

EXPERIMENT #13
STRUCTURE OF ALKANES
REPORT FORM

Part I: Structural Formulas

A. Methane

(Construct the model by using one C atom and 4 H atoms)

ACTUAL STRUCTURAL FORMULA (3-dimensional)	COMPLETE STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
All four bonds are shown	All four bonds are shown	No bonds are shown
Bond angle: _____		Hybridization: _____

- Are the four H atoms identical? _____

B. Methyl

(Construct the model by removing one H atom from the methane molecule. Remove only the H atom but keep the bond in place; this bond is referred to as the “free” bond)

ACTUAL STRUCTURAL FORMULA (3-dimensional)	COMPLETE STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
3 Regular and one “free” bond are shown	3 Regular and one “free” bond are shown	Only the “free” bond is shown

C. Ethane

(Construct the model by using two C atoms and 6 H atoms)

COMPLETE STRUCTURAL FORMULA (2-dimensional)	CONDENSED STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
All 7 bonds are shown	Only the C-C bonds are shown	No bonds are shown
Bond angle: _____		Hybridization: _____

- Are the six H atoms identical? _____

D. Ethyl

(Construct the model by removing one H atom from the ethane molecule. Remove only the H atom but keep the bond in place; this bond is referred to as the "free" bond)

COMPLETE STRUCTURAL FORMULA (2-dimensional)	CONDENSED STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
6 Regular and one "free" bond are shown	Only the C-C bonds and the "free" bond are shown	Only the "free" bond is shown

E. Propane

(Construct the model by using three C atoms and 8 H atoms)

COMPLETE STRUCTURAL FORMULA (2-dimensional)	CONDENSED STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
All bonds are shown	Only the C-C bonds are shown	No bonds are shown
Bond angle: _____		Hybridization: _____

- Are the eight H atoms identical? _____
- The complete structure contains _____ primary carbons and _____ secondary carbons.
- The complete structure contains _____ primary hydrogens and _____ secondary hydrogens.

F. n-Propyl

(Construct the model by removing one H atom from one of the primary carbons. Remove only the H atom but keep the bond in place; this bond is referred to as the “free” bond)

COMPLETE STRUCTURAL FORMULA (2-dimensional)	CONDENSED STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
All bonds are shown (including the “free” bond)	Only the C-C bonds and the “free” bond are shown	Only the “free” bond is shown

G. iso-Propyl

(Construct the model by removing one H atom from the secondary carbon. Remove only the H atom but keep the bond in place; this bond is referred to as the “free” bond)

COMPLETE STRUCTURAL FORMULA (2-dimensional)	CONDENSED STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
All bonds are shown (including the “free” bond)	Only the C-C bonds and the “free” bond are shown	Only the “free” bond is shown

- What is the difference between the n-propyl and the iso-propyl groups?

H. n-Butane

(Construct the model by using four C atoms connected in a continuous chain;
complete the formula with 10 H atoms)

COMPLETE STRUCTURAL FORMULA (2-dimensional)	CONDENSED STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
All bonds are shown	Only the C-C bonds are shown	No bonds are shown
Bond angle: _____		Hybridization: _____

- Are the ten H atoms identical? _____
- The complete structure contains _____ primary carbons, and _____ secondary carbons, and _____ tertiary carbons.
- The complete structure contains _____ primary hydrogens, and _____ secondary hydrogens, and _____ tertiary hydrogens.

I. iso-Butane

(Construct the model by connecting three C atoms to each other and connecting a fourth C atom to the "center" C atom; complete the formula with H atoms)

COMPLETE STRUCTURAL FORMULA (2-dimensional)	CONDENSED STRUCTURAL FORMULA (2-dimensional)	MOLECULAR FORMULA
All bonds are shown	Only the C-C bonds are shown	No bonds are shown
Bond angle: _____		Hybridization: _____

- Are the ten H atoms identical? _____
- The complete structure contains _____ primary carbons, and _____ secondary carbons, and _____ tertiary carbons.
- The complete structure contains _____ primary hydrogens, and _____ secondary hydrogens, and _____ tertiary hydrogens.