Hydrocarbons: A Structural Study

Introduction:

The physical and chemical properties of molecules are determined, to a large extent, by their three-dimensional shapes. Consequently, an understanding of molecular shape is very important to an understanding of chemistry. Most people, however, find it difficult to think in three dimensions. To make this task easier, scientists have developed kits for constructing 3-D models of molecules. By working with the model kits, the student can learn to visualize and understand molecular shape.

In this experiment, you will work with a ball-and-stick model kit. In this kit, atoms are represented by colored wooden balls, drilled with holes. Sticks and springs may be fit into the holes to indicate chemical bonds. Short sticks are used to represent all other single covalent bonds. Springs are used to indicate double or triple covalent bonds.

In this experiment, you will use ball-and-stick models to study the structures of hydrocarbons.

Color Code of Models:

Black	Carbon	Note: For Double and Triple Bonds draw: ししし			
Yellow	Hydrogen	For Below the Plane draw: — — — For Above the Plane draw:			
Red	Oxygen	For the Same Plane draw: Objectives:			
Blue	Nitrogen	 To build ball-and-stick models of hydrocarbon molecules. To study the relationship between the 3-D models and the structural 			
Green	Chlorine	formulas of chemical compounds. 3. To create models of structural and geometric isomers.			
Purple	lodine	Data:			
Orange	Bromine	Draw the structural formula and sketch the 3-D model of the following compounds and answer questions about each.			
Setup a table in your lab notebook like the one below:					
Methane	Molecu	Ilar Formula Ethane Molecular Formula			
Structural		Structural			
Formula		Skotch: Earmula: Skotch:			

Methane Structural	Molecular Formula	Ethane Molecular Formula Structural	-
Formula:	Sketch:	Formula: Sketch:	
H-C-H angle?		Rotation around C-C bond?	

Propane Molecular Formula_	Butane Molecular Formula
Structural	Structural
Formula: Sketch:	Formula: Sketch(es):
Other isomers?	
Pentane Molecular Formula_	Cyclohexane Molecular Formula
Structural	Structural
Formula(s): Sketch(es):	Formula: Sketch:
	Conformations
	Boat Chair
	Rotation around C-C bond?
Ethene Molecular Formula	1,2-Dichloroehene Molecular Formula
Structural	Structural
Formula: Sketch:	Formula: Sketch:
	Cis
	-
	Trans
Rotation around C=C bond?	
Butene molecular formula	
Structural Isomers:	Structural Formula: Sketch:
Structural	
Formula(s): Sketch	i(es):
Geometric Isomers Sketche	

Shape? Rotation around triple C bond?
Benzene molecular formula Structural Formula: Sketch: Is the molecule planar? Chair and boat conformations?

Conclusion: