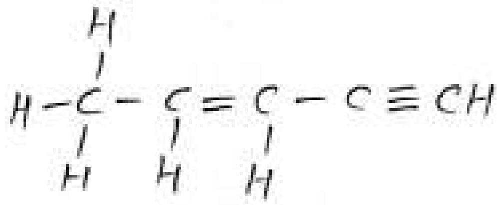
Set - S1

Solution 136.



Total σ bonds ⇒ C−C ⇒ 4

C−H ⇒ 6

total σ = 10

total π-bonds = 3 π bonds (C=C ⇒ 1π, C≡C ⇒ 2π)

Option - C

Solution. 137.

(b) $[SiCl_6]^{2-}$

The main reasons are -

(i) Six large chloride ions cannot be accommodated around Si^{4+} due to limitations of its size.

(ii) Interaction between lone pair of chloride ion and Si^{4+} is not very strong.

Solution. 138

Given,

$E^{\circ}_{cell} = 0.59V$

$T = 298K$

$\Delta G = -nRT \ln K_{eq}$

$\Delta G = -nFE^{\circ}_{cell}$

For 1 mole $n = 1$

$-FE^{\circ}_{cell} = -RT \ln K_{eq}$

$96500 \times 0.59 = 8.314 \times 298 \times 2.303 \log K_{eq}$

$\log K_{eq} = \frac{56935}{5705.85} = 9.91 \approx 10$

$K_{eq} = 1.0 \times 10^{10}$ Option 1

Solution 139. $Be(OH)_2$

Explanation:-

$Be(OH)_2 + \underset{Acid}{H_2SO_4} \longrightarrow BeSO_4 + 2H_2O$

$Be(OH)_2 + \underset{Base}{2NaOH} \longrightarrow Na_2Be(OH)_4$

Solution 140 Nylon 2-nylon 6

Explanation:- Its monomers are Glycine and Amino caproic acid which are easily degradable.

Option-(4)

Solution 141. (a) Pure nitrogen → (iv) Sodium azide

(b) Haber process → (iii) Ammonia

(c) Contact process → (ii) Sulphuric acid

(d) Deacon process → (i) chlorine

Option-(2)

Solution.142 Water + Nitric acid

$H_2O + HNO_3$

Explanation:- Here water molecules formed strong H-bonding with HNO_3 means there is strong interaction between H_2O & HNO_3 molecules therefore the boiling point of resulting mix. increases.

Option-(3)

Solution 143. 50 mL + 2M $AgNO_3$ $\longrightarrow$ 50 mL of 1.5M KI

moles of $AgNO_3$ = 0.05 × 2 = 0.1 mole (excess)

moles of KI = 0.05 × 1.5 = 0.075

Explanation:- For the formation of negatively charged colloids $[AgI]I^-$, excess of $AgNO_3$ req.

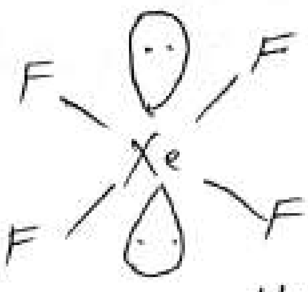
Option-(1)

Solution.144 Alanine

Explanation:- Alanine is produced by human body therefore it is non essential amino acid

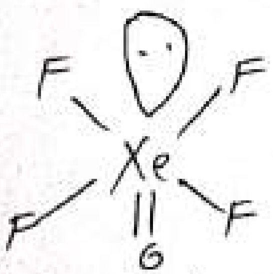
Option - (1)

Solution.145

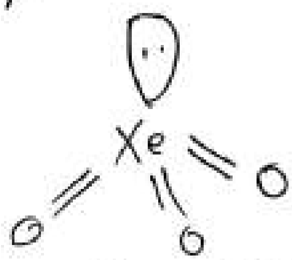


Square planar

Distorted Octahedral



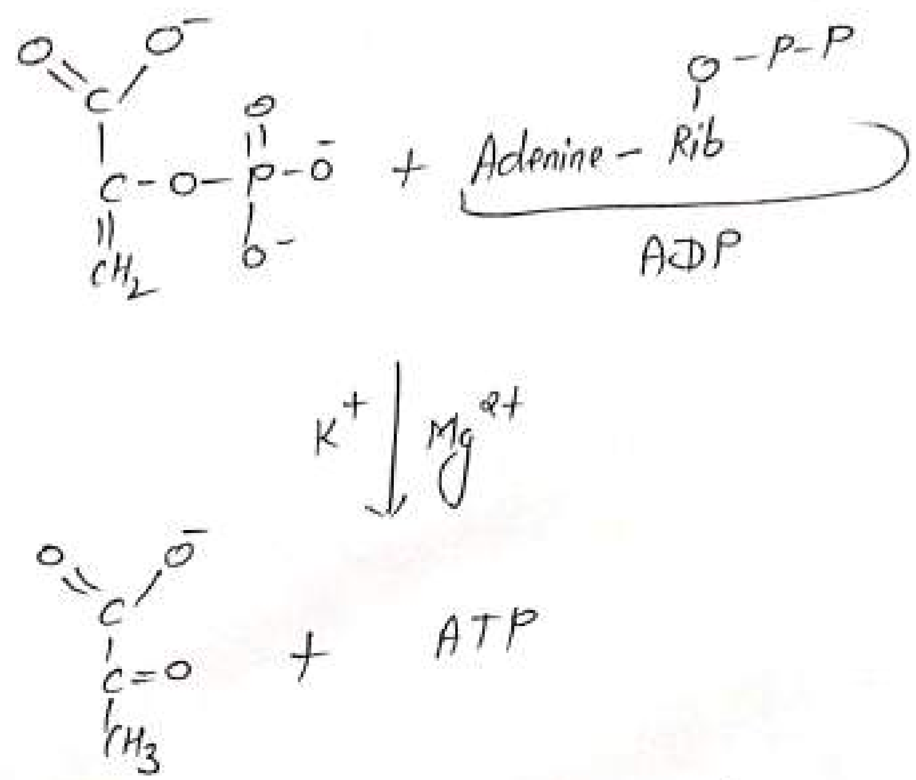
Square pyramidal



Pyramidal

Option-(4)

Solution. 146

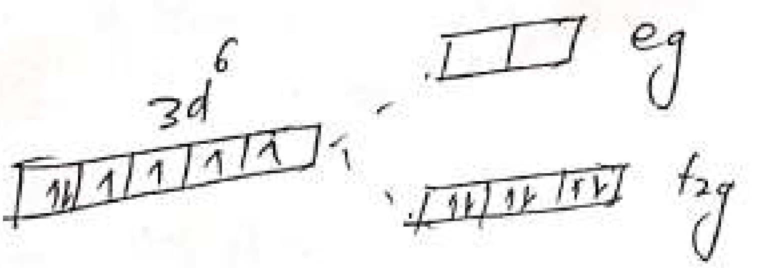


Option - (4)

Solution. 147 $K_4[Fe(CN)_6] \longrightarrow 4K^+ + [Fe(CN)_6]^{4-}$

Oxidation state of Fe = +2 ($3d^6$)

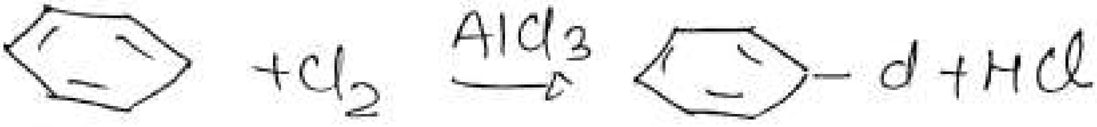
Here, CN^- is a strong ligand therefore pairing in 3d-orbital takes place



$t_{2g}^6 \; e_g^0$

Option - (4)

148) (option :- 4) :-



⇒ Here Benzene reacts with chlorine in presence of $AlCl_3$ (acts as catalyst)

149) ⇒ option (D)

H_2, Pd/C (Quinoline)

↑ this gives cis product.

150 ⇒ option (3)

As we are n+l rule.

so

| $5f > 6p > 5p > 4d$ |

151) ⇒ option (1)

The pi bonding involves overlap of p orbitals of oxygen with p orbital of mangnese.

152.) :- option(4)

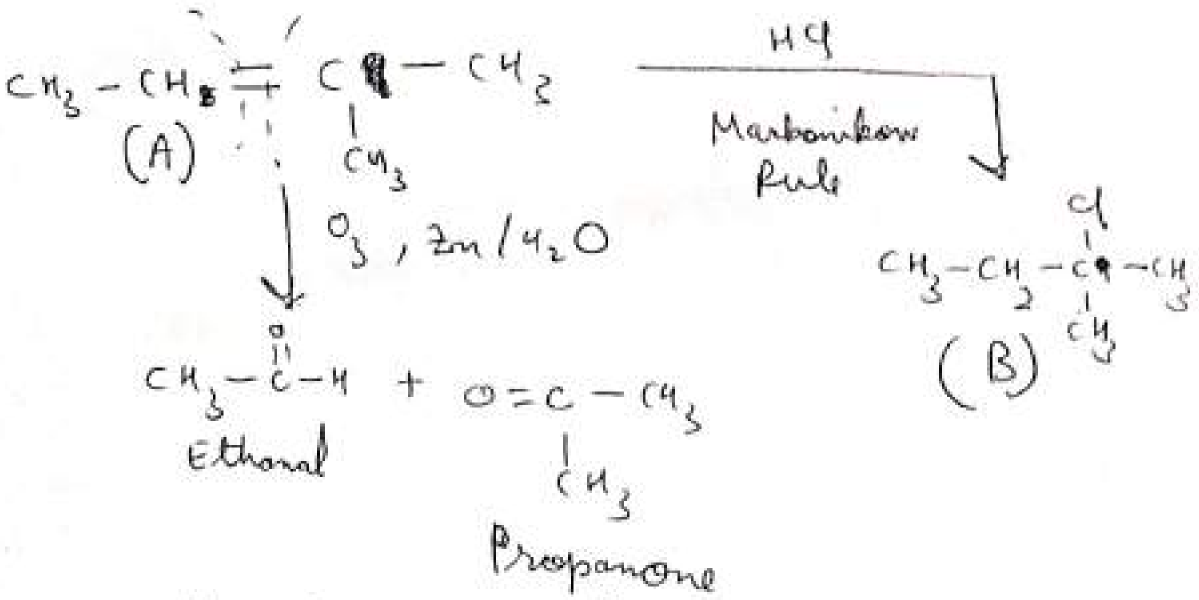
Li < B < Be < C < O < N < F < Ne

153.) :- option (1)

$H_2PO < H_2Te < H_2Se < H_2S < H_2O$

Reason :- thermal stablity decreases down the group.

154.) :-



∴ option (1) is correct

155) ⇒ (2.)

$CuCO_3 \cdot Cu(OH)_2$

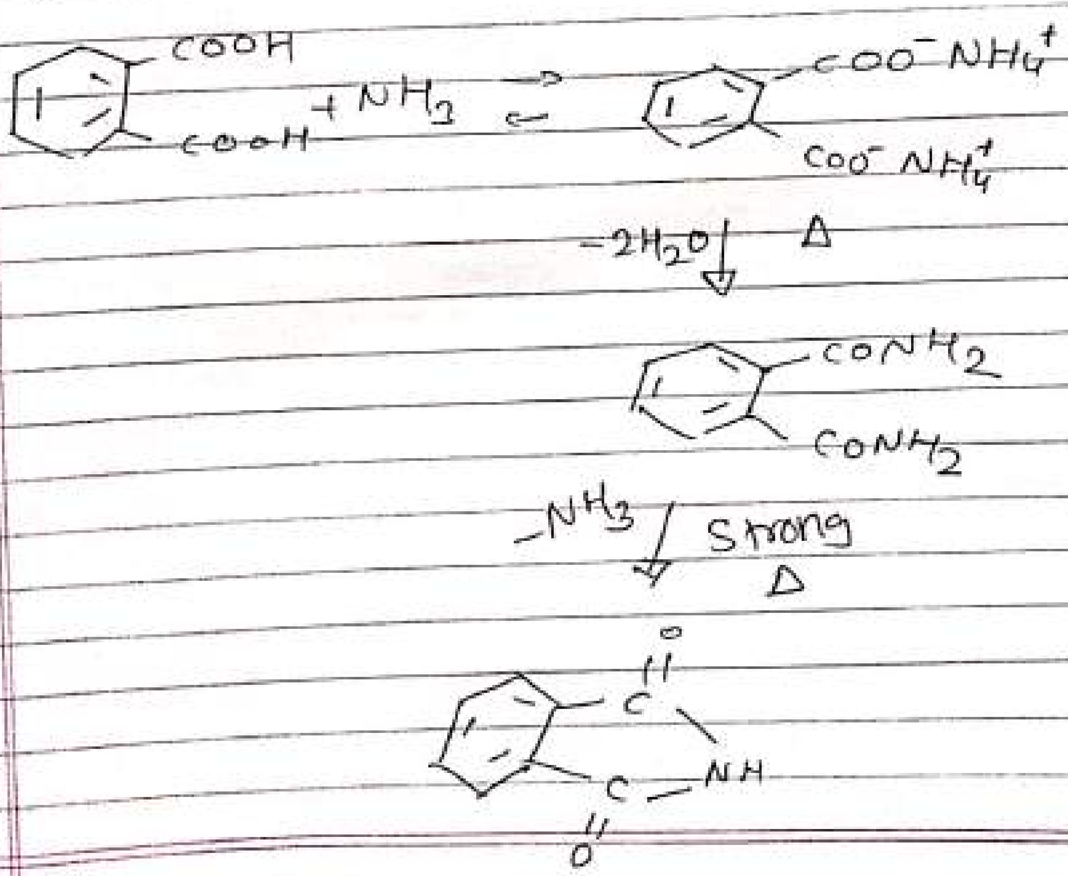
↑

Formula (Theory Based)

156.) ⇒ (3) penicillin(G)

(Theory Based)

157.) ⇒ option- (4)



Sol^n. 158.

(a) $2Cu^+ \rightarrow Cu^{2+} + Cu^0$

reduction ($Cu^+ \rightarrow Cu^0$), oxidation ($Cu^+ \rightarrow Cu^{2+}$)

hence, disproportionation

(b) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$

$+6 \rightarrow +7$ (oxidation), $+6 \rightarrow +4$ (reduction)

hence disproportionation

(c) $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$

$+7 \rightarrow +6$, $+4$ (reduction); $-2 \rightarrow 0$ (oxidation)

hence, disproportionation

~~2 MnO4 + Mn2+ →~~

3) $2MnO_4^- + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 4H^+$

$+7 \rightarrow +4$ (reduction), $+2 \rightarrow +4$ (oxidation)

reverse of disproportionation

hence, (3) a, b ~~and c~~ are correct

option (3) is correct

159.) ⇒ Option - (1)

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

$$-\frac{d[N_2]}{dt} = -\frac{d[H_2]}{3\,d(t)} = \frac{1}{2}\frac{d[NH_3]}{dt}$$

~~(160) ⇒ (1) $CH_3 - O - CH_3$~~

~~its ether its surrounded by two CH_3 group which will protect from protonation.~~

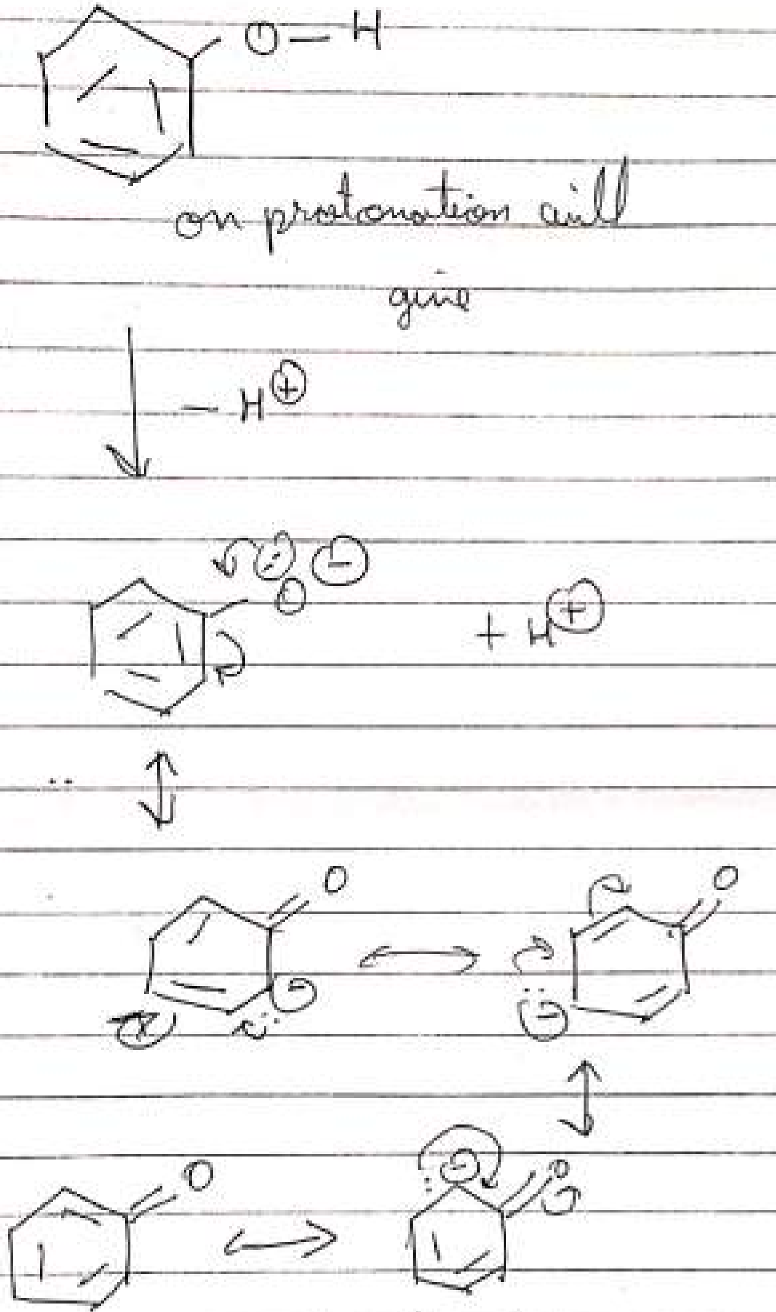
(161) ⇒ option (2)

⇒ Sulphur dioxide

(Theoretical Question)

Sol-160

2(a))



on protonation will give

resonance stabilized hence conjugate base is stable

hence it will be most protonated

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162.) (option - 1)

Haber's -

$N_2 + 3H_2 \rightleftharpoons 2NH_3$

3 moles Hydrogen produces 2 mole NH_3

2 moles NH_3 require 3 mole H.

1 mole " " $\frac{3}{2}$ mole H

20 moles → $\frac{3}{2} \times 20$ (10)

= 30

(163) :- option - (1)

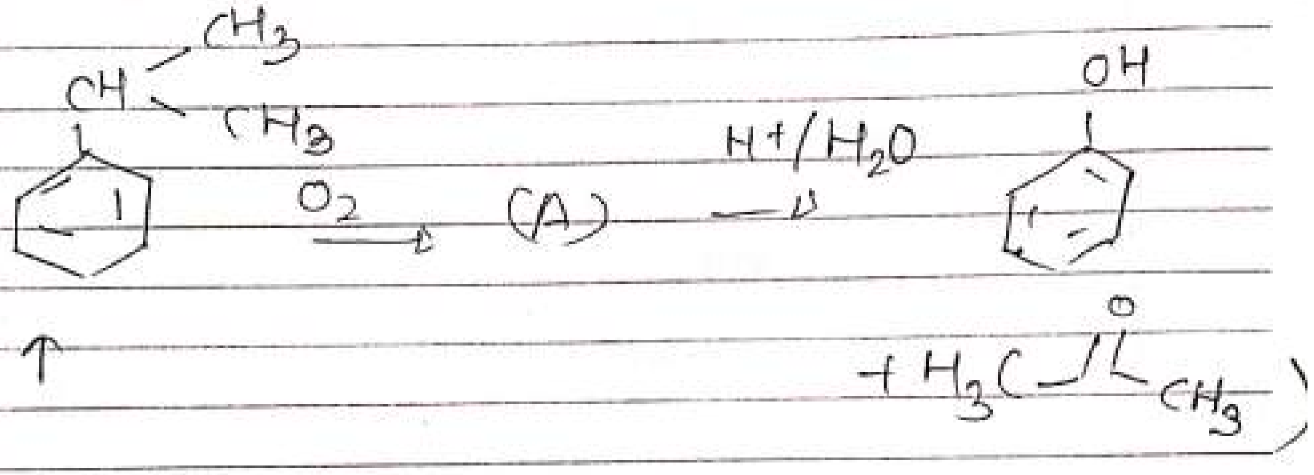
$\left(Z = \frac{PV}{nRT} \right)$

$Z < 1$

So

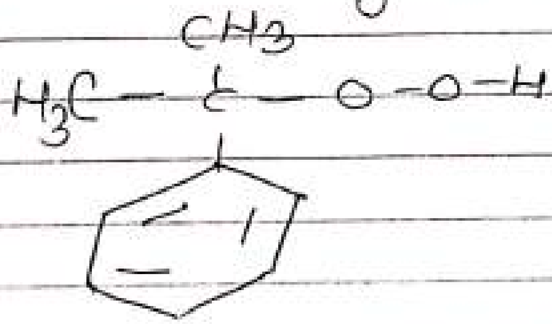
Attractive force dominant.

164) = C (B)



Cumene

on oxidation gives peroxide



Solution. 165. Given that

$\Delta E^{\circ}_{cell} = 0.24\,V$, $T = 298K$

$n = 2$

$\Delta G^{\circ} = -nFE^{\circ}_{cell}$

$= -2 \times 96500 \times 0.24$

$= -46320\ J\,mol^{-1}$

$\Delta G^{\circ} = -46.32\ kJ\,mol^{-1}$

option-(3)

Solution. 166. Given,

$V_1 = 0.1L$, $V_2 = 0.25L$

$p_{ext} = 2\ bar = 2 \times 10^{5}\ pas$

$w = -p_{ex}\Delta V = p_{ext}(V_2 - V_1)$

$= -(2 \times 10^{5})(0.25 - 0.1) \times 10^{-3}$

$= -0.3 \times 10^{5} \times 10^{-3}$

$w = -30\ J$.

Option-(3)

Solution. 167. PbF_4

Explanation:- According to Fajan's rule a smaller size cation formed covalent bonding but here Pb^{4+} has larger size and F is more electronegative therefore Pb-F bond ionic

option - (3)

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Solution. 168. $Ca(OH)_2 \longrightarrow Ca^{2+} + 2OH^-$

$\qquad\qquad\qquad\qquad\qquad\quad S \qquad 2S$

$pH = 9$

$pOH = 14 - 9 = 5$

$OH^- = 10^{-5} \Rightarrow S = \frac{10^{-5}}{2} = 0.5 \times 10^{-5}$

$K_{sp} = S(2S)^2 = \underbrace{0.5 \times 10^{-5}}_{Ca^{2+}} \times \underbrace{(1 \times 10^{-5})^2}_{OH^-}$

$K_{sp} = 0.5 \times 10^{-15}$.

Option - (3)

Solution. 169 Balmer series - comes under visible region (400nm - 700nm)

Option - (4)

Solution. 170. $\Delta_{mix}H = 0$

Explanation :- For an ideal solution solute-solute interaction and solvent-solvent interaction almost similar to the solute-solvent interaction therefore after mixing enthalpy remains unchanged.

Option - (1)

173) => Option - 3

$(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

=> the basicity of amine in aquous solution depends on stablity of ammonium cation which in turn depends on combination of following Factor

1) +I

2) extent of Hydrogen Bond

3.) sterric effect

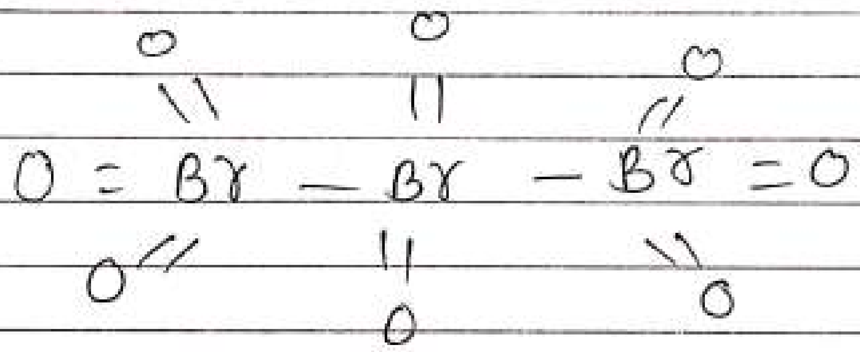
so order

2 > 1 > 3 > NH_3

174.) Option-(C)

More the no. of Bonds
High stablity

So you have to count
maximum no. of Bond



Solution.171. Clark's method

$$Ca(HCO_3)_2 + Ca(OH)_2 \longrightarrow 2CaCO_3\downarrow + 2H_2O$$

$$Mg(HCO_3)_2 + Ca(OH)_2 \longrightarrow MgCO_3\downarrow + 2H_2O + CaCO_3\downarrow$$

In this method $Ca(OH)_2$ (lime water) added to the hard water that form ppt. of $MgCO_3$ & $CaCO_3$ and separated out.

Option-(4)

Solution.172.

$$\underset{\text{base}}{H_2O} + \underset{\text{Acid}}{HF} \longrightarrow \underset{\text{conjugate acid}}{H_3O^+} + \underset{\text{conjugate base}}{F^-}$$

$$(\text{Acid})\ H_2O \longrightarrow \underline{OH^-} + H^+$$

$$(\text{Acid})\ HF \longrightarrow H^+ + \underline{F^-}$$ conjugate base

Option-(1)

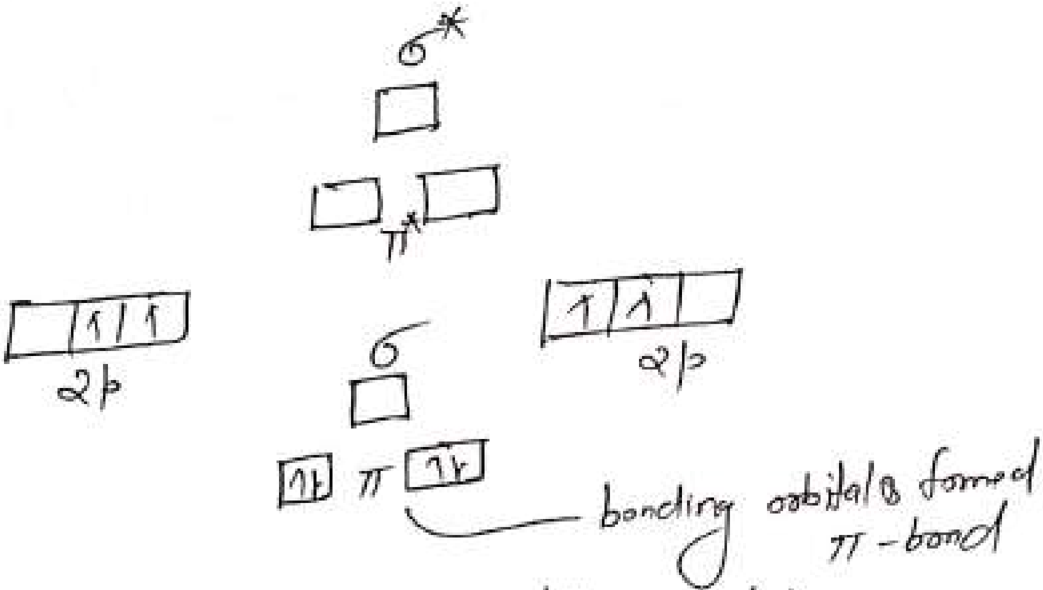
Solution.175. $2H(g) \longrightarrow H_2(g)$

Explanation:- Entropy defined by the increases in the randomness of molecules here 2 hydrogen atoms converted into 1 H_2 gaseous molecule therefore entropy decreases $\Delta S = -ve$

Option-(2)

Solution. 176: C_2

Explanation:-



Option - (1)

Solution. 177: Let $[A]_0 = 100$ $[A]_t = 100 - 99 = 1$

For first order rex^n

$$t = \frac{2.303}{k} \log \frac{[A]_0}{[A]_t}$$

$$= \frac{2.303}{k} \log \frac{(10)^2}{1}$$

$$t = \frac{4.606}{k}$$

Option - (1)

Solution. 178:

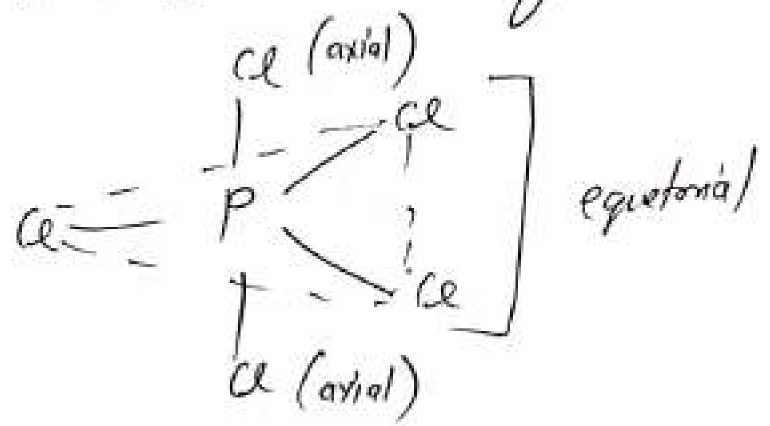
$NH_4OH + HCl \longrightarrow NH_4Cl + H_2O$

NH_4OH: base; NH_4Cl: con. salt

Option - (1)

Solution. 179. PCl_5

Explanation:- Due to unequal bonds (axial, equatorial) in PCl_5 it is highly unstable or reactive



Solution. 180. HCP has total atoms = 6

Octahedral voids = 6

Anion occupied octahedral voids = 6 = A

Cation occupied 75% of octahe = 0.75 × 6

= 4.5 = C

Formula ⇒ $C_{4.5}A_6$ or $C_{\frac{45}{10}}A_6$

$C_{\frac{9}{2}}A_6 \Rightarrow C_9A_{12}$

⇓

C_3A_4

Option- (1)