

## CHEM 1151 Organic Review Lecture Guide

### Purpose

The purpose of this worksheet is to guide you through the lecture and highlight important topics. This lecture guide will help to increase your knowledge and familiarity with foundational organic chemistry topics that were introduced in CHEM 1151.

**Student Learning Outcomes:** After completing this lecture guide, you will be able to:

- Generate the IUPAC nomenclature of alkane molecules.
- Generate the IUPAC nomenclature of cycloalkanes.
- Distinguish between structural and conformational isomers.
- Construct the chemical structure of substituted alkane and cycloalkane molecules.

### Criteria

This worksheet is optional and will not count as a grade.

1. \_\_\_\_\_ is the area of chemistry involving the study of organic compounds. These are covalent compounds that contain \_\_\_\_\_ and may also include other atoms such as nitrogen, oxygen, or sulfur.
2. Organic molecules can be represented using various notations. The \_\_\_\_\_ structure shows all bonds and nonbonding electrons. This form can be used in organic or inorganic compounds. The \_\_\_\_\_ structure indicates the atoms present in a molecule and how they are bonded without showing all the bonds. The \_\_\_\_\_ structure shows the bonds present between atoms but does not show the elemental symbol for all atoms. In this structure, the symbol for \_\_\_\_\_ is not shown. This notation also omits showing the symbol for \_\_\_\_\_ that are bonded to carbon atoms.
3. \_\_\_\_\_ are the simplest types of organic compounds. They are referred to as \_\_\_\_\_ hydrocarbons because they have the maximum number of hydrogen and general molecular formula of \_\_\_\_\_.

4. Alkanes are considered \_\_\_\_\_ if the carbon atoms are bonded one next to another in a continuous chain. If there are atoms branching from one or more position on the continuous chain, the alkane is called a \_\_\_\_\_ alkane.
5. The prefixes used in naming organic compounds identify the number of carbon atoms in the continuous chain or branch. Those prefixes are:
- one \_\_\_\_\_
  - two \_\_\_\_\_
  - three \_\_\_\_\_
  - four \_\_\_\_\_
  - five \_\_\_\_\_
  - six \_\_\_\_\_
  - seven \_\_\_\_\_
  - eight \_\_\_\_\_
  - nine \_\_\_\_\_
  - ten \_\_\_\_\_
6. The first step in identifying the IUPAC name of an alkane is to locate the longest continuous chain (LCC) of carbon atoms. This chain, referred to as the \_\_\_\_\_, is then named based on the prefix representing the specific number of carbon and the \_\_\_\_\_ suffix. After identifying the LCC, the next step is to identify any \_\_\_\_\_ that are present. These are atoms or groups of atoms branching from the parent chain. If two of the same group are present, the prefix \_\_\_\_\_ is used. If three of the same substituents are present, the prefix \_\_\_\_\_ is used. If four of the same groups are present, \_\_\_\_\_ is used. The parent chain is then numbered to indicate the \_\_\_\_\_ of the substituents. Finally, everything is put together. The \_\_\_\_\_ is/are listed first and placed in \_\_\_\_\_ order followed by the \_\_\_\_\_ name.

7. If multiple substituents are present, the location of each must be shown. Numbers are separated from other numbers using a \_\_\_\_\_. Numbers are separated from letters using a \_\_\_\_\_. The name is written as one long word \_\_\_\_\_ spaces.
8. When carbon atoms connected by single bonds form a cyclic structure, the molecule represents a \_\_\_\_\_ and has a general molecular formula of \_\_\_\_\_.
9. The smallest cyclic structure contains \_\_\_\_\_ carbon atoms and has an IUPAC name of \_\_\_\_\_. The most common and stable cyclic molecules are \_\_\_\_\_ and \_\_\_\_\_.
10. The rules for naming cyclic molecules are similar to alkanes. If the LCC is the carbon chain inside the ring, the cycloalkane is the \_\_\_\_\_. If the LCC is the carbon chain outside of the ring the ring is the \_\_\_\_\_.
11. If a cyclic molecule has only one substituent the number is \_\_\_\_\_ in the name.