

Study Guide for Exam #3 (Ch. 5-8)

Chem21, Introduction to Organic and Biochemistry

MEMORIZE

- Class suffix and nomenclature for carboxylic acids, carboxylates, esters, amines, ammonium salts, and amides
- Reactions: acid-base reactions for carboxylic acids and amines, formation of esters from (1) carboxylic acid + alcohol, (2) acid chloride + alcohol, (3) acid anhydride + alcohol, acidic hydrolysis of esters and amides, saponification of esters and amides, formation of amides from (1) acid chlorides and amines, (2) acid anhydrides and amines.

Chapter 5: Carboxylic Acids and Esters

I. Nomenclature of Carboxylic Acids (5.1): Given the line-angle structure, be able to derive the correct IUPAC name for carboxylic acids. Or, given the IUPAC name, be able to draw the correct line-angle structure.

Ex., Ch. 5: 5.5-8

II. Properties of Carboxylic Acids (5.2-5): Be able to list the intermolecular forces present in carboxylic acids and how these affect boiling point and solubility in water. Be able to identify the hydrogen bond donor and acceptor(s) in the functional group. Be able to predict the products for a carboxylic acid in an (1) acid-base neutralization and (2) esterification with an alcohol. Be able to identify a carboxylate.

Ex., Ch. 5: 5.10-11, 5.13-18, 23-26

III. Nomenclature of Esters (5.6): Given the line-angle structure, be able to derive the correct common name for esters. Or, given the common name, be able to draw the correct line-angle structure.

Ex., Ch. 5: 5.33, 5.43-44, 48-50

IV. Reactions with Esters (5.7): Know how to predict the structure of the ester produced from the esterification of (1) a carboxylic acid and alcohol, (2) an acid chloride and alcohol, and (3) an acid anhydride and alcohol. Know how to predict the products for acidic hydrolysis and basic saponification with esters.

Ex., Ch. 5: 5.52-35-39

Chapter 6: Amines and Amides

I. Nomenclature of Amines (6.1-2): Be able to determine if the amine is primary, secondary, or tertiary. Given the line-angle structure, be able to derive the correct IUPAC or common name. Or, given the name, be able to draw the line-angle structure.

Ex., Ch. 6: 6.3-15

II. Properties of Amines (6.3-4): Be able to list the intermolecular forces present in amines and how they affect boiling point and solubility in water. Be able to identify hydrogen bond acceptors and donors in a structure. Be able to predict the products from an acid-base neutralization with amines, and identify the ammonium.

Ex., Ch. 6: 6.17-22, 6.24, 6.26, 6.31-32

III. Nomenclature of Amides (6.7): Given the line-angle structure, be able to derive the correct IUPAC name. Or, given the IUPAC name, be able to draw the line-angle structure.

Ex., Ch. 6: 6.45-48

IV. Properties of Amides (6.5): Be able to predict the structure of the amide formed from (1) an acid chloride and an amine or (2) an acid anhydride and an amine. Be able to list the intermolecular forces present in amides and how they affect boiling point and solubility in water. Be able to identify hydrogen bond acceptors and donors in a structure. Be able to predict the products from both an (1) acidic and (2) basic (saponification) hydrolysis of an amide.

Ex., Ch. 6: 6.25, 6.49-50, 6.52-55

Chapter 7: Carbohydrates

I. Chirality (7.2): Know how to identify chiral carbons present in compounds.

Ex., Ch. 7: 7.6-9, 15-16

II. Structure of Carbohydrates (7.3-5): From Fisher projections, know how to determine whether the carbohydrate is an aldose or ketose, D or L isomer. From a Haworth projection, know how to identify the anomeric carbon and identify and label the glycosidic bond (if appropriate), and α or β isomer, and the hemiacetal or acetal group. Know how to identify a *mono-, di-, or poly-*saccharide.

Ex., Ch. 7: 7.11-12, 7.17-18, 7.21-22, 7.27-28, 7.35, 7.52

III. Common Sugars (7.6): Be able to identify the structures of ribose, deoxyribose, glucose, galactose, and fructose.