

CHAPTER OVERVIEW

22: CARBOXYLIC ACID DERIVATIVES AND NITRILES

LEARNING OBJECTIVES

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

- describe the structure and physical properties of carboxylic acid derivatives and nitriles (section 22.1)
- determine the structure of carboxylic acid derivatives and nitriles from their elemental analysis and spectral data (MS, IR ^1H NMR & ^{13}C NMR) (section 22.2)
- predict the products and specify the reagents to interconvert between a carboxylic acid and its derivatives (section 22.3)
- predict the products and specify the reagents to hydrolyze carboxylic acid derivatives (22.4)
- predict the products and specify the reagents for transesterification reactions (section 22.5)
- predict the products and specify the reagents for reduction reactions of carboxylic acid derivatives (section 22.6)
- predict the products and specify the reagents for organometallic reactions with carboxylic acid derivatives (section 22.7)
- predict the products and specify the reagents for the synthesis and reactions of
 - acyl chlorides (section 22.4)
 - anhydrides (section 22.5)
 - esters (section 22.6)
 - amides (section 22.7)
 - nitriles (section 22.8)
 - thioesters (section 22.9)
 - step-growth (condensation) polymers via ester and amide bonds (section 22.10)
- discuss the chemistry of beta-lactams and biological acylation (section 22.11 and 22.12 respectively)
- combine the reactions studied to date to develop efficient and effective multiple-step synthesis

Please note: IUPAC nomenclature and important common names of carboxylic acid derivatives and nitriles were explained in Chapter 3.

Topic hierarchy

- [22.1: Structure and Physical Properties of Acid Derivatives](#)
- [22.2: Spectroscopy of Carboxylic Acid Derivatives](#)
- [22.3: Interconversion of Acid Derivatives by Nucleophilic Acyl Substitution](#)
- [22.4: Acid Halide Chemistry](#)
- [22.5: Acid Anhydride Chemistry](#)
- [22.6: Ester Chemistry](#)
- [22.7: Amide Chemistry](#)
- [22.8: Nitrile Chemistry](#)
- [22.9: Thioesters- Biological Carboxylic Acid Derivatives](#)
- [22.10: Polyamides and Polyesters- Step-Growth Polymers](#)
- [22.11: Beta-Lactams- An Application](#)
- [22.12: Biological Acylation Reactions](#)
- [22.13: Additional Exercises](#)
- [22.14: Solutions to Additional Exercises](#)

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