Ketones with Classification and Properties

The word Ketone is derived from Aketon which is an old German word for acetone. According to the rules of IUPAC , they can be named by changing the -ane of the parent alkane .However, according to traditional non-systematic names are still used, for e.g acetone and benzophenone. These are the non-systematic names and are considered as retained IUPAC names, since some textbooks use names such as 2-propanone or propan-2-one in place of acetone, the simplest ketone (C H3-CO-CH3). Keepind in mind that the position of the carbonyl group can be usually denoted by a number.

Hybridization in Ketones

The ketonic C atom is described as sp2 hybridized atom. They are trigonal planar all around the ketonic carbon, with C-C-O single and C-C-C single bond angles of approximately 120° (angle of hybridization). These are different from aldehydes due to that the CO is bonded to two carbon atoms within a carbon skeleton . In aldehydes, the carbonyl is bonded to a carbon atom and a hydrogen and are thus located right at the ends of carbon chains. They are also different from other carbonyl-containing group functions, such as carboxylic acids (acids major role), esters and amides.

Different Classes of Ketones: Ketones can be classified on the basis of their substituents (ingredients). A simple big classification further divides ketones into

1) Symmetrical Derivative having a definite shape compounds.

- Example of Symmetrical Derivative are **Acetone and benzophenone.**

2) Asymmetrical Derivatives having shapes which depend on the basis of equivalency of the two organic substituents that are attached to the carbonyl center.

- Example of Asymmetrical Derivative is **Acetophenone.**

Classification of Ketones

1) Diketones: Diketones are well known for their unusual properties. The diacetyl (CH3C(O)C(O)CH3) ketones is used for the butter-flavoring in popcorn. Acetylacetone is virtually a misnomer because this species exists mainly as the monoenol a common ligand in coordination chemistry.

2) Unsaturated ketones
Unsaturated ketones contains the unit of alkene and alkyne. Vinyl ketone, CH3C(O)CH=CH2 is the common example of unsaturated ketones.

3) Cyclic ketones
Most of the ketones posses cyclic property. Formula for the simple class is (CH2)nCO. Cyclohexanone, is the example of cyclic ketone, whichact as an important intermediate compound in the production of nylon.

Properties of Ketones:

The carbonyl group is polar and it is a consequence of the fact that the electronegativity of the oxygen atom is greater than that for C atom. Thus making ketones as nucleophilic at oxygen atom and electrophilic at carbon atom. Just because the carbonyl groups interact with water by hydrogen (H) bonding, ketones are thus typically more soluble in water than the related methylene compounds (important properties).

Ketones are thus the hydrogen-bond acceptors (that accept hydrogen bonds). Ketones are generally not Hyderogen-bond donors and thereby cannot attach hydrogen-bond to itself. Because of their inability to serve both as hydrogen-bond donors (that donate) and acceptors (that accept) , ketones do not tend to "self-associate" and are thus more volatile than any alcohol and carboxylic acid of any comparison of molecular weights. Thus these factors relate to the sweet smell of ketones in perfumes and many other solvents.

Applications of Ketones:

- They are commonly used in the biochemistry.
- Ketone strips are used by the diabetics patients under the concern of doctor.
- Ketones are produced on large scale in the industries as solvents and polymer precursors.
- Acetone is a commonly used as a solvent in nail polish remover as it is the most active ingredient for some paint thinners.