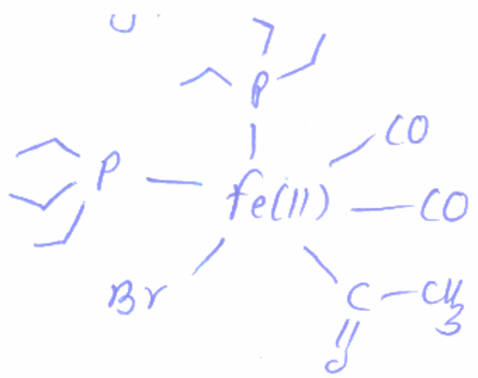
JEE ADVANCED-2015

CHEMISTRY

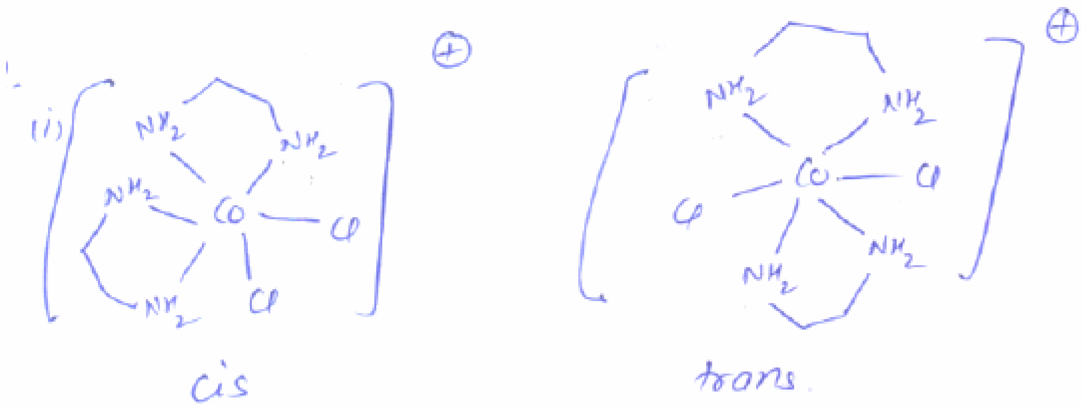
Q.21 Sol. (3)

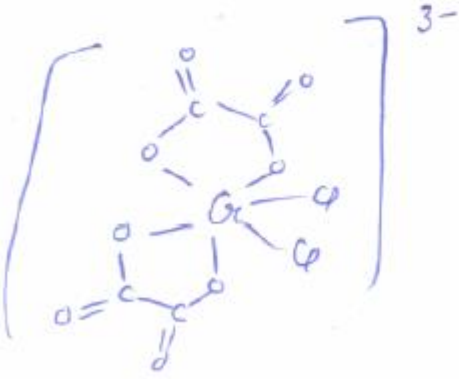
acetyl	$CH_3CO \rightarrow$ mono coordination
Bromido	$Br^- \rightarrow$ mono coordination
dicarbonyl	$CO \,\&\, CO \rightarrow$ di coordination
bis(triethylphosphene)	$\rightarrow$ di coordination



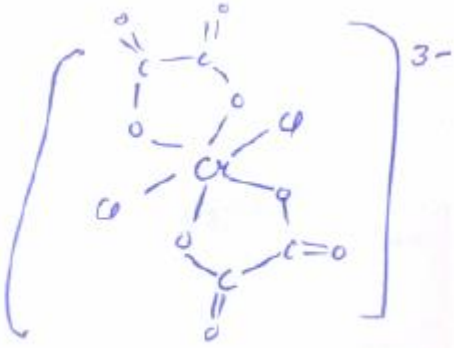
no. of Fe–C(bonds) is 3.

Q.22 Sol. (6)

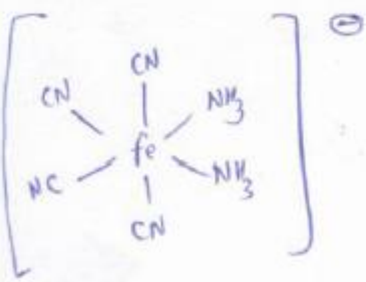




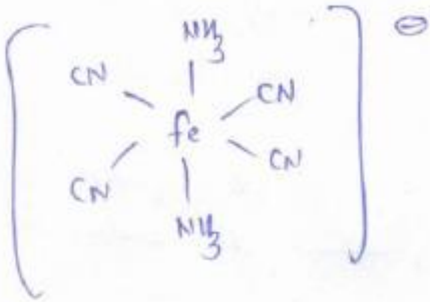
cis



trans.



cis



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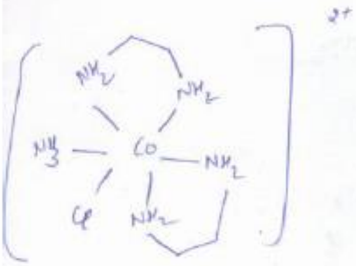
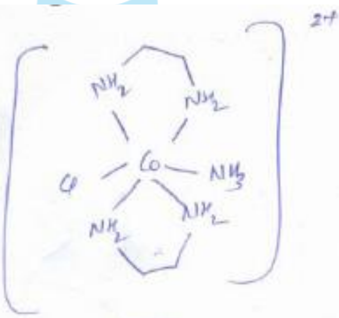


cis



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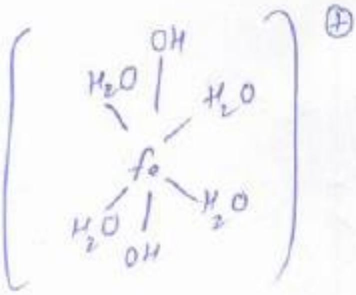

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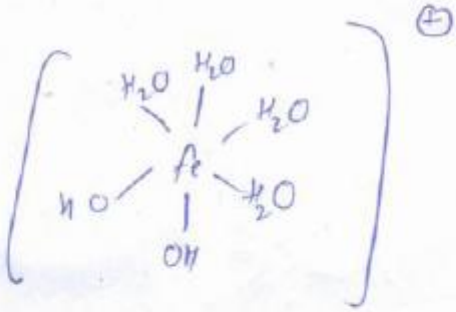


cis.

Similar to the above structures, $\left[CO\left(NH_3\right)_4(H_2O)\,(Cl)\right]$

Also exists in cis & tarns forms

Q.23 Sol. (6)

The rxn is

$$B_2H_6 + 6CH_3OH \rightarrow 2B\left(OCH_3\right)_3 + 6H_2$$

Q.24 Sol. (3)

$$\Lambda_{mHX} = 10\,\lambda_{mHY}$$

$$M_{HX} = 0.01M$$

$$M_{HY} = 0.10\,M$$

given that $\lambda^{\infty}_{x-} = \lambda^{\infty}_{y-}$

$$\left(\frac{1000 \times k_{HX}}{M_{HX}}\right) = \left(\frac{1000 \times k_{HY}}{M_{HY}}\right)(10)$$

Solving this, we get

$$\left(\frac{k_a HY}{k_a HX}\right) = 1000$$

$$\Rightarrow \log \frac{k_a(\text{HY})}{k_a(\text{HX})} = 3$$

$$\Rightarrow \log \text{Ka}(\text{HY}) - \log \text{Ka}(\text{HX}) = 3$$

$$-\text{þKa}(\text{HY}) + \text{þKa}(\text{HX}) = 3$$

Q.25 Sol. (9)

We have to apply equation of state

$$PV = nRT$$

According to this, the pressure of mixture in the container is directly proportional to the no. of particles in the container.

${}^{238}_{92}U$ undergoes $\propto(\text{alpha})$ dissociation.

Till it reaches ${}^{206}_{82}Pb$

Finally, in the container,

$$\frac{\textit{no. of particles after decay}}{\textit{no.of particles before decay}} = \frac{9}{1}$$

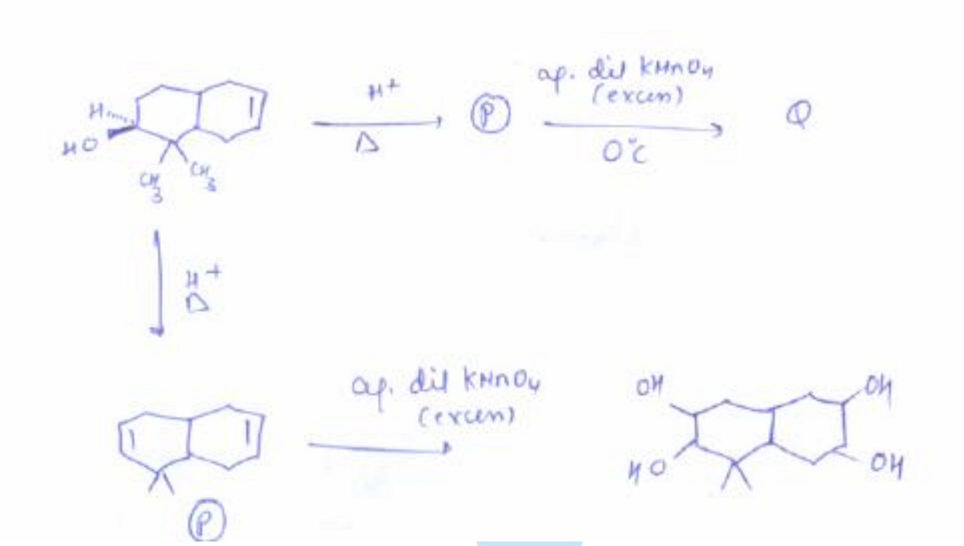
$$\because \quad \frac{Pf}{Pi} = \frac{9}{1}$$

Q.26 Sol. (8)

$$8H^+ + MnO_{4^-} + \left[Fe(H_2O)_2(ox)_2\right]^{2-} \rightarrow Mn^{2+} + Fe^{3+} + 4CO_2 + 6H_2O$$

$$\frac{rate\ of\ Change\ of\left[H^+\right]}{rate\ of\ Change\ of\left[MnO_4^-\right]}=8 \quad \frac{\left[H^+\right]}{\left[MnO_4^-\right]}=8$$

Q.27 Sol. (4)



Q.28 Sol. (4)

(i) Rxn is Gattermann Koch Rxn & gives benzaldehyde.

(ii) Treatment of  with water at high temp also yields benzaldehyde.

Also, on reduction of benzoylchoride

With H_2 yields benzaldehyde.

Reduction of (iv) also yields the product

Q.29 Sol. (B, C, D)

Surface $+ O_2 \rightarrow e^-$ transfer taken place.

$O_2 + e^- \rightarrow O_2^-$ (bond length of $O_2^- > O_2$)

heat is released during the rxn.

& on acceptance of e– by O_2, the occupancy of π^*_{2p} of O_2 increases

Q.30 Sol. (B)

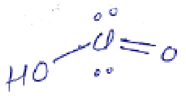
$(CH_3)_3 SiCl$ is used for chain termination rxn.

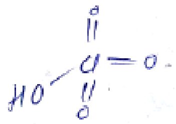
for chain propagation, we use $(CH_3)_2 SiCl_2$

Q.31 Sol. (C, D)

By looking at the concept of Qualitative analysis, we can say that Cu^{2+}, Pb^{2+} and Hg^{2+} can be precipitated upon passing H_2S in dil aq. sol of salts.

Q.32 Sol. (B, C)

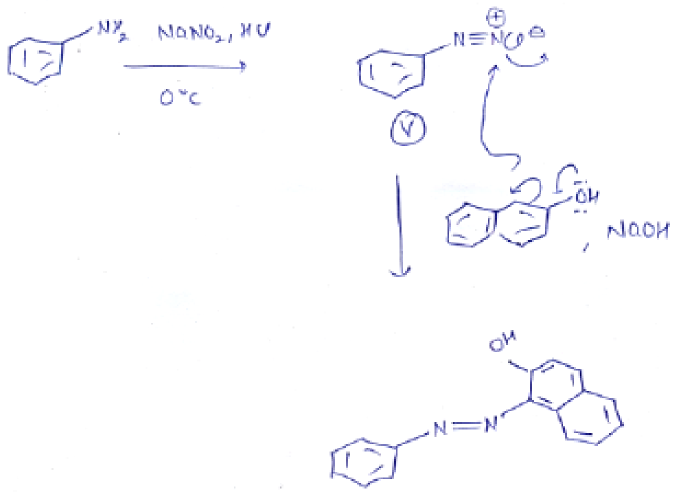




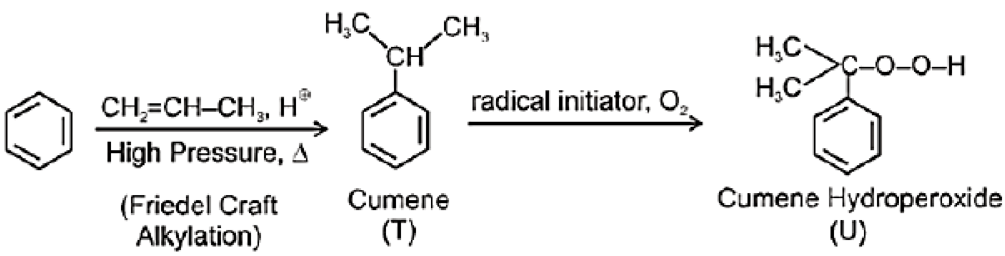
Acc. to the above structures,

the correct statements are (C)(B)

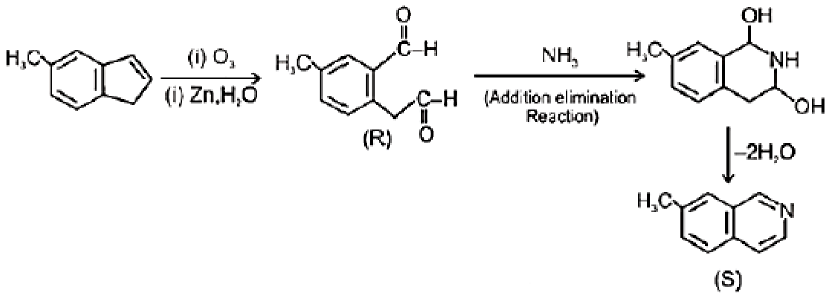
Q.33 Sol. (A)



Q.34 Sol. (B)



Q.35 Sol. (A)



Q.36 Sol. (C)

$$P(V\text{-}b) = RT$$

$$\Rightarrow PV - Pb = RT \quad \Rightarrow \frac{PV}{RT} = \frac{PB}{RT} + 1$$

$$\Rightarrow Z = 1 + \frac{Pb}{RT}$$

Hence $Z > 1$ at all pressures.

This means, repulsive tendencies will be dominant when interatomic distance are small.

This means, interatomic potential is never negative but becomes positive at small interatomic distances.

Hence answer is (C)

Q.37 Sol. (A)

Let the heat capacity of insulated beaker be C.

$$\text{Mass of aqueous content in expt.1} = (100+100)\times 1 = 200\,\text{g}$$

$$\Rightarrow \text{Total heat capacity} = (C+200\times 4.2)\,\text{J/K}$$

Moles of acid, base neutralised in expt.1 $=0.1\times 1=0.1$

$$\Rightarrow \text{Heat released in expt 1} = 0.1\times 57 = 5.7\,\text{KJ}$$

$$\Rightarrow 5.7\times 1000 = (C+200\times 4.2)\times \Delta T.$$

$$5.7\times 1000 = (C+200\times 4.2)\times 5.7$$

$$\Rightarrow (C+200\times 4.2) = 1000$$

In second experiment,

$$nCH_3COOH = 0.2,\ n_{NaOH} = 0.1$$

$$\text{Total mass of aqueous content} = 200\,\text{g}$$

$$\Rightarrow \text{Total heat capacity} = (C+200\times 4.2) = 1000$$

$$\Rightarrow \text{Heat released} = 1000\times 5.6 = 5600\,\text{J}$$

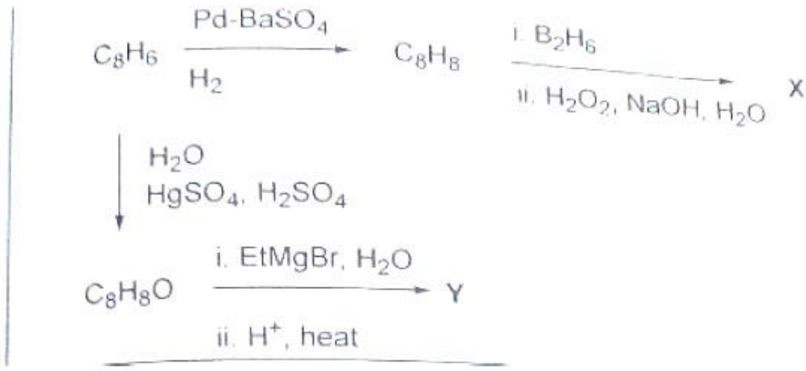
Overall, only $0.1\,\text{mol}$ of CH_3COOH undergo neutralization.

$$\Rightarrow \Delta H_{neutralization}\ \text{of}\ CH_3COOH = -\frac{5600}{0.1} = -56000\,\text{J/mol}.$$

$$\Rightarrow \Delta H_{ionization}\ \text{of}\ CH_3COOH = 57-56 = 1\,\text{KJ/mol} \quad = -56\ \text{KJ/mol}.$$

$$\Rightarrow \Delta H_{ionization}\ \text{of}\ CH_3COOH = 57-56 = 1\,\text{KJ/mol}$$

Q.38 Sol. (B)

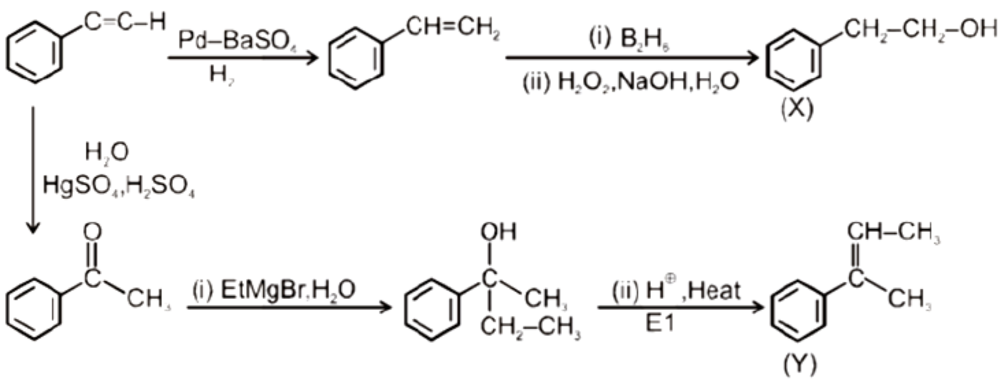


Final solution contains 0.1 mole of CH_3COOH and CH_3COONa each.

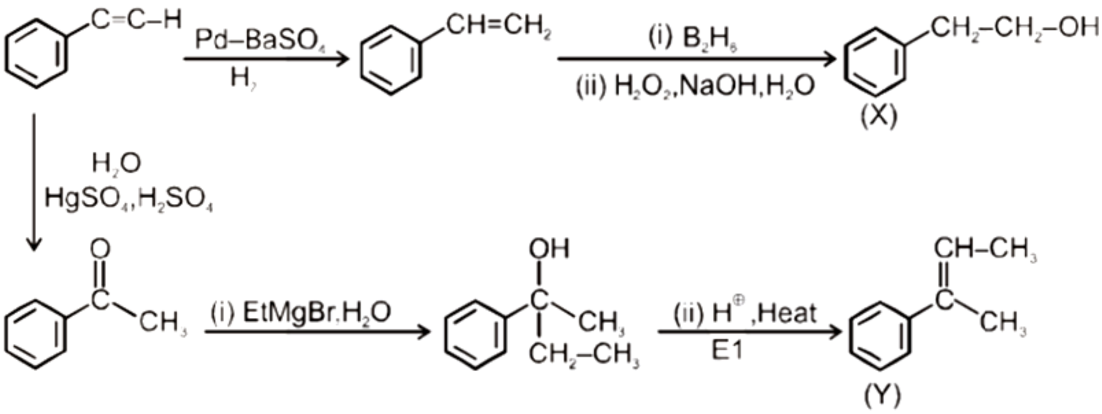
Hence it is a buffer solution

$$pH = pk_a + \log \frac{C[H_3COO]}{[CH_3COOH]}$$

Q.39 Sol. (C)



Q.40 Sol. (D)


C≡C–H
Pd–BaSO4
H2
CH=CH2
(i) B2H6
(ii) H2O2,NaOH,H2O
CH2–CH2–OH
(X)
H2O
HgSO4,H2SO4
O
C
CH3
(i) EtMgBr.H2O
OH
C
CH3
CH2–CH3
(ii) H⊕,Heat
E1
CH–CH3
C
CH3
(Y)