

Name _____

Molecule Magic: How Shapes Matter in Chemistry

Open-Ended Response Answer Key

1. A molecule with three bonding pairs and one lone pair, such as ammonia (NH_3), has a trigonal pyramidal shape. The lone pair causes repulsion, pushing the hydrogen atoms closer together and creating a pyramid-like structure.
2. Understanding molecule shape is crucial in drug design. Scientists study the shape of receptors and enzymes in the body to design drugs that can fit into them, affecting their function. For example, the shape of the active site of an enzyme determines how a drug molecule can interact with it, leading to desired effects.
3. The shape of a molecule affects its physical properties. For instance, a linear molecule like carbon dioxide (CO_2) has a low boiling point and is less dense than water due to its shape. In contrast, a tetrahedral molecule like methane (CH_4) has a higher boiling point and is less volatile.
4. A molecule with four bonding pairs and no lone pairs, such as methane (CH_4), has a tetrahedral shape. This arrangement allows it to form strong covalent bonds with other atoms, making it less reactive compared to molecules with different shapes.

