

## 1.6 Aldehydes and Ketones

- Ketones give rise to a group of chemicals known as pheromones and steroids (testosterone).



- Ketones have the general formula:  $\text{R} - \text{C}(=\text{O}) - \text{R}'$
- Aldehydes are a group of chemicals with divergent aromatic qualities. Short aldehydes have unpleasant odours and are used as preservatives. Long aldehydes have pleasant odours and are used in aromatherapy.



- Aldehydes have the general formula:  $\text{R} - \text{C}(=\text{O}) - \text{H}$
- Both contain the carbonyl group:  $\text{C} = \text{O}$

### Naming Aldehydes and Ketones

- Aldehydes are named based on the parent alkane. The -e is dropped and -al is added. E.g. ethanal ( $\text{CH}_3\text{CHO}$ ) (a.k.a. as acetaldehyde)
- Ketones are named based on the parent alkane. The -e is dropped and -one is added. E.g. propanone ( $\text{CH}_3\text{COCH}_3$ ) (a.k.a. acetone)

### Properties of Aldehydes and Ketones

- Since they contain a double bond with oxygen, they will not form hydrogen bonds but will have strong dipole bonds.
- Both have a lower boiling point than analogous alcohols.
- Soluble in both polar and non-polar substances and makes them good solvents.

### Preparing Aldehydes and Ketones from Alcohol (Oxidation Rxn)

- Oxidation usually refers to the gain of electrons (Ch. 9). However, in organic chemistry it usually refers to the addition of oxygen or loss of hydrogen.
- Need to use an oxidizing agent such as  $\text{H}_2\text{O}_2$ ,  $\text{K}_2\text{Cr}_2\text{O}_7$ , and  $\text{KMnO}_4$  (usually it is  $\text{KMnO}_4$  in  $\text{H}_2\text{SO}_4$ )
- Primary Alcohol: ethanol + oxidizer  $\rightarrow$  ethanal and water

- Secondary Alcohol: 2-propanol + oxidizer  $\rightarrow$  propanone + water

- Tertiary Alcohol: 2-methyl-2-propanol + oxidizer  $\rightarrow$  no reaction

### From Aldehydes and Ketones to Alcohol (Hydrogenation Rxn)

- Hydrogenation is a type of addition reaction. For aldehydes and ketones you also need high temperatures, high pressures, and a catalyst.
- E.g. ethanal + hydrogen  $\rightarrow$  ethanol

- E.g. propanone + hydrogen  $\rightarrow$  2 propanol

### Homework

- Practice 1,2,3,4,5,6,7
- Questions 1,2,3,4,5