

CHAPTER ELEVEN

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 11: HYDROCARBONS

3 lectures

Organic Compounds (section 11.1)

- Differentiate between organic and inorganic substances by composition, bond type, bond polarity, mp, bp, flammability and solubility in water.
- Understand the significance of the Urea synthesis, conducted by Wöhler.

Alkanes (11.2)

- Write the IUPAC name and formula of alkane chains of up to ten carbons.
- Draw the structure of alkanes in expanded, condensed and skeletal form.
- Understand how single bond rotation produces different conformations of the same molecule.
- Name and draw cycloalkanes with three to ten carbons.

Alkanes with Substituents (11.3)

- Know that alkanes may have branches or substituents.
- Understand the relationship between structural isomers.
- Using IUPAC standards, name or draw branched chain alkanes.
- Name alkanes and cycloalkanes with methyl, ethyl, propyl, isopropyl, tert-butyl or halogen groups.
- Draw the structure and formula of substituted alkanes given their name.

Properties of Alkanes (11.4)

- Identify alkanes with less than five carbons as gases at room temperature.
- Identify alkanes with five to eight carbons as volatile liquids at room temperature.
- Know that alkanes are highly combustible and commonly used as fuels.
- Understand alkanes with nine to seventeen carbons are oils and used as lubricants.
- Know paraffins are alkanes with 18+ carbons, are waxy solids, and used to coat produce.
- Know petrolatum are alkanes of 25+ carbons and are used in cosmetics and ointments.
- Know that alkanes are insoluble in water, but soluble in many non-polar solvents.
- Know that alkanes have densities less than water.
- Be able to write the combustion reaction for a given alkane.

Alkenes & Alkynes (11.5)

- Understand that alkenes and alkynes are hydrocarbons with double and triple bonds, respectively.
- Understand why alkenes and alkynes are called unsaturated hydrocarbons.
- Know alkanes are saturated hydrocarbons and contain the maximum number of hydrogen atoms.
- Understand why unsaturated hydrocarbons burn hotter even though alkanes release more heat.
- Write the IUPAC name of alkenes and alkynes and draw their structures, including cyclic and substituted structures.

Cis-Trans Isomerism, Reactions, & Aromatics (11.6-11.8)

- Understand how a double bond can lead to either of two geometric isomers (stereo isomers).
- Understand how stereo isomerism is different than conformation or structural isomerism.
- Name and draw the structure of substances which may be cis or trans stereoisomers.
- Know the conditions and be able to predict the product of hydrogenation (H_2 addition), hydration (H_2O addition), bromination, and permanganate oxidation reactions of alkenes.
- Be able to draw and name single ring aromatic compounds.