(6) Peracetic acid :

It is prepared by treating acetic anhydride with concentrated H_2O_2 solution and then distilling the mixture under reduced pressure :

$$(CH_3CO)_2O + H_2O_2 \xrightarrow[\text{under reduced pressure}]{\text{Distillation}} \underset{\text{Peracetic acid}}{CH_3COOOH}$$

It is used in Baeyer-Villiger oxidation e.g. when acetone is treated with peracetic acid, methyl acetate is formed—

$$CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow{CH_3COOOH} CH_3-\overset{\overset{O}{\|}}{C}-OCH_3$$

It involves an intramolecular anionotropic rearrangement in which an alkyl group which the bonded pair of electron migrates from the carbonyl C-atom to an electron deficient O-atom. This reaction is usually carried out in inert solvent like CH_2Cl_2. This reaction gives a good yield of esters or acids. More nucleophilic alkyl group migrates, hence the order of migration is given as

$$3^\circ > 2^\circ > 1^\circ$$

$$CH_3CO.CMe_3 \xrightarrow[CH_3COOH]{CH_2Cl_2} CH_3COOCMe_3$$

(7) Diborane, B_2H_6 :

It is at best prepared by the action of LAH on BCl_3 vapours

$$4BCl_3 + 3LiAlH_4 = 2B_2H_6 + 3AlCl_3 + 3LiCl$$

It is also prepared by the action of H_3PO_4 on Mg_3B_2

$$\underset{\text{Mg-boride}}{Mg_3B_2} + 2H_3PO_4 \rightarrow B_2H_6 + Mg_3(PO_4)_2$$

It is used for carrying out ***hydroboration***. In this reaction, the alkyl borane products formed by the action B_2H_6 on unsaturated organic compounds in dry ether under an inert atmosphere may be converted into hydrocarbons by carboxylic acids, to alcohols by alkaline H_2O_2 and ketones or carboxylic acids by oxidation with chromic acid.

$$B_2H_6 + 3(RCH = CHR) = B(CH_2 - CH_2R)_3 + 2BR_3$$

$$BR_3 + 3CH_3COOH = \underset{\text{Hydrocarbon}}{3RH} + B(CH_3COO)_3$$

$$B(CH_2CH_2R)_3 + 3H_2O_2 = \underset{1^\circ \text{ alcohol}}{3RCH_2CH_2OH} + B(OH)_3$$

$$B(CH_2CH_2R)_3 \xrightarrow{[O]} \underset{\text{Carboxylic acid}}{CH_3COOH}$$

Q.61. What are amino acids ?

Ans. : Amino acids : Amino acids are amino substituted carboxylic acids. They have both $-NH_2$ and $-COOH$ groups. In solid state and in aqueous solution they exist largely as **Zwitter ions** (or internal salts) formed by proton transfer from $-COOH$ to $-NH_2$ group.

$$NH_2CH_2CO_2H \rightleftharpoons NH_3CH_2CO_2$$

amino acid — Zwitter ion

Hence amino acids have high melting points and large dipole moments and are very water soluble. The pH at which the Zwitter ion concentration is largest and the molecule has no net charge is called the **isoelectric point** and usually falls between 4.6 and 6.3. Amino acids form salts with strong acids and strong bases. Simple amino acids containing one $-NH_2$ and one $-COOH$ groups are classified α, β, γ etc. depending upon the position of $-NH_2$ group with respect to $-COOH$ group e.g.,

1. $CH_3CH_2CH(NH_2)COOH$
   α - Amino butyric acid
   (2-Amino butanoic acid)
2. $CH_2(NH_2)-CH_2-CH_2COOH$
   β - Amino butyric acid
   (3-Amino butanoic acid)
3. $NH_2-CH_2-CH_2-CH_2-COOH$
   γ - Amino butyric acid
   (4-Amino butanoic acid)

α-Amino acids are the most important among all amino acids as proteins are built up of α-aminoacid units. These are obtained from bio sources. They are opitically active except glycine and have L-configurating at α-carbon atom.

Amino acids can have many $-NH_2$ and $-COOH$ groups. Such amino acids are of three types :

1. When the number of $-NH_2$ groups is equal to that of $-COOH$ groups, then we have the **neutral amino acids.**
2. When the number of $-NH_2$ groups is greater than that of $-COOH$ groups, then we have the **basic amino acids.**
3. When the number of $-NH_2$ groups is lesser than that of $-COOH$ groups, then we have the **acidic amino acids.**

Q.62. Write the different methods of synthesis of α-amino acids.

Ans. : Synthesis of α-amino acids :

1. By the action of conc. NH_3 solution on α-halogenated acids e.g.