

CHAPTER FIFTEEN

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 15: LIPIDS

2 lectures

Lipids (section 15.1)

- List the main characteristics common to lipids.
- Understand lipids are not soluble in water but are soluble in organic solvents.
- Recognize lipids are the base hydrocarbons produced or stored by biological processes.
- Know lipids include fatty acids and steroids, know the four main classes of fatty acids.

Fatty Acids (section 15.2)

- Classify and provide examples of fatty acids (FA) that are saturated, mono-, & polyunsaturated.
- Recognize unsaturations in fatty acids may be cis or trans.
- Differentiate between these types, recognize the properties (especially bp and mp) of these types.
- Describe the role of prostaglandins in biology.
- Know sources of fatty acids provide mixtures of FA and which sources are rich in each type.
- Know the the meaning of lipid number (ex: 16:1) and omega number (ex: N-3 or ω -3) notation.

Waxes & Triglycerides (section 15.3)

- Describe the structure and list common properties of waxes.
- List uses of waxes in nature and by human beings.
- Know fatty acids are stored in the body by esterification with glycerol, forming triglycerides.
- Understand most triglycerides found in nature are mixed (contain different fatty acids).
- Realize triglycerides are a major form of energy storage for animals.
- Know we call triglycerides that are solid at room temperature fats, and oils if they're liquid.

Properties of Triglycerides (section 15.4)

- Discuss commercial uses of fats and oils.
- Explain why and how we make hydrogenated fats.
- Recognize that hydrogenation is often partial and how this produces trans fats.
- Describe the process for hydrolysis of fats to produce fatty acids.
- Describe the process for saponification of fats to produce fatty acid salts (soaps).
- Write chemical equations for any of these reactions.

Phospholipids (section 15.5)

- Know the structure and two types of phospholipids, and there similarity to triglycerides.
- Identify the polar head and non-polar tail in phospholipid structure.
- Recognize the difference in structure between a glycerophospholipid and sphingomyelin.
- Describe how phospholipids can act as surfactants, provide examples of this action.

Steroids & Cell Membranes (section 15.6, 15.7)

- Know the structure, ring designation, and numbering of the steroid nucleus.
- Know cholesterol is a sterol (steroid alcohol).
- Understand bile salts, their relationship to cholesterol, and how the body makes and uses them.
- Understand how phospholipids produce a bilayer and cell membrane.
- Understand lipoproteins move lipids through the blood stream to where they're stored or needed.
- Understand the relative size, composition, and purpose of the four plasma lipoproteins (pg 535).
- Understand the three processes by which substances are transported through the cell membrane.