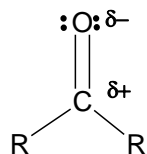


Ketones

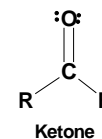
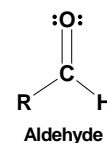


The carbonyl group has two hydrocarbon groups attached.

1

Similarity and difference between aldehyde and ketone

- Ketones are similar in structure to aldehydes.
- The only difference is that a ketone has two alkyl groups while the aldehyde has one alkyl group and a hydrogen atom.



2

Nomenclature of Ketones

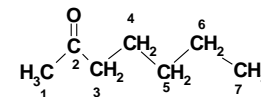
- The simplest ketone has 3 carbon atom, since a carbonyl group is surrounded by 2 carbon atoms.
- The IUPAC nomenclature for ketones requires that the ending -e of alkane name be replaced with -one, for example:

Number of Carbons	IUPAC name
3	Propanone
4	Butanone
5	Pentanone
6	Hexanone
7	Heptanone
8	Octanone

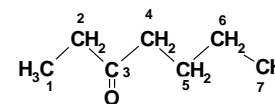
3

Nomenclature of Ketones

- Number the parent chain starting with the end of the chain closest to the carbonyl carbon atom.



- There is need to give the location of the carbonyl carbon. In the case of the molecule above, it is 2-heptanone. This would differentiate it from 3-heptanone (below).

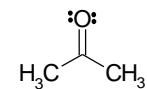


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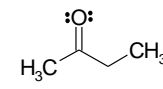
Nomenclature of Ketones

- There are two types of ketones where the carbonyl group is attached to benzene ring and are known as phenones.
- If a methyl group is attached to the other end of the carbonyl group, it is known as acetophenone.
- On the other hand, If a phenyl group is attached to the other end of the carbonyl group, it is known as benzophenone

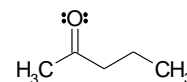
5



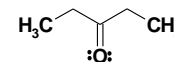
Propan-2-one



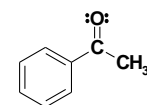
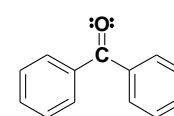
Butan-2-one



Pentan-2-one



Pentan-3-one

Acetophenone
(1-Phenyl-ethanone)Benzophenone
(Diphenyl-methanone)

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Properties of Ketones

- As in Aldehydes, the Van der Waal forces of attractions get stronger as the molecules get longer and have more electrons.
- That increases the sizes of the temporary dipoles that are set up.
- This is why the boiling points increase as the number of carbon atoms in the chains increases.

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Boiling point of some ketones

- Note that the boiling point of the phenones are much higher than the other ketones due to the presence of benzene ring

Compound	Melting point (°C)	Boiling point (°C)
Acetone	-95	56.1
Butanone	-86	79.6
2-Pentanone	-78	102
3-Pentanone	-42	102
Acetophenone	21	202
Benzophenone	48	306

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Uses of Ketones

- Ketones are often used in perfumes and paints to stabilize the other ingredients so that they don't degrade as quickly over time.
- They also have other uses in
 - surface coatings, adhesives, thinners,
 - printing inks and cleaning agents, in tanning,
 - as solvents, as preservatives,
 - in hydraulic fluids
 - intermediates in the chemical industry.

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Important Ketone: Propanone (Acetone)

- It is a colorless, flammable liquid.
- It is the simplest example of the ketones.
- Owing to the fact that acetone is miscible with water, and virtually all organic solvents, it serves as an important solvent in its own right, typically the solvent of choice for cleaning purposes in the laboratory.

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Important Ketone: Propanone (Acetone)

- Appearance: Colorless liquid
- Density 0.79 g/cm^3
- Melting point: $-94.9 \text{ }^\circ\text{C}$, 178 K , $-139 \text{ }^\circ\text{F}$
- Boiling point: $56.53 \text{ }^\circ\text{C}$, 330 K , $134 \text{ }^\circ\text{F}$
- Solubility in water: miscible

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Important Ketone: Propanone (Acetone)

- It is used to make polymers and synthetic fibres. For example, in the production of methyl 2-methylpropenoate which is the monomer poly(methyl 2-methylpropenoate) (Perspex).
- Acetone is a good solvent that is a component of some paints and varnishes.
- It is often used as the primary component in cleaning agents such as nail polish remover.

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