

Name: _____ Date: _____

Answer Key: The Tetravalent Secret: An 11th Grade Organic Chemistry Intro

Why can a single element build millions of different molecules? Identify the fundamental patterns of carbon chains and functional groups in this introductory quiz.

1. Which unique property of carbon allows it to form the complex, stable backbones found in organic molecules like polymers and DNA?

Answer: B) The ability to form four covalent bonds

Carbon is tetravalent, meaning it has four valence electrons available for bonding, allowing it to form long chains, rings, and complex structures.

2. True or False: Isomers are molecules that have the same molecular formula but different structural arrangements.

Answer: A) True

Isomers, such as butane and isobutane, share the same atoms (C₄H₁₀) but are connected differently, resulting in different physical properties.

3. An organic compound that contains only carbon and hydrogen atoms is classified as a(n) _____.

Answer: B) Hydrocarbon

Hydrocarbons are the simplest organic compounds, consisting entirely of carbon and hydrogen atoms (e.g., alkanes, alkenes).

4. Which of these is a characteristic of saturated hydrocarbons like pentane?

Answer: B) They contain only single bonds

Saturated hydrocarbons (alkanes) contain only single C-C bonds, meaning the carbon atoms are 'saturated' with the maximum possible number of hydrogen atoms.

5. If you find a molecule with the suffix '-ol' (such as Methanol or Propanol), which functional group is likely present?

Answer: C) Hydroxyl group

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The '-ol' suffix in IUPAC nomenclature indicates an alcohol, which is characterized by the presence of a hydroxyl (-OH) functional group.

6. True or False: Organic chemistry only involves molecules produced by living organisms.

Answer: B) False

While once believed to only come from life (vitalism), organic chemistry now includes the study of millions of synthetic compounds like plastics and medicines.

7. The specific arrangement of atoms responsible for the characteristic chemical reactions of a molecule is called a _____.

Answer: B) Functional group

A functional group is an atom or group of atoms that replaces hydrogen in a hydrocarbon, giving the molecule specific chemical properties.

8. Which of the following describes an 'unsaturated' hydrocarbon?

Answer: C) It contains at least one double or triple bond

Unsaturated hydrocarbons, like ethene (double bond) or ethyne (triple bond), contain fewer than the maximum number of hydrogens per carbon atom.

9. True or False: A fossil fuel like octane (common in gasoline) is an example of an organic compound.

Answer: A) True

Octane is a hydrocarbon chain consisting of eight carbon atoms, making it a classic example of organic chemistry in the energy sector.

10. In organic chemistry, the process of burning an organic compound in the presence of oxygen is known as _____.

Answer: B) Combustion

Combustion is a major reaction type for hydrocarbons, releasing energy while producing carbon dioxide and water vapor.