

CHAPTER OVERVIEW

19: KETONES AND ALDEHYDES

LEARNING OBJECTIVES

After reading this chapter and completing ALL the exercises, a student can be able to

- describe the structure and physical properties of aldehydes and ketones (section 19.1)
- determine the structure of aldehydes and ketones from their elemental analysis and spectral data (MS, IR ^1H NMR & ^{13}C NMR) (section 19.2)
- predict the products and specify the reagents to synthesize aldehydes and ketones for reactions studied to date (section 19.3)
- predict the products and specify the reagents to synthesize aldehydes and ketones for new reactions (section 19.4)
- write the general mechanism for nucleophilic addition reactions with aldehydes and ketones (sections 19.5 to 19.11, 19.13, & 19.15)
- predict the relative reactivity of carbonyl compounds to nucleophilic addition reactions (sections 19.5 to 19.13, & 19.15)
- predict the relative equilibrium constant & rates of hydration for aldehydes and ketones (section 19.6)
- show the general mechanism for the Wittig reaction (section 19.13)
- predict the products and specify the reagents for oxidation and reduction reactions of aldehydes and ketones (section 19.14 and 19.15)
- combine the reactions studied to date to develop efficient and effective multiple-step synthesis including the use of acetals/ketals as protecting groups (sect 19.12)

Please note: IUPAC nomenclature and important common names of aldehydes and ketones were explained in Chapter 3.

Topic hierarchy

- [19.1: Carbonyl Compound Structure and Properties](#)
- [19.2: Spectroscopy of Ketones and Aldehydes](#)
- [19.3: Review of Ketone and Aldehyde Synthesis](#)
- [19.4: 19.4 New Synthesis of Aldehydes and Ketones](#)
- [19.5: Nucleophilic Addition Reactions of Ketones and Aldehydes](#)
- [19.6: Nucleophilic Addition of Water \(Hydration\)](#)
- [19.7: Nucleophilic Addition of Cyanide and Acetylide](#)
- [19.8: Nucleophilic Addition of Grignards](#)
- [19.9: Nucleophilic Addition of Amines \(Imine and Enamine Formation\)](#)
- [19.10: Nucleophilic Addition of Hydrazine \(Wolff-Kishner Reaction\)](#)
- [19.11: Nucleophilic Addition of Alcohols \(Acetal Formation\)](#)
- [19.12: Acetals as Protecting Groups](#)
- [19.13: Nucleophilic Addition of Phosphorus Ylides \(The Wittig Reaction\)](#)
- [19.14: Oxidation of Aldehydes](#)
- [19.15: Reductions of Ketones and Aldehydes](#)
- [19.16: Additional Exercises](#)
- [19.17: Solutions to Additional Exercises](#)

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