Name: _____ **Date:** _____

Secrets of the Carbon Skeleton: A 10th Grade Chemistry Investigation

Analyze molecular geometry, functional group reactivity, and IUPAC nomenclature through application-based organic chemistry problems.

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1. A student identifies a molecule with the formula C5H12. Which structural characteristic most likely accounts for this molecule having a lower boiling point than its straight-chain isomer, n-pentane?

A. Increased surface area for London dispersion forces
B. Presence of a high-energy triple bond
C. Molecular branching reducing intermolecular contact
D. The addition of a hydroxyl functional group

2. In a saturated hydrocarbon chain, every carbon atom is bonded to the maximum possible number of hydrogen atoms through single bonds.

A. True
B. False

3. The sharp, distinctive aroma of an orange is largely due to Limonene. Limonene is classified as a ____ because it contains only carbon and hydrogen with at least one double bond.

A. Alkyne
B. Alkene
C. Alcohol
D. Ketone

4. Which functional group is most likely responsible for the pleasant, fruity scent found in synthetic flavorings like pear or pineapple oil?

A. Carboxyl group (-COOH)
B. Halogen group (-X)
C. Ester group (-COOR)
D. Amino group (-NH2)

5. Aromatic compounds, such as naphthalene (mothballs), are defined by stable ring structures that follow Hückel's rule for electron delocalization.

A. True
B. False

6. When an organic chemist converts vegetable oil into margarine, they perform a/an ____ reaction to turn liquid unsaturated fats into solid saturated fats.

A. Hydrogenation
B. Fermentation
C. Oxidation

D. Combustion

7. Formaldehyde (CH_2O) is the simplest aldehyde. In the Lewis structure of an aldehyde, the oxygen atom is always double-bonded to:

A. A hydrogen atom
B. A terminal carbon atom
C. Another oxygen atom
D. A nitrogen atom

8. In organic chemistry, isomers are molecules that have the same physical properties but different chemical formulas.

A. True
B. False

9. Which of the following organic compounds is used as the primary building block for the polymer 'polyethylene' found in plastic grocery bags?

A. Propyne
B. Ethene
C. Cyclohexane
D. Methanol

10. Functional groups like the -OH group or the -COOH group increase a molecule's ____ in water because they allow for hydrogen bonding.

A. Density
B. Flammability
C. Solubility
D. Viscosity