Ch-4 Carbon and its Compounds

Properties and Nature of Carbon

1. Always forms covalent bonds.
2. Tetravalent.
3. Tetrahedral.
4. 3 allotropes – diamond, graphite, Buckminster-fullerenes.
5. Catenation – unique properties of self-linking of carbon atoms.

Name of Compounds	IUPAC Names
Alkene	Alkane – ane + ene → alkene
Alkyne	Alkane – ane + yne → alkyne
Haloalkanes	Halo + alkane → haloalkane
Alcohols	Alkane – e + ol → alkanol
Aldehydes	Alkane – e – al → alkanal
Ketones	Alkane – e + one → alkanone
Carboxylic acids	Alkane – e + oic acid → alkanoic acid

Chemical Properties of Carbon Compounds

1. **Combustion –** burning of carbon compound in air.
2. **Substitution –** replacement of an atom or a group of atoms in an organic molecule by another atom or group of atoms.
3. **Addition –** addition of 2 reactants to form a single product.
4. **Oxidation –** addition of oxygen.

Ethanol

1. Colourless, distinct smell and burning taste, soluble in water in all proportions, neutral to litmus.
2. Reaction with sodium – $2\ CH_3CH_2OH + 2\ Na \rightarrow 2\ CH_3CH_2ONa + H_2$
3. Reaction with conc. H_2SO_4 - $CH_3CH_2OH + H_2SO_4$ (conc.) $\rightarrow CH_2{=}CH_2 + H_2O$
4. Combustion – $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 2H_2O$ + heat

Soaps

1. These are the sodium salts of the long chain carboxylic acids. The ionic group in soaps is $–COO^-Na^+$.
2. Not suitable for washing purposes, when the water is hard.

Detergents

1. These are the sodium salts of benzene sulphonic acids. The ionic group in a detergent is either $–SO_3^-Na^+$ or $–SO_4^-Na^+$.
2. Can be used for washing, even when the water is hard.

Ethanoic Acid

1. Colourless, pungent smelling liquid, soluble in water in all proportions.
2. Reaction with sodium carbonate – $2\ CH_3COOH + Na_2CO_3 \rightarrow 2\ CH_3COONa + CO_2 + H_2O$

3. Reaction with sodium hydrogen carbonate – $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2 + H_2O$
4. Esterification – $CH_3COOH + CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4 + \Delta} CH_3COOCH_2CH_3 + H_2O$
5. Hydrolysis – $Ch_3COOC_2H_5 \xrightarrow{NaOH} C_2H_5OH + CH_3COOH$