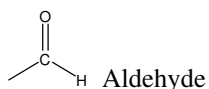


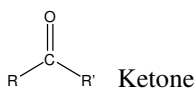
CHEM 20482 - Basic Organic Chemistry - Chapter 17 Review

Aldehydes and Ketones

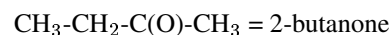
Structure & Nomenclature



-al



-one

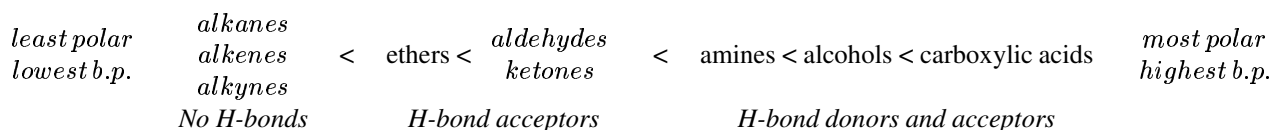


Common Names: formaldehyde, acetaldehyde, benzaldehyde, acetone, acetophenone, benzophenone

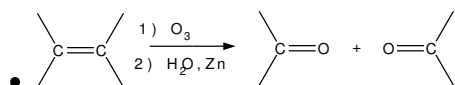
Properties

C=O bond is polar, sp^2 -hybridized trigonal planar, and cannot form H-bonds

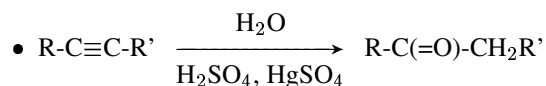
Ketones generally *slightly* more stable than aldehydes.



Synthesis of Aldehydes and Ketone



Ozonolysis



terminal alkynes \rightarrow methyl ketone

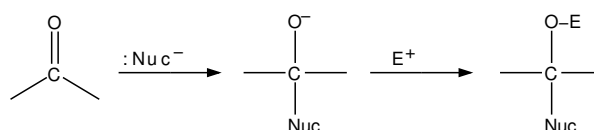


1° alcohols \rightarrow aldehydes

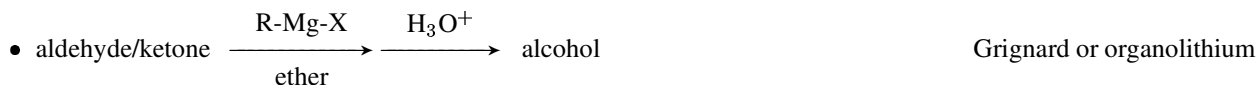


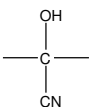
2° alcohols \rightarrow ketones

Addition Reactions of Carbonyls


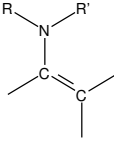


Simple Addition



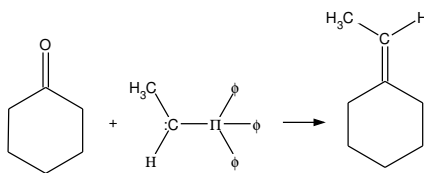
- aldehyde/ketone $\xrightleftharpoons{\text{H}_2\text{O}}$ *gem*-diol formaldehyde > aldehydes > ketones
- aldehyde/ketone $\xrightleftharpoons{\text{ROH}}$ *hemiacetal*/*hemiketal* $\xrightleftharpoons{\text{ROH}}$ *acetal*/*ketal* Use of *diol* favors product
- aldehyde/ketone $\xrightarrow{\text{HC}\equiv\text{N}}$  Cyanohydrin: ($\text{C}\equiv\text{N}^-$ is nucleophile)

Reactions with Amines

- 1° amines
 - aldehyde/ketone $\xrightarrow{\text{RNH}_2}$ [carbinolamine] \rightarrow  Imine product. (Water lost in last step)
- 2° amines
 - aldehyde/ketone $\xrightarrow{\text{RNHR}'}$ [carbinolamine] \rightarrow  Enamine product. (Water lost in last step)
- 3° amines
 - (No reaction)

Wittig Reaction

- $\text{RR}'\text{CH-X} + \text{P}\phi_3 \rightarrow \text{RR}'\text{CH-P}\phi_3^+ \xrightarrow{\text{base}} \text{RR}'\text{C-P}\phi_3$ ylide via $\text{S}_{\text{N}}2$ reaction. ($\phi = \text{C}_6\text{H}_5$ ring)
- aldehyde/ketone + ylide \rightarrow alkene (+ $\text{O}=\text{P}\phi_3$)
- Example



Oxidation Reactions

- aldehyde $\xrightarrow{[\text{ox}]}$ carboxylic acid Almost any oxidizing agent works