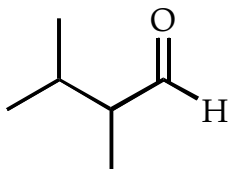


Nomenclature

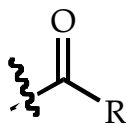
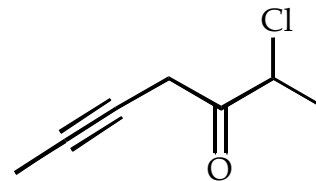
Aldehydes:

- CHO carbon is number 1
- ending is -al

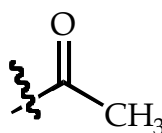


Ketones:

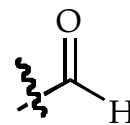
- numbering starts at end nearest carbonyl
- ending is -one



acyl group

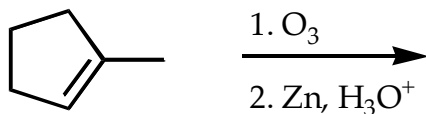
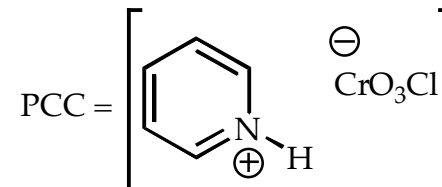
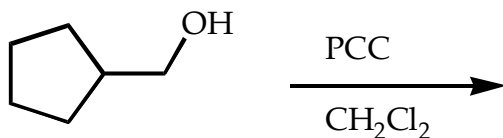


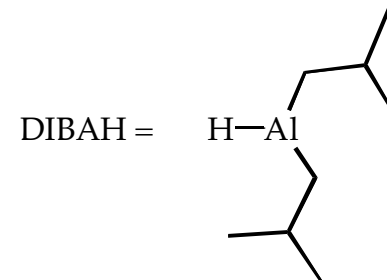
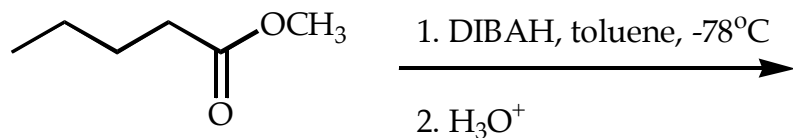
acetyl



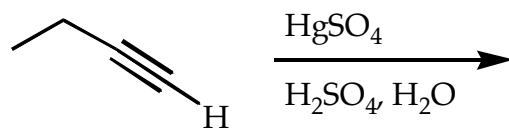
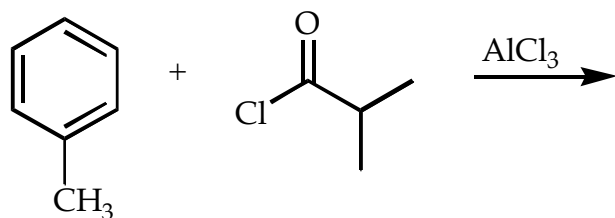
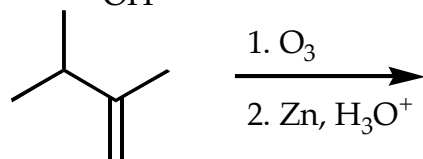
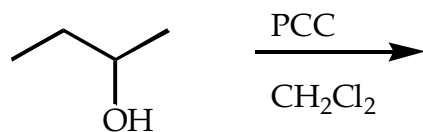
formyl

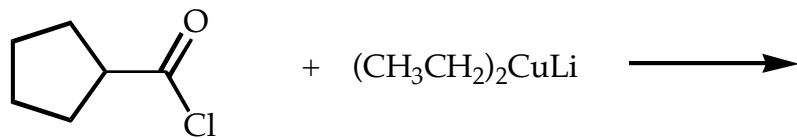
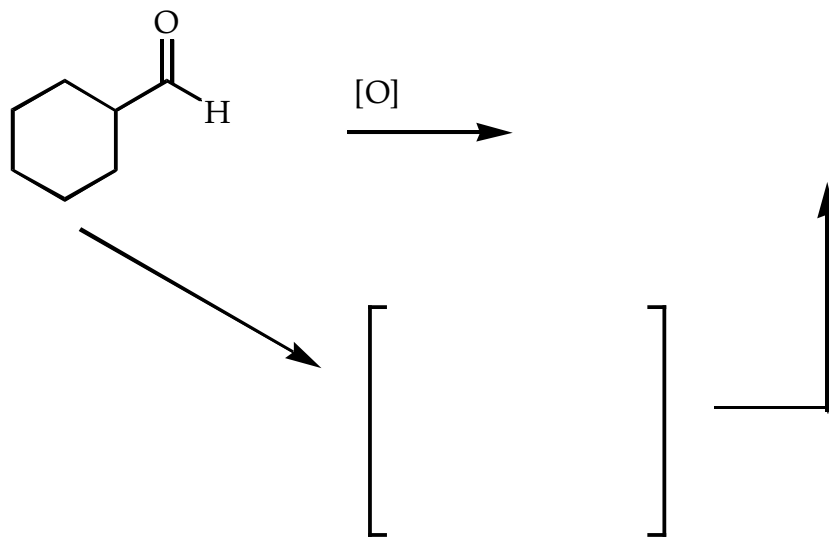
Preparation of Aldehydes



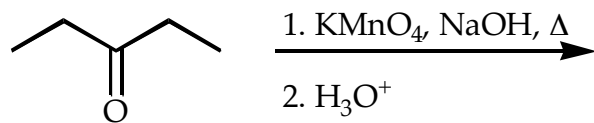


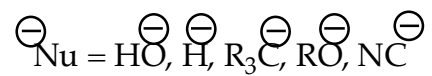
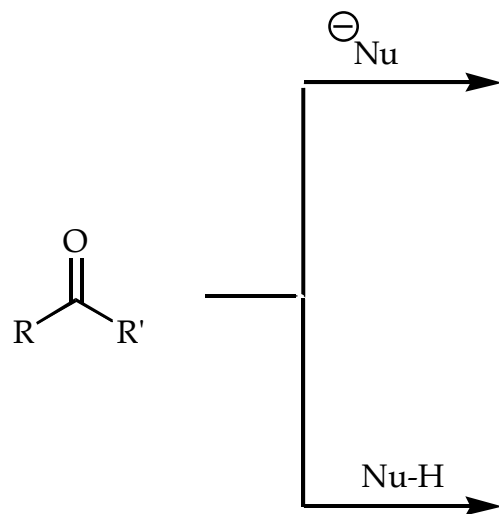
Preparation of Ketones



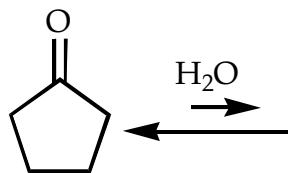
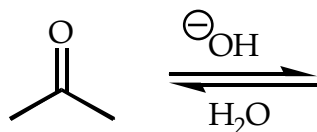
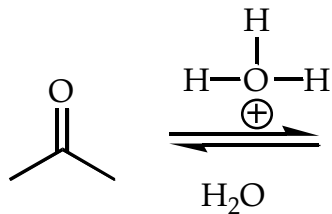
**Oxidation**

[O] = KMnO_4 or HNO_3, Δ or $\text{CrO}_3, \text{H}_3\text{O}^+$ or $\text{Ag}_2\text{O}, \text{NH}_4\text{OH}$

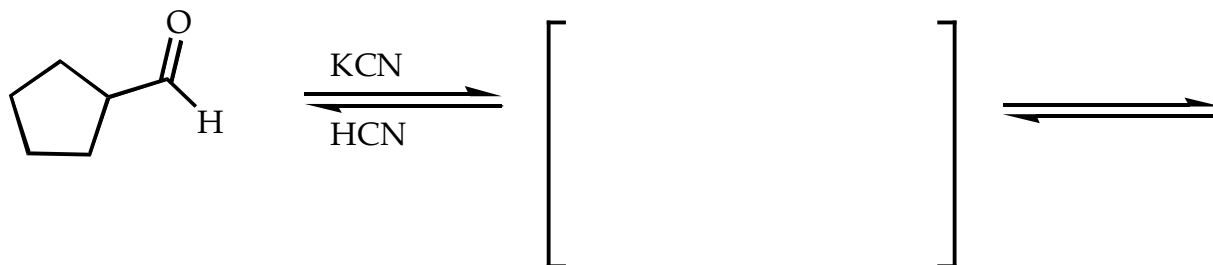


General Nucleophilic Addition Reactions

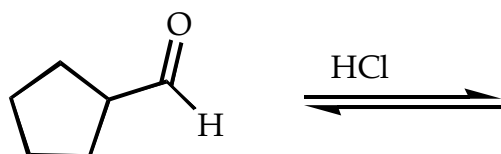
Why are aldehydes more reactive than ketones?

Hydration Reaction**Base-catalyzed hydration mechanism****Acid-catalyzed hydration mechanism**

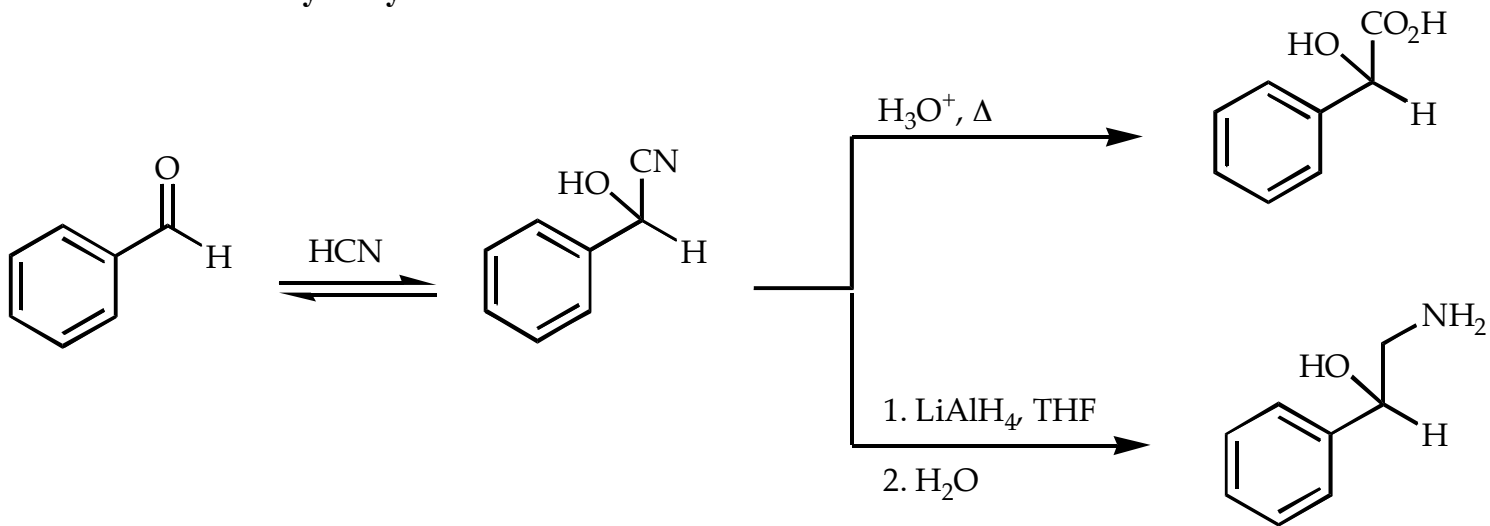
Cyanohydrin Formation

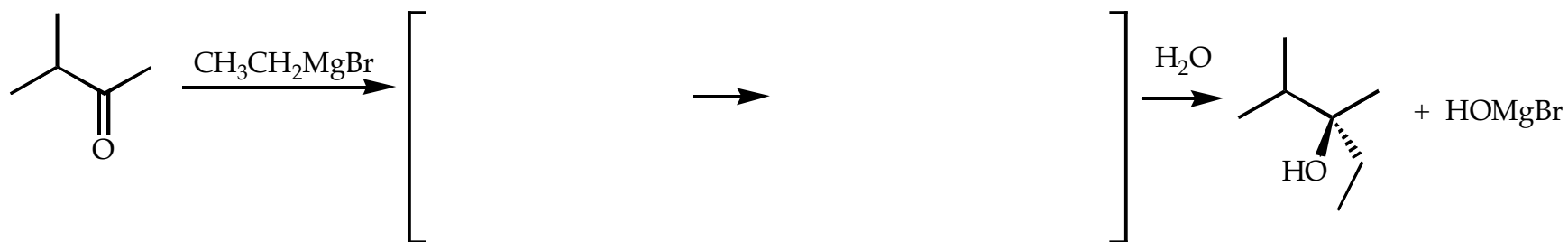
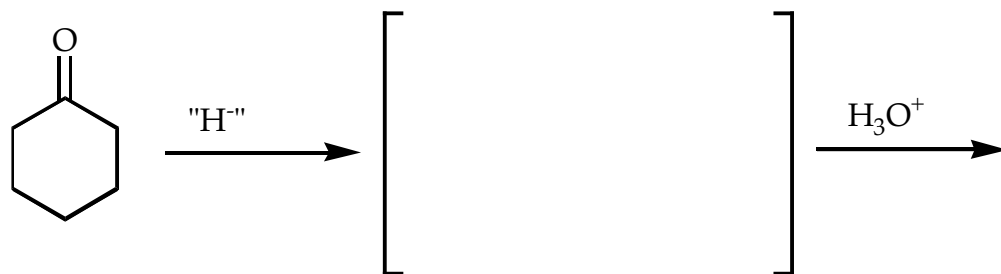


compare to reaction with other protic acids

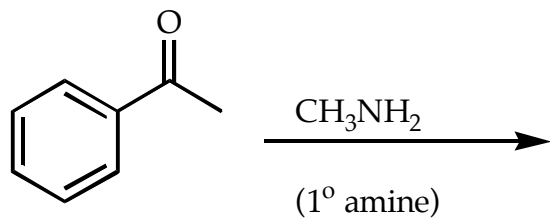


Further reactions of cyanohydrins

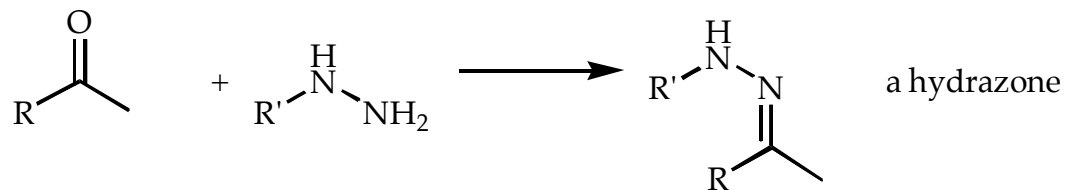
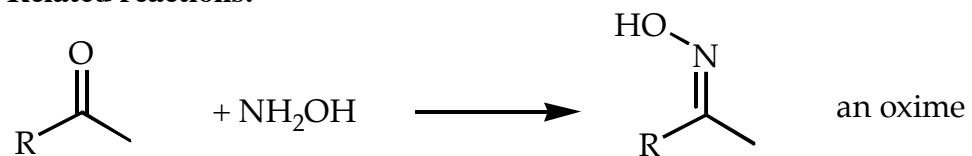


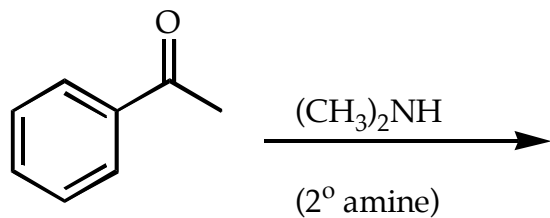
Alcohol Formation**Grignard****Hydride reagents**

H⁻ comes from NaBH₄ or LiAlH₄

Nucleophilic Addition of Amines**Mechanism:**

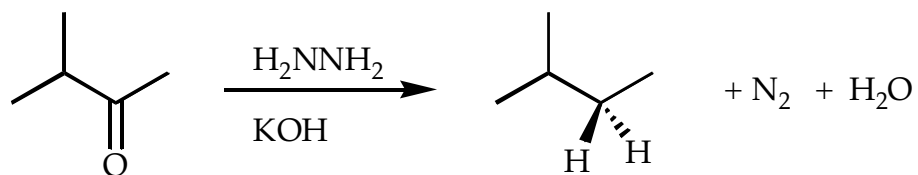
- reaction works best at pH = 5. Why?

Related reactions:

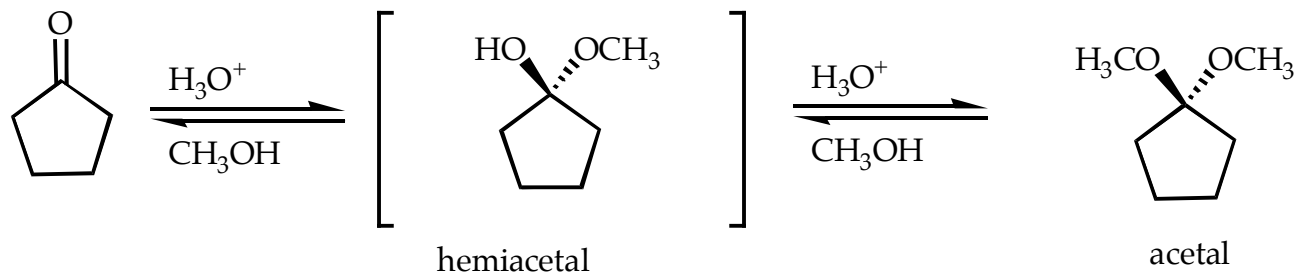


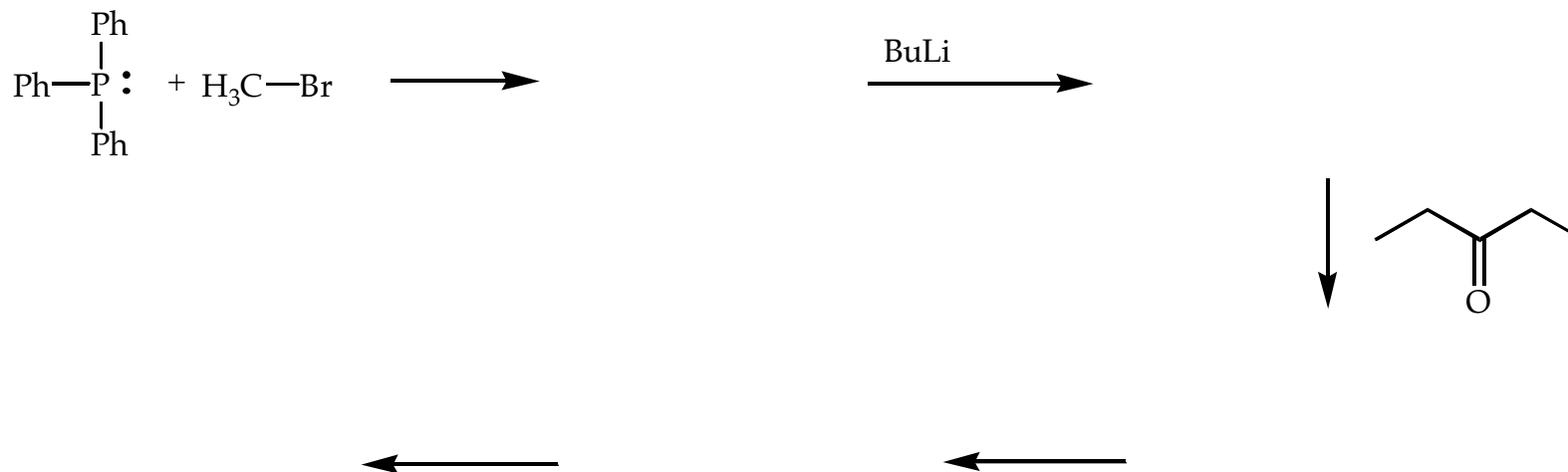
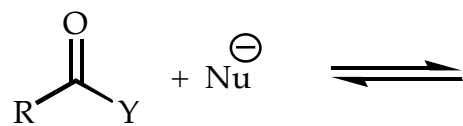
Mechanism:

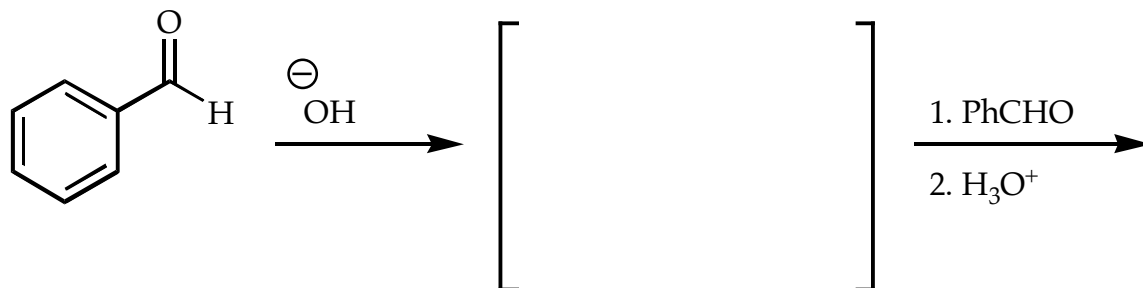
Wolff-Kishner Reaction



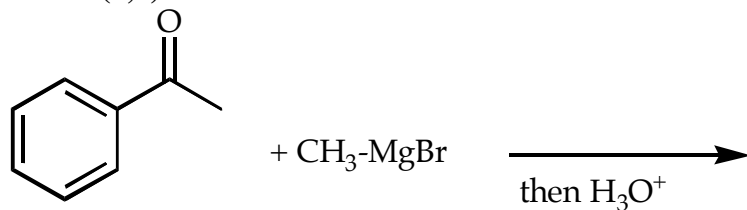
Mechanism:

Acetal formation**Mechanism:****Application:**

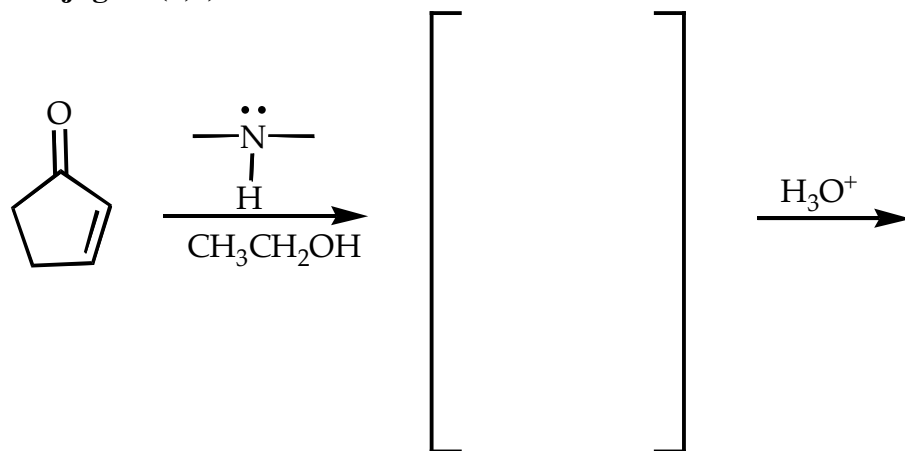
Wittig Reaction**Cannizzaro Reaction****General nucleophilic addition**

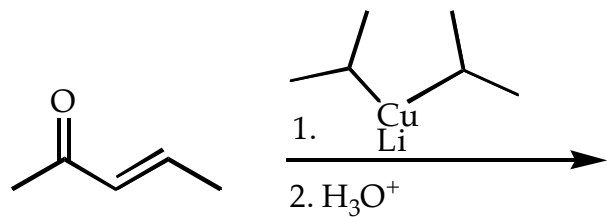
**Conjugate Addition**

Direct (1,2) addition



Conjugate (1,4) addition





Spectroscopy

IR:

C=O:

Aliphatic aldehyde

1730 cm^{-1}

Aliphatic ketone

1715 cm^{-1}

Aromatic aldehyde

1705 cm^{-1}

Aromatic ketone

1690 cm^{-1}

$^1\text{H NMR}$:

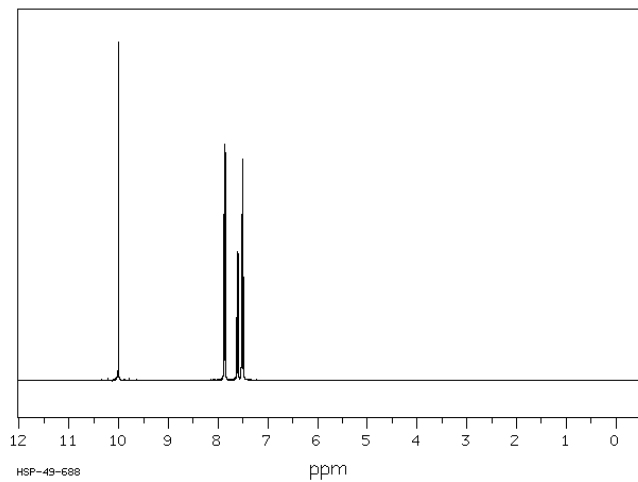
CHO δ 10 ppm

CH_2CO δ 2.3-2.0 ppm

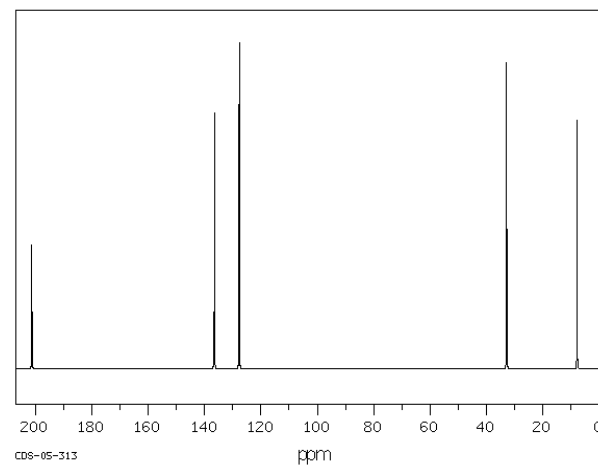
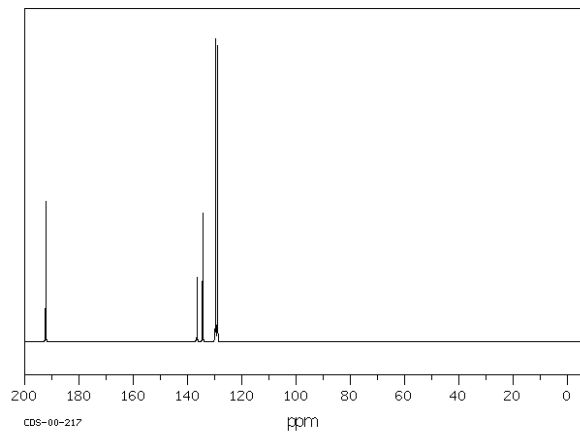
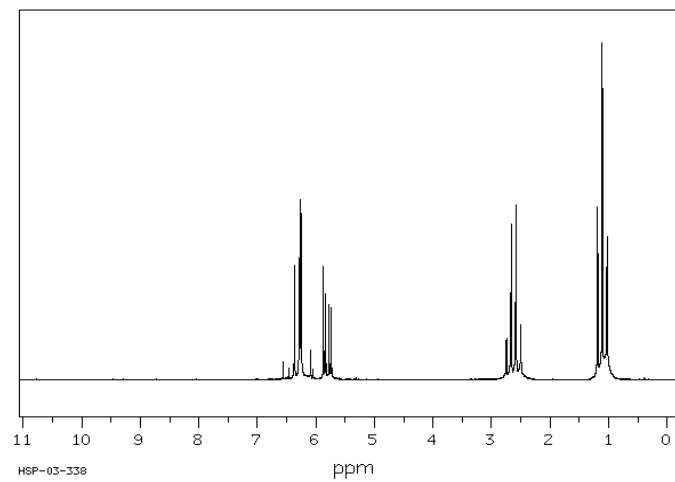
$^{12}\text{C NMR}$:

$\text{C}=\text{O}$ δ 190-215 ppm

benzaldehyde



1-penten-3-one*

* <http://www.aist.go.jp/RIODB/SDBS/>