

Naming the Isomers of Hydrocarbons

PROBLEM

How do you identify isomers of hydrocarbons?

INTRODUCTION

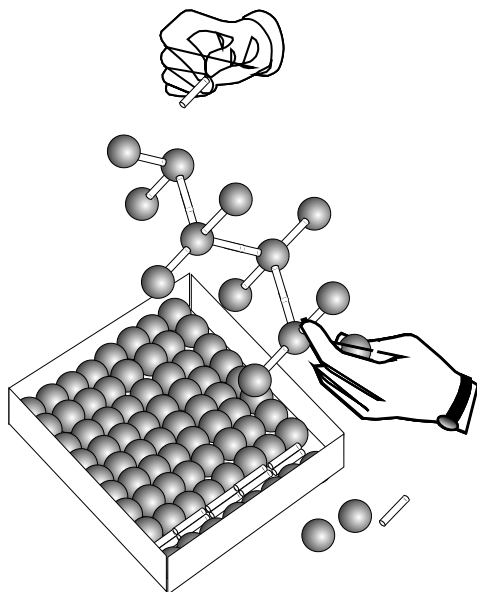
Although many hydrocarbons have the same formula, they are not the same compound. They are isomers. Constructing models and drawing pictures makes it clear that the isomers of a compound have different structures. They also have different names. In this laboratory investigation, you will construct, draw, and name all of the isomers of a hydrocarbon.

MATERIALS (per group)

Molecular Model Kit

PROCEDURE

1. Obtain a molecular model kit containing colored spheres to represent atoms, and sticks or springs to represent bonds.
2. Construct a model of C_7H_{16} as follows: Use black spheres to represent carbon, yellow spheres to represent hydrogen, long sticks to represent bonds between carbons, and short sticks to represent bonds between carbon and hydrogen. Attach the spheres together in such a way that all the holes are filled.
3. Based on the molecular model you construct, draw the structural formula for the compound in the space provided on the next page.
4. Name the type of compound as follows: If it has all single bonds, it is an alkane and has the suffix "ANE" in the name. If it has one double bond, it is an alkene and has the suffix "ENE" in the name. If it has one triple bond, it is an alkyne and has the suffix "YNE" in the name.
5. The rest of the name of the compound is determined by counting the number of carbons in the longest chain, and the number, length, and location of the side chains. Each of these is indicated by using one of the prefixes in the table below:



Number	Prefix			
	Carbons in Main Chain	Carbons in side chain	Number of side chains	Location of side chains
1	meth	methyl	-	1
2	eth	ethyl	di	2
3	prop	propyl	tri	3
4	but	butyl	tetra	4
5	pent	pentyl	penta	5
6	hex	hexyl	hexa	6
7	hept	heptyl	hepta	7

- Write the name of the isomer below the structural formula following the rules described on the previous page. See the example of methyl butane (C_5H_{12}) drawn to the right. The main chain is called "BUTANE" because it is four carbons long and has all single bonds. The branch is called "METHYL" because it is one carbon long. There are no other prefixes or numbers because there is only one branch in the only possible location it can be.
- Repeat steps 2-6, using a different arrangement of carbons. Continue repeating steps 2-6 until you have constructed, drawn and named all the possible isomers of C_7H_{16} .

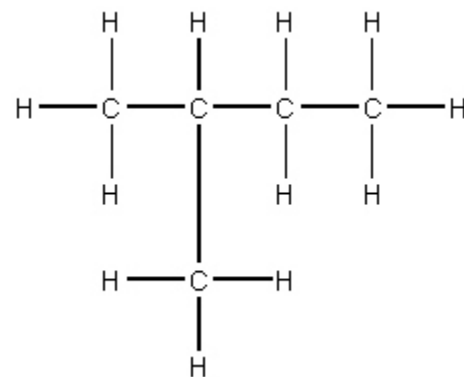


Figure 2. Methyl butane

OBSERVATIONS

Drawings and Names of the Isomers of C_7H_{16}

CONCLUSIONS

- How many different isomers of C_7H_{16} are there? _____
- Why might these isomers have different properties if they have the same simple formula?

