

## Organic Nomenclature (Unsaturated Hydrocarbons) 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 properties and nomenclature of unsaturated hydrocarbons.

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

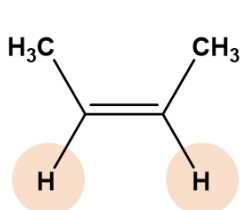
- Distinguish between classes of hydrocarbon compounds.
- Formulate the name of unsaturated organic hydrocarbons.
- Construct the chemical structure of unsaturated hydrocarbon molecules.
- Identify cis/trans isomers.

### Criteria

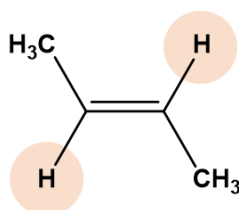
This worksheet is optional and will not count as a grade.

1. \_\_\_\_\_ are organic molecules that contain a carbon-carbon double bond. These molecules have a general molecular formula of \_\_\_\_\_. Since they do not have the maximum number of hydrogen, they are classified as \_\_\_\_\_ hydrocarbons.
2. The number and location of carbon-carbon double bonds can provide insight into the molecule. If a molecule is referred to as a \_\_\_\_\_, that indicates that two carbon-carbon double bonds are present. \_\_\_\_\_ is used to indicate a molecule with many double bonds and a \_\_\_\_\_ indicates a carbon-carbon double bond in a cyclic molecule.
3. The double bond present in alkenes causes the molecule to have \_\_\_\_\_ rotation. As a result, some alkenes can exist as a set of \_\_\_\_\_ isomers, which are often referred to as cis-trans isomers. In order for cis-trans isomers to be possible, each carbon of the double bond must have one \_\_\_\_\_ and one \_\_\_\_\_ bonded to it. If this is not true, the alkene can not exist as a cis-trans isomer.

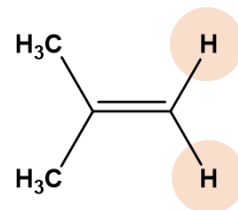
4. Cis-trans isomers differ in the location of the groups attached to the \_\_\_\_\_ bond. If both hydrogen or both carbon are on the same side of the double bond, the alkene represents the \_\_\_\_\_ isomer. If the groups are on opposite sides, it is a \_\_\_\_\_ isomer.



\_\_\_\_\_



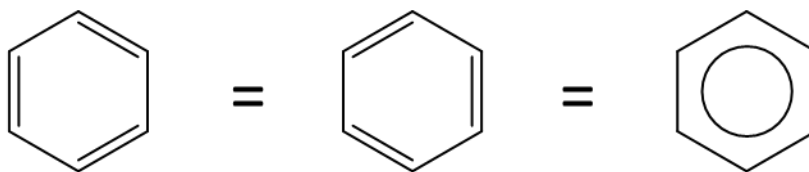
\_\_\_\_\_



\_\_\_\_\_

5. The parent chain of the alkene is the longest continuous chain of carbon atoms that includes \_\_\_\_\_. The parent name is then determined based on the prefix for that number of carbon atoms followed by the \_\_\_\_\_ suffix.
6. When numbering the LCC of an alkene, the \_\_\_\_\_ is assigned the lowest number even if that causes the \_\_\_\_\_ to have a higher number.
7. If cis-trans isomers are possible, the identity is added to the \_\_\_\_\_ of the name.
8. \_\_\_\_\_ are organic molecules that contain a carbon-carbon triple bond. These molecules have a general molecular formula of \_\_\_\_\_. Since they do not have the maximum number of hydrogen, they are classified as \_\_\_\_\_ hydrocarbons.
9. The triple bond of an alkyne is \_\_\_\_\_ and \_\_\_\_\_ than the bonds in alkanes and alkenes.

10. The parent chain of the alkyne is the longest continuous chain of carbon atoms that includes \_\_\_\_\_ . The parent name is then determined based on the prefix for that number of carbon atoms followed by the \_\_\_\_\_ suffix.
11. When numbering the LCC of an alkyne, the \_\_\_\_\_ is assigned the lowest number even if that causes the \_\_\_\_\_ to have a higher number.
12. \_\_\_\_\_ are organic molecules that contain an unsaturated cyclic molecule known as \_\_\_\_\_. When the benzene serves as a substituent, it is called a \_\_\_\_\_ group.
13. Benzene has \_\_\_\_\_ electrons, meaning that they are shared with all the carbon atoms in the ring.



Structural representations of benzene.

14. The parent chain of the aromatic compound is \_\_\_\_\_. If a molecule has only one substituent, the number is \_\_\_\_\_ in the name. If two or more substituents are present, locator names are needed to indicate the position of each group. If the molecule has exactly two substituents, the common name can be determined using \_\_\_\_\_ to indicate the 1,2-disubstitution location of substituents; using \_\_\_\_\_ to indicate the 1,3-location; and using \_\_\_\_\_ to indicate the 1,4-disubstitution.