Lesson 3: Visualizing Molecules with the Old Nobby Organic Chemistry Model Kit

Subject: Chemistry (Structure & Bonding)

Build 3D molecules to understand shape, polarity, and isomers. Perfect for middle school through high school chemistry—or any visual learner.

Learning Objectives

1. Identify common molecular geometries (linear, trigonal planar, tetrahedral, trigonal pyramidal, bent).
2. Relate electron domains/hybridization (sp, sp^2, sp^3) to 3D shapes.
3. Distinguish structural vs. geometric isomers; introduce chirality (R/S) with models.
4. Connect 3D shape to polarity and intermolecular forces at a conceptual level.

Materials Needed

1. Old Nobby Organic Chemistry Model Kit (atoms, bonds, wedge/dash pieces)
2. Printed build cards or prompt list (included in PDF)
3. Notebook or lab sheet for sketches and reflections

Lesson Steps

1. Warm-Up: Build methane (CH■), water (H■O), ammonia (NH■), and CO■. Record shapes and bond angles.
2. Assign hybridization for each model and discuss domain geometry.
3. Build isomers (ethanol vs. dimethyl ether) and compare predicted properties.
4. Construct cis/trans 2-butene to show geometric isomerism.
5. Model chirality with lactic acid or a 4-different-substituent carbon center.
6. Predict polarity and intermolecular forces for each molecule.

Discussion & Reflection

1. How does 3D shape change molecular behavior?
2. Why can two molecules have the same formula but different properties?
3. Where do you see chirality in real life (e.g., hands, medicines)?

Parent & Teacher Tips

1. Take photos of each model for a visual study guide.
2. Sketch each model to reinforce visual memory.
3. Use color-coded notes matching atom colors for faster recall.
4. Revisit models during later chemistry units like IMFs or reactions.

Wrap-Up

Physical models transform abstract chemistry into tangible learning. By building and comparing structures, students develop real intuition about molecular shape, polarity, and behavior.