They retain metallic conductivity

(3) They are chemically reactive

(4) They are much harder than the pure metal

Ans. (3)

140. How many grams of concentrted mitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3?

(1) 54.0 conc. HNO_3

(2) 45.0 conc. HNO_3

(3) 90.0 conc. HNO_3

(4) 70.0 conc. HNO_3

Ans. (2)

Sol. $M = \frac{W \times 1000}{M_w \times V_{solution}(mL)}$

$2 = \frac{W \times 1000}{63 \times 250}$

$W = 31.5$ g

70% HNO_3 means 70g HNO_3 is present in 100g solution.

$\therefore$ 31.5g HNO_3 will be present in $\frac{100}{70} \times 31.5$

= 45 g of solution

141. Which of the following lanthanoid ions is diamagnetic?

(Atoms, Ce = 58, Sm = 62, Yb = 70)

(1) Yb^{2+} (2) Ce^{2+}

(3) Sm^{2+} (4) Eu^{2+}

Ans. (1)

Sol. dimagnetic – no w.e^- present

Yb^{+2} = 70 [Xe] $6s^\circ$ $4f^{14}$ $5d^\circ$ U.e^- = zero.

142. Which one of the following molecules contains no π bond ?

(1) NO_2 (2) CO_2

(3) H_2O (4) SO_2

Ans. (3)

143. Based on equation $E = -2.178 \times 10^{-18}\ J \left(\frac{Z^2}{n^2}\right)$ certain conclusions are written. Which of them is **not** correct ?

(1) For n = 1, the electron has a more negative energy than it does for n = 6 which means that the electron is more lossely bound in the smallest allowed orbit.

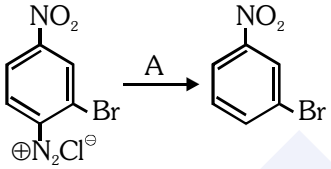
(2) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus

(3) Larger the value of n, the larger is the orbit radius

(4) Equation can be used to calculate the change in energy when the electron change orbit

Ans. (1)

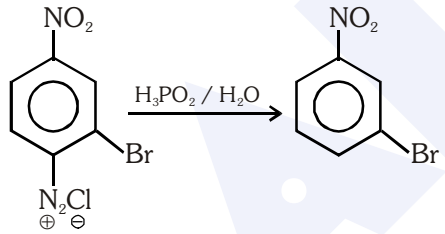
Sol. Correct answer is - for n = 1 the electron has more negative energy than it does for n = 6 which means that the electron is less loosely bound in the smallest allowed orbit.

144. In the reaction  A is

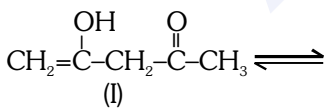
(1) H^+/H_2O (2) $HgSO_4/H_2SO_4$

(3) Cu_2Cl_2 (4) H_3PO_2 and H_2O

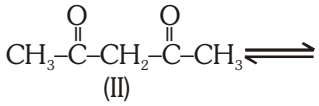
Ans. (4)

Sol. 

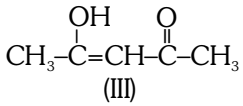
145. The order of stability of the following tautomeric compounds is :-



(I)



(II)



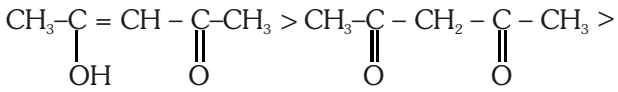
(III)

(1) II > III > I (2) I > II > III

(3) III > II > I (4) II > I > III

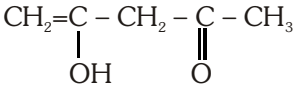
Ans. (3)

Sol. Stability order is



Intra molecular H-Bonding and conjugated diene and it has involved more acidic – H[–CH_2–]

(No conjugated diene)



Involvement of less acidic –H in tautomerism

146. Nylon is an example of :-

(1) Polythene (2) Polyester

(3) Polysaccharide (4) Polymide

Ans. (4)

Sol. Nylon has polyamide linkage. It is formed by condensation reaction of amines and carboxylic acid groups.

147. XeF_2 is isostructural with :-

(1) $BaCl_2$ (2) TeF_2 (3) ICl_2^- (4) $SbCl_3$

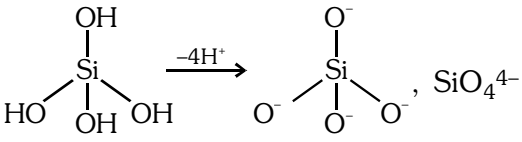
Ans. (3)

148. The basic structural unit of silicates is :-

(1) SiO_4^{2-} (2) SiO^- (3) SiO_4^{4-} (4) SiO_3^{2-}

Ans. (3)

Sol. Silicates – Salt of silicic acid H_4SiO_4



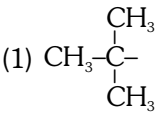
, SiO_4^{4-} silicate ion

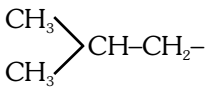
149. Which of the following structure is similar to graphite?

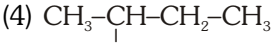
(1) B_2H_6 (2) BN (3) B (4) B_4C

Ans. (2)

150. The structure of isobutyl group in an organic compound is :-

(1) 

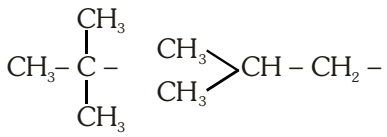
(2) 

(4) 

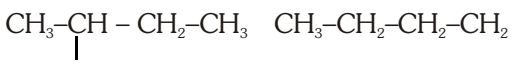
(4) $CH_3–CH_2–CH_2–CH_2–$

Ans. (2)

Sol.



t-Butyl isobutyl



sec-butyl n-Butyl

151. The number of carbon atoms per unit cell of diamond unit cell is :-

(1) 1 (2) 4 (3) 8 (4) 6

Ans. (3)

Sol. In the diamond cubic unit cell, there are eight corner atoms, six face centered atoms and four more atoms inside the structure.

$\therefore$ Number of atoms present in a diamond cubic unit cell

= 1 + 3 + 4 = 8 atoms

152. An excess of $AgNO_3$ is added to 100 mL of a 0.01 M solution of dichlorotetraaquachromium(III) chloride. The number of moles of AgCl precipitated would be :-

(1) 0.01 (2) 0.001 (3) 0.002 (4) 0.003

Ans. (2)

153. What is the maximum numbers of electrons that can be associated with the following set of quantum numbers ?

n = 3, l = 1 and , = –1

(1) 2 (2) 10 (3) 6 (4) 4

Ans. (1)

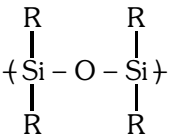
Sol. n = 3, ℓ = 1 and m = –1 represent a 3p-orbital so maximum 2 electrons can be accomodate in it.

154. Which of these is not a monomer for a high molecular mass silicone polymer ?

(1) $PbSiCl_3$ (2) $MeSiCl_3$

(3) Me_2SiCl_2 (4) Me_3SiCl

Ans. (4)

Sol. Silicones are organo-silicon polymer containing  linkage.

Since Me_3SiCl contain only one Cl therefore it can't form high molecular mass silicon polymer

It act a chain terminating organo silane

155. A reaction having equal energies of activation for forward and reverse reactions has :-

(1) $\Delta H = \Delta G = \Delta S = 0$ (2) $\Delta S = 0$

(4) $\Delta G = 0$ (4) $\Delta H = 0$

Ans. (4)

Sol. $\Delta H = (Ea)_f - (Ea)_b$

Given : $(Ea)_f = (Ea)_b$

$\therefore \quad \Delta H = 0$

156. At 25°C molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 $ohm^{-1}\ cm^2\ mol^{-1}$ and at infinite dilution its molar conductance is 238 $ohm^{-1}\ cm^2\ mol^{-1}$. The degree of ionisation of ammonium hydroxide at the same concentration and temperature is :-

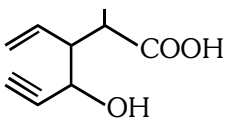
(1) 40.800% (2) 2.080%

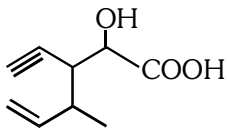
(3) 20.800% (4) 4.008%

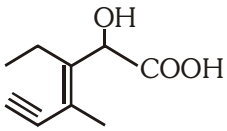
Ans. (4)

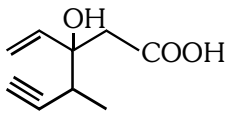
Sol. $\% \alpha = \frac{\lambda^c}{\lambda^\infty} \times 100 = \frac{9.54}{238} \times 100 = 4.008\%$

157. Structure of the compound whose IUPAC name is 3–Ethyl–2–hydroxy–4–methylhex–3–en–5–ynoic acid is :-

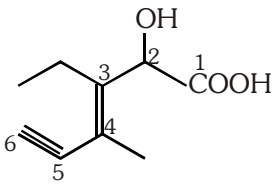
(1) 

(2) 

(3) 

(4) 

Ans. (3)

Sol. 

3-Ethyl-2-hydroxy-4-methylhex-3-ex-5-ynonic acid

158. Among the following ethers, which one will produce methyl alcohol on treatement with hot concentrated HI ?

(1) $CH_3–\underset{\displaystyle CH_3}{\underset{|}{CH}}–CH_2–O–CH_3$

(2) $CH_3–CH_2–CH_2–CH_2–O–CH_3$

(3) $CH_3–CH_2–\underset{\displaystyle CH_3}{\underset{|}{CH}}–O–CH_3$

(4) $CH_3–\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}–O–CH_3$

Ans. (4)

Sol. C–O bond cleavage of ether depends on mechanism involved in reaction which can be SN^1 or SN^2. If any one group can form stable carbocation like tertiary butyl group then reaction follow's SN^1 mechanism

$$CH_3–\overset{CH_3}{\overset{|}{\underset{CH_3}{\overset{|}{C}}}}–O–CH_3 \xrightarrow[HI]{\text{Hot \& conc.}} CH_3–\overset{CH_3}{\overset{|}{\underset{CH_3}{\overset{|}{C}}}}–\overset{\oplus}{O}H–CH_3$$

$$CH_3–\overset{CH_3}{\overset{|}{\underset{CH_3}{\overset{|}{C}}}}–I \xleftarrow{I^{\ominus}} CH_3–\overset{CH_3}{\overset{|}{\underset{CH_3}{\overset{|}{C}}}}\oplus + CH_3–OH$$

Methyl alcohol

159. Antiseptics and disinfectants either kill or prevent growth of microganisms. Identify which of the following statements is **not true** :-

(1) Disinfectants harm the living tissues

(2) A 0.2% solution of phenol is an antiseptic while 1% solution acts as a disinfectant

(3) Chlorine and Iodine are used as strong disinfectants

(4) Dilute solutions of Boric acid and Hydrogen Peroxide are strong antiseptics

Ans. (4)

160. A magnetic moment of 1.73 BM will be shown by one among the following :-

(1) $[CoCl_6]^{4-}$ (2) $[Cu(NH_3)_4]^{2+}$

(3) $[Ni(CN)_4]^{2-}$ (4) $TiCl_4$

Ans. (2)

Sol. Magnetic moment 1.73 BM

$\mu = \sqrt{n(n+2)}$ B.M

n = no. of unpaired e^-

μ = 1.73

$1.73 = \sqrt{n(n+2)}$ B.M

n = 1

* $[CoCl_6]^{4-} \rightarrow Co^{+2}$; d^7

Cl^- (weak field ligand) $t_2g^5eg^2$ unpaired e^-= 3

* $[Cu(NH_3)_4]^{2+}$ Cu^{+2} – d^9

NH_3 Strong field ligand, hybridisation dsp^2

* one e^- of 3d jumps into 4p subshell.

unpaired e^- = 1

* $[Ni(CN)_4]^{2-} \rightarrow Ni^{+2}$ – d^8 unpaired e^- =0

CN^- – Strong field ligand dsp^2

* $TiCl_4 \rightarrow Ti^{+4}$ d° unpaired e^- = zero.

161. $KMnO_4$ can be prepared from K_2MnO_4 as per the reaction :-

$$3MnO_4^{2-} + 2H_2O \rightleftharpoons 2MnO_4^- + MnO_2 + 4OH^-$$

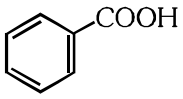
The reaction can go to compition by removing OH^- ions by addings :-

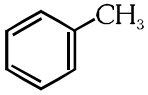
(1) SO_2 (2) HCl

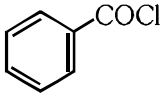
(3) KOH (4) CO_2

Ans. (4)

162. Reaction by which Benzaldehyde cannot be prepared :-

(1)  +Zn/Hg and conc. HCl

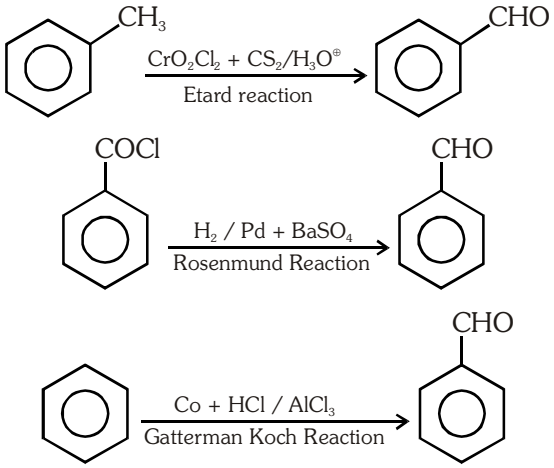
(2)  $+CrO_2Cl_2$ in CS_2 followed by $H_3O^{\oplus}$

(3)  $+ H_2$ in presence of $Pd+BaSO_4$

(4)  + CO + HCl in presence of anhydrous $AlCl_3$

Ans. (1)

Sol. In presence of Zn – Hg and conc. HCl reduction is useful specially for aldehyde and ketone but carboxylic group remains uneffected



163. Which of the following does not give oxygen on heating ?

(1) $(NH_4)_2Cr_2O_7$ (2) $KClO_3$

(3) $Zn(ClO_3)_2$ (4) $K_2Cr_2O_7$

Ans. (1)

Sol. $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2 + Cr_2O_3 + 4\ H_2O$

do not produces O_2.

164. A metal has a fcc lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72g cm^{-3}. The molar mass of the metal is :-

(1) 20g mol^{-1} (2) 40g mol^{-1}

(3) 30g mol^{-1} (4) 28g mol^{-1}

Ans. (4)

Sol. $\rho = \dfrac{Z \times M}{N_A \times a^3}$ for FCC, Z = 4

$a = 404\ pm = 404 \times 10^{-10}\ cm.$

$$2.72 = \frac{4 \times M}{6.02 \times 10^{23} \times (404 \times 10^{-10})^3}$$

$M = 27\ gmol^{-1}$

165. Dipole induced dipoloe interactions are present in which of the following pairs :-

(1) SiF_4 and He atoms (2) H_2O and alcohol

(3) Cl_2 and CCl_4 (4) HCl and He atoms

Ans. (4)

Sol. Dipole - induced dipole occurs between polar & Non-polar molecule

HCl	He
Polar	Non-polar
$\mu \neq 0$	$\mu = 0$

166. Roasting of sulphides gives the gas X as a by product.This is colourless gas with choking smel of burnt sulphur and causes great damage to respiratory organs as a result of acid rain. It aqueous solution is acidic, acts as reducing agent and its acid has never been isolated. The gas X is :-

(1) SO_3 (2) H_2S (3) SO_2 (4) CO_2

Ans. (3)

167. Some meta-directing substituents in aromatic substitution are given. Which one is most deactivating?

(1) $-NO_2$ (2) $-C\equiv N$

(3) $-SO_3H$ (4) $-COOH$

Ans. (1)

Sol. Deactivating power :

$-NO_2 > -C \equiv N > -SO_3H > COOH$

168. Nitrobenzene on reaction with conc. HNO_3/H_2SO_4 at 80-100°C forms which one of the following products ?

(1) 1, 2, 4-Trinitrobenzene

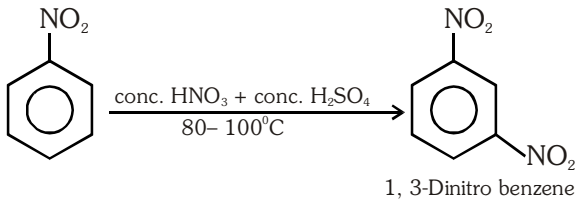
(2) 1, 2-Dinitrobenzene

(3) 1, 3-Dinitrobenzene

(4) 1, 4-Dinitrobenzene

Ans. (3)

Sol.



Mixture of [Conc HNO_3 conc H_2SO_4] gives $\overset{\oplus}{NO_2}$ which acts as electrophile and in nitrobenzene $-NO_2$ group is m–directing group so $\overset{\oplus}{NO_2}$ attacks at m–position.

169. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at one atm pressure. The oxidation potential of electrode would be ?

(1) 1.81 V (2) 0.059 V

(3) 0.59 V (4) 0.118 V

Ans. (3)

Sol. $\frac{1}{2}H_2(g) \longrightarrow H^+ + e^-$

$$E_{O.P.} = E^\circ_{O.P.} - \frac{0.059}{n}\log\frac{[H^+]}{(P_{H_2})^{1/2}}$$

$$E_{O.P.} = 0 - \frac{0.059}{1}\log\frac{10^{-10}}{(1)^{1/2}}$$

(pH = 10, $[H^+] = 10^{-10}$ M)

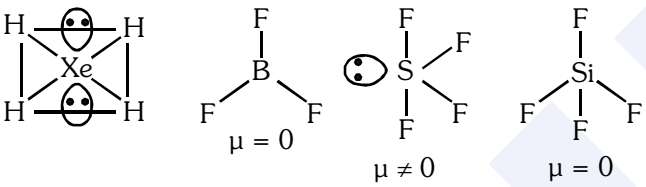
$E_{O.P.} = 0.59$ V

170. Which of the following is a polar molecule ?

(1) XeF_4 (2) BF_3 (3) SF_4 (4) SiF_4

Ans. (3)

Sol. Unsymmetrical distribution of e^- cloud leads to the formation of polar molecule



171. A button cell used in watches function as following

$Zn(s) + Ag_2O(s) + H_2O(\ell) \rightleftharpoons 2Ag(s) + Zn^{2+}(aq) + 2OH^-(aq)$

If half cell potentials are

$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$; $E^\circ = -0.76V$

$Ag_2O(s) + H_2O(\ell) + 2e^- \rightarrow 2Ag(s) + 2OH^-(aq)$; $E^\circ = 0.34V$

The cell potential will be :-

(1) 1.34 V (2) 1.10 V (3) 0.42 V (4) 0.84 V

Ans. (2)

Sol. $Zn^{2+}(aq) + 2e^- \longrightarrow Zn(s)$; $E^\circ = -0.76$ V

$Ag_2O(s) + H_2O(\ell) + 2e^- \longrightarrow 2Ag(s) + 2OH^-(aq)$; $E^\circ = 0.34$ V

$Zn(s) + Ag_2O(s) + H_2O(\ell) \longrightarrow 2Ag(s) + Zn^{+2}(aq) + 2OH^-(aq)$; $E_{cell} = ?$

$E^\circ_{cell} = (E^\circ_{R.P.})_{cathode} - (E^\circ_{R.P.})_{anode}$

$E^\circ_{cell} = 0.34 - (-0.76) = 1.10$ V

$E_{cell} = E^\circ_{cell} = 1.10$V

172. Which of these is **least likely** to act as a Lewis base?

(1) PF_3 (2) CO (3) F^- (4) BF_3

Ans. (4)

173. Which of the following compounds will not undergo Friedal-Craft's reaction easily :-

(1) Toluene (2) Cumene

(3) Xylene (4) Nitrobenzene

Ans. (4)

Sol. Friedal Craft reaction fails when strong deactivating group is attached with benzene ring.

174. Which is the monomer of Neoprene in the following ?

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

(3) $CH_2=\underset{\displaystyle CH_3}{\underset{|}{C}}-CH=CH_2$ (4) $CH_2=\underset{\displaystyle Cl}{\underset{|}{C}}-CH=CH_2$

Ans. (4)

Sol.

$$nCH_2=\underset{\displaystyle Cl}{\underset{|}{C}}-CH=CH_2 \xrightarrow{\text{Polymersation}}$$

Chloroprene

$$-\left[CH_2-\underset{\displaystyle Cl}{\underset{|}{C}}=CH-CH_2\right]_n-$$

Neoprene

[Artificial rubber]

175. 6.02×10^{20} molecules of urea are present in 100mL of its solution. The concentration of solution is :-

(1) 0.1 M (2) 0.02 M

(3) 0.01 M (4) 0.001M

Ans. (3)

Sol. Number of moles = $\frac{\text{number of molecules}}{N_A}$

$$= \frac{6.02\times10^{20}}{6.02\times10^{23}} = 10^{-3} \text{ mol}$$

$$\text{Molar conc.} = \frac{n\times1000}{V_{solution}(mL)} = \frac{10^{-3}\times1000}{100}$$

Molar conc. = 0.01 M

176. Maximum deviation from ideal gas is expected from :

(1) $NH_3(g)$ (2) $H_2(g)$ (3) $N_2(g)$ (4) $CH_4(g)$

Ans. (1)

Sol. NH_3 will show maximum deviation from ideal gas due to dipole-dipole attraction.

177. Which of the following is paramagnetic ?

(1) NO^+ (2) CO (3) O_2^- (4) CN^-

Ans. (3)

Sol. $O_2^- \rightarrow 15\ e^-$ contains one unpaired e^- in ABMO.

$\sigma 1s^2 \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2\ \sigma 2p_{z^2}\ \pi 2p_{x^2} = \pi 2p_{y^2}\ \pi^*$

178. Identify the correct order of solubility in aqueous medium :

(1) $Na_2S > ZnS > CuS$

(2) $CuS > ZnS > Na_2S$

(3) $ZnS > Na_2S > CuS$

(4) $Na_2S < CuS > ZnS$

Ans. (1)

179. What is the activation energy for a reaction it its rate doubles when the temperature is raised from 20°C to 35°C ? ($R = 8.314\ J\ mol^{-1}\ K^{-1}$)

(1) 15.1 kJ mol^{-1} (2) 342 kJ mol^{-1}

(3) 269 kJ mol^{-1} (4) 34.7 kJ mol^{-1}

Ans. (4)

Sol. $$\log\frac{K_2}{K_1} = \frac{Ea}{2.303R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

$$\frac{r_2}{r_1} = \frac{K_2}{K_1} = 2$$

$$\Rightarrow \log 2 = \frac{Ea}{2.303 \times 8.314 \times 10^{-3}}\left(\frac{1}{293} - \frac{1}{308}\right)$$

$$\Rightarrow\ Ea = 34.7\ KJ\ mol^{-1}$$

180. Which is the strongest acid in the following ?

(1) H_2SO_3 (2) H_2SO_4 (3) $HClO_3$ (4) $HClO_4$

Ans. (4)