

CHAPTER FOURTEEN

The following is a list of important topics for students taking Chemistry 30B, by chapters in the course textbook (Chemistry, An Introduction to General, Organic & Biological Chemistry 12th Ed by Karen C. Timberlake). Exams and assignments will focus on helping students achieve these goals. Additional topics may be added during the semester and not all will be tested for on any given exam or assignment. Students are encouraged to use this outline to review chapters, prepare for exams, and determine if Chemistry 30B meets the student's personal objectives in studying chemistry.

CH 14: CARBOXYLIC ACIDS, ESTERS, AMINES & AMIDES

2 lectures

Carboxylic Acids (section 14.1)

- Understand the difference between a selective and specific chemical change.
- Draw and name carboxylic acids using the IUPAC system.
- Know the structure and common name of formic acid and acetic acid.

Properties of Carboxylic Acids (section 14.2)

- Understand how resonance structures of the carboxyl group cause bond dipoles & partial charges.
- Draw and name carboxylate ions and salts.
- Name and draw derivatives of benzoic acid.
- Know that carboxylate salts are solid at room temperature, odorless, and soluble in water.
- Know properties and some common uses of carboxylic acids and their salts.
- Know why salicylic acid is more acidic than other carboxylic acids.

Esters (section 14.3)

- Know how esterification combines carboxylic acids and alcohols to form esters.
- Name and draw esters using the IUPAC system.

Hydrolysis of Esters (section 14.4)

- Understand how esters equilibrate in strong acid to hydrolyze.
- Understand how strong bases can be used irreversibly to hydrolyze esters.
- Predict the product of acidic or basic hydrolysis reactions of esters (separate reactions!).
- Predict the product the product of esterification (condensation) of carboxylic acids.

Amines (section 14.5)

- Draw and name amines using the IUPAC system.
- Understand amine and ammonium salts have a tetrahedral nitrogen (sp^3).
- Classify amines as primary, secondary or tertiary (this is different than with alcohols!).
- Know what makes a compound a heterocycle.
- Name and draw derivatives of aniline and ammonium salts.
- Know smaller amines have a fishy odor, can be absorbed through the skin and are an irritant.
- Know amines have hydrogen bonding, that amines with less than six carbons are water soluble.
- Know how amines can act as a base and how ammonium ions can act as an acid.
- Know that ammonium salts are solid at room temperature, odorless, and soluble in water.

Amides (section 14.6)

- Understand that amides are a composite group composed of a carbonyl with attached amine.
- Understand that resonance structures of amides cause the nitrogen to be trigonal planar (sp^2).
- Draw and name amides using the IUPAC system.
- Know the conditions and predict the products or reactants in an amidation reaction.
- Understand amides up to five carbons are soluble in water.
- Know urea, acetaminophen, and many barbiturates are amides.
- Know how hydrogen bonding operates in amides.
- Know the conditions and predict the reactants or products of acid hydrolysis of an amide.
- Know the conditions and predict the reactants or products of base hydrolysis of an amide.