

Name: _____ Date: _____

Answer Key: Wrangle Molecular Shapes: Pre-K Organic Chemistry Challenge

Snap together carbon chains and build 3D fuel models to see how sticky atoms change into bouncy power.

1. If you are building a 'tail' for a fatty acid molecule and want to make it superwiggly, which carbon-carbon connection should you use to create a 'kink' or bend in the chain?

Answer: B) A rigid cis-double bond

In organic chemistry, a 'cis' double bond creates a physical bend in the carbon chain, making the molecule take up more space and act more like a liquid oil than a solid fat.

2. Imagine you are an engineer building a 'Polythene' bridge. To make the bridge strong instead of soft, you must stack the long carbon chains ____.

Answer: B) in straight, neat rows

High-density polyethylene (HDPE) is strong because the linear carbon chains stack closely together in crystalline patterns, rather than being branched and messy.

3. True or False: A carbon atom is like a Lego brick with four hands that can hold onto four different friends at the same time.

Answer: A) True

Carbon has a valency of four, meaning it forms four covalent bonds to reach a stable state, allowing for the complex branching found in living things.

4. You found a 'Ring of Fire' molecule called Cyclohexane! If you want to change its shape without breaking any bonds, which 'chair' or 'boat' movement are you performing?

Answer: B) A conformational flip

Conformations are different spatial arrangements of atoms that result from rotation around single bonds; the 'chair' flip is a classic way cyclohexane minimizes strain.

5. To make a smell like a 'stinky sock' turn into a smell like a 'sweet pineapple,' you should perform a reaction called ____.

Answer: A) Esterification

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Esterification combines an organic acid and an alcohol to create an ester, which often provides the fruity scents found in nature.

6. True or False: If you have two molecules with the exact same atoms, they must always behave exactly the same way.

Answer: B) False

Isomers are molecules with the same formula but different structures; like 'left-hand' and 'right-hand' versions, their shape changes how they interact with the world.

7. If you are designing a secret 'Bio-Plastic' that disappears in water, you should build a polymer chain using which 'water-loving' group?

Answer: B) A Hydroxyl (-OH) group

Hydroxyl groups are polar and form hydrogen bonds with water, making organic molecules more likely to dissolve or interact with liquids.

8. When carbon atoms share electrons to hold hands very tightly, they create a strong ___ bond.

Answer: A) Covalent

Covalent bonds involve the sharing of electron pairs between atoms and are the primary bonds holding organic molecules together.

9. True or False: 'Saturated' fats are like a bus full of passengers where every single seat (hydrogen spot) is taken.

Answer: A) True

A saturated hydrocarbon has no double bonds, meaning it is 'saturated' with the maximum possible number of hydrogen atoms.

10. Look at these two molecules: one is a circle and one is a line. If they have the same atoms, why does the circle one take longer to 'boil' and fly away into the air?

Answer: B) It has stronger intermolecular 'stickiness' due to its shape

Molecular geometry (shape) changes surface area and how molecules stick together (Van der Waals forces), which changes their boiling points.