

Molecular Geometry Assignment

Discussion

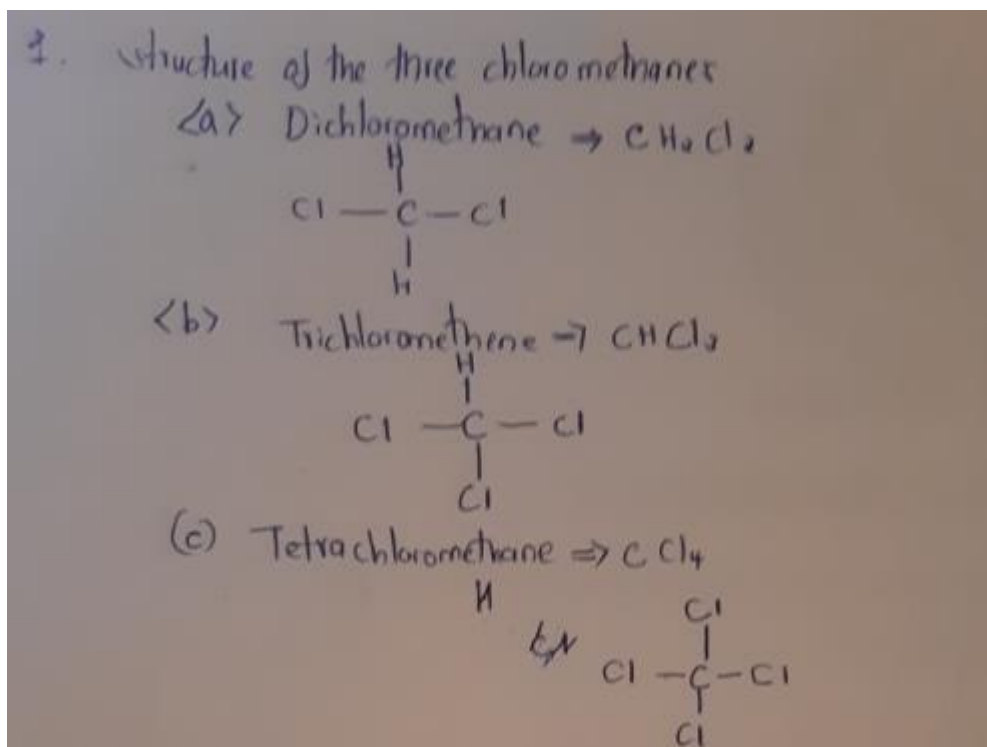
Organic compounds are extremely numerous - on the order of tens of millions, and several new compounds are being discovered and synthesized each day. The chemical and physical properties of these compounds depend upon what elements are present, how many atoms of each element are present, and how these atoms are arranged in the molecule.

Molecular formulas often, permit one to distinguish between two compounds. However, there are many substances that have identical molecular formulas but are completely different compounds. Consider the molecular formula C_2H_6O . There are two compounds that correspond to the formula: ethyl alcohol and dimethyl ether. While the molecular formula gives no clue as to which compound one may be referring, examination of the structural formula immediately reveals a different arrangement of atoms for these substances.

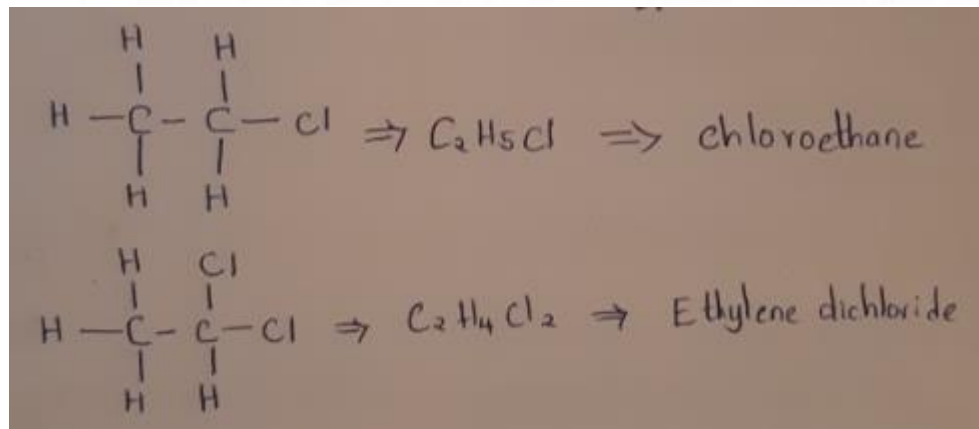
In addition, when molecular models are used, trial and error will show that there are just two ways that two carbons, six hydrogens, and one oxygen can be arranged without violating the usual valences of the elements. Compounds that have the same molecular formula but different structural formulas are termed isomers. This difference in molecular structure results in differences in chemical and physical properties of isomers. In the case of ethyl alcohol and dimethyl ether, these differences are very pronounced. In other cases, the differences may be more subtle.

Questions

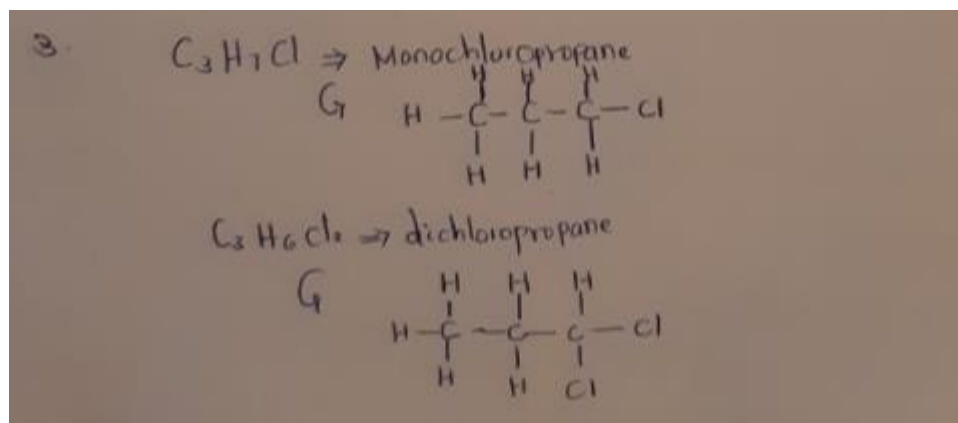
1. Draw the structure of and name each of the chloromethanes (3 total).



2. Draw the structures for C_2H_5Cl and $C_2H_4Cl_2$ and name each compound.

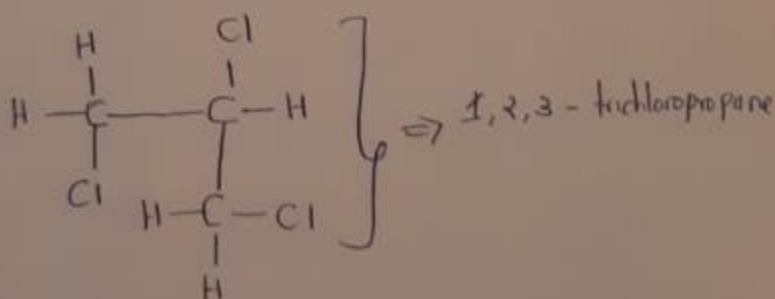
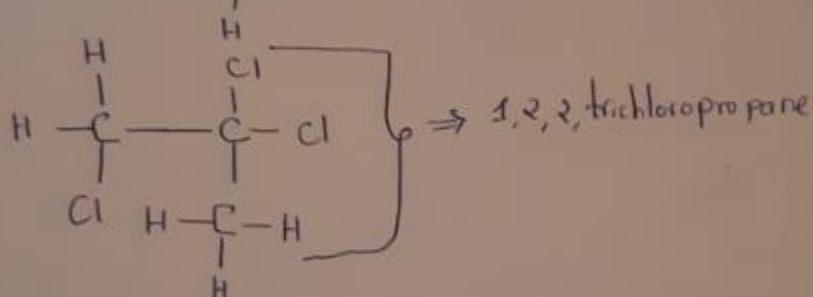
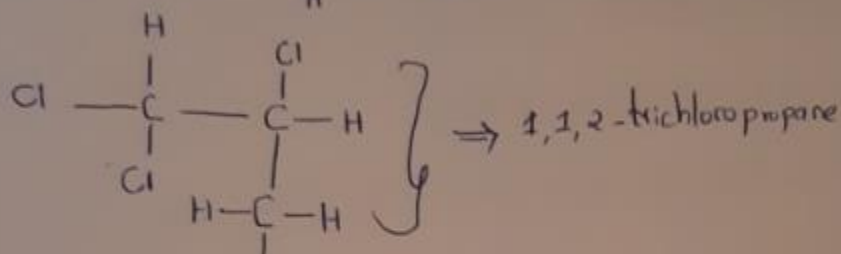
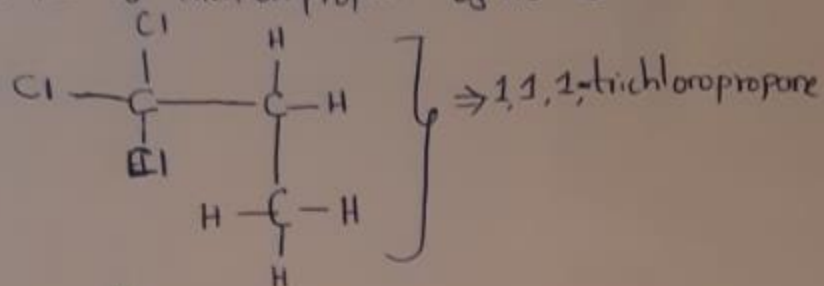


3. Draw the structural formulas name all isomers of monochloropropane, C_3H_7Cl , and dichloropropane, $C_3H_6Cl_2$.

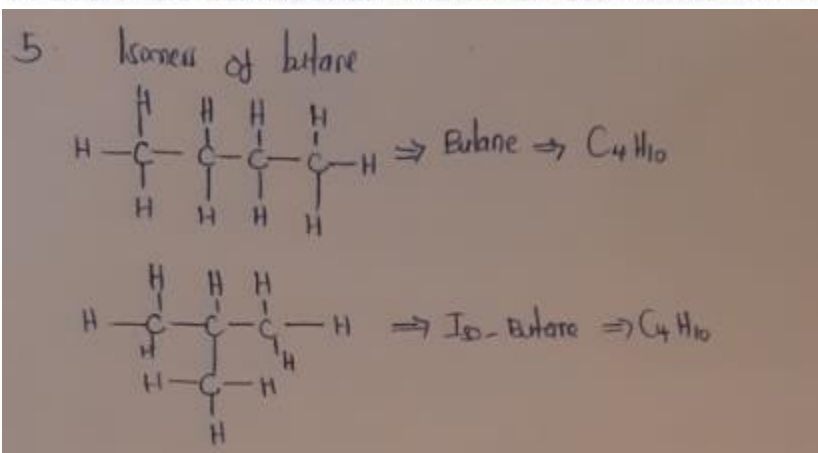


4. Draw the structural formulas and name all the isomers of trichloropropane, $C_3H_5Cl_3$.

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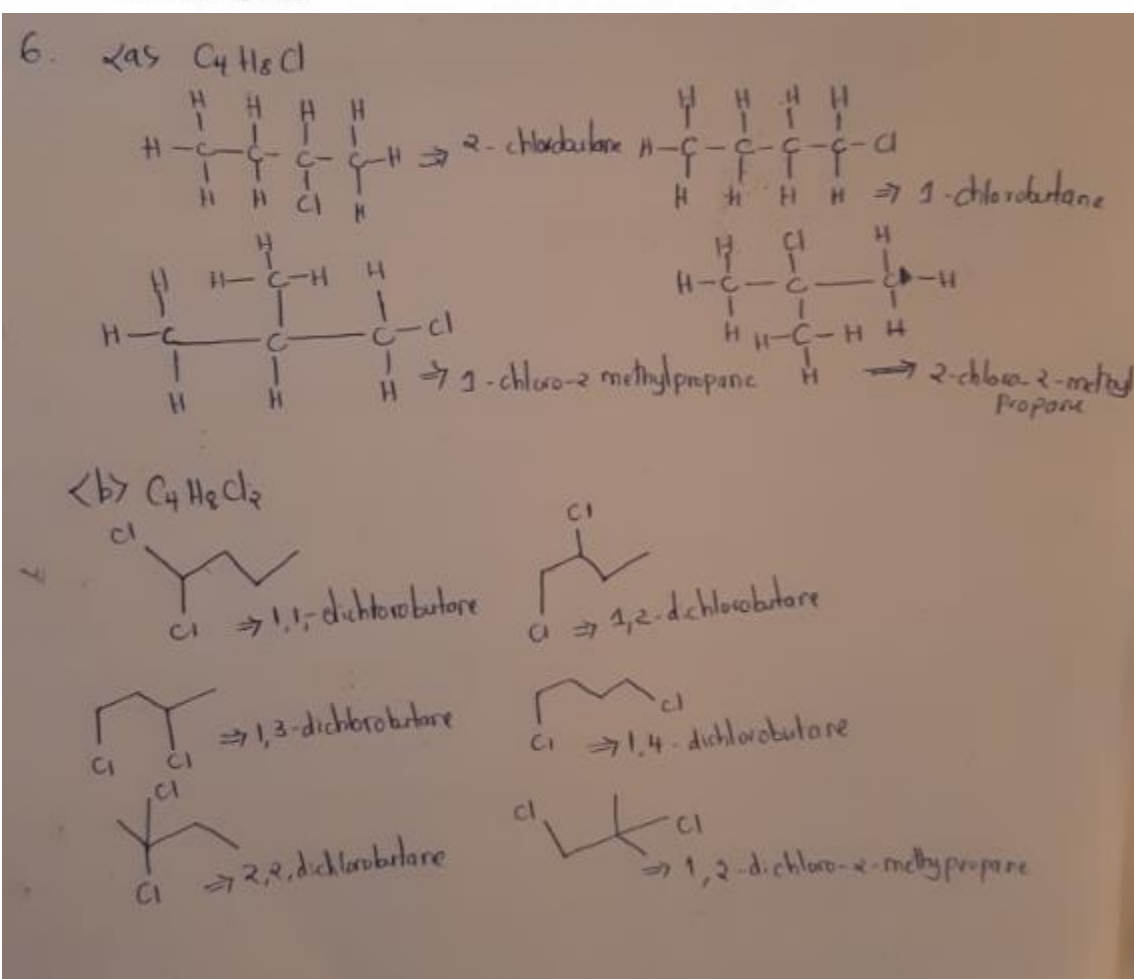
5. Draw the structural formulas and names for all the isomers of butane.



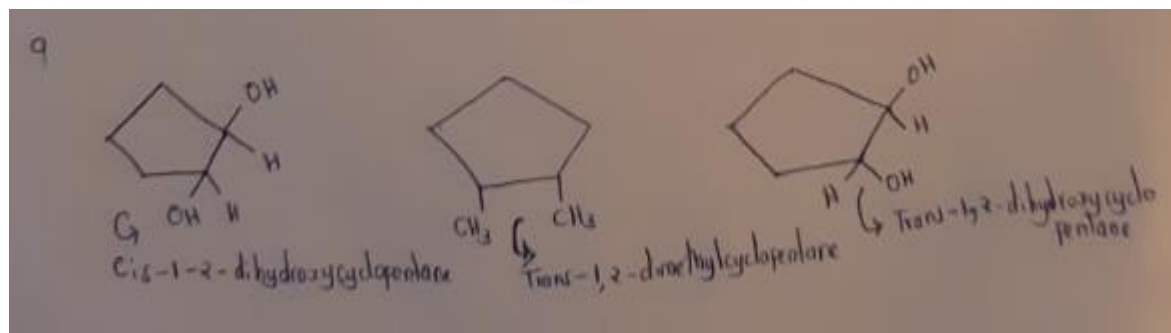
6. Draw the structural formulas and names for all the isomers of:

a. $\text{C}_4\text{H}_8\text{Cl}$

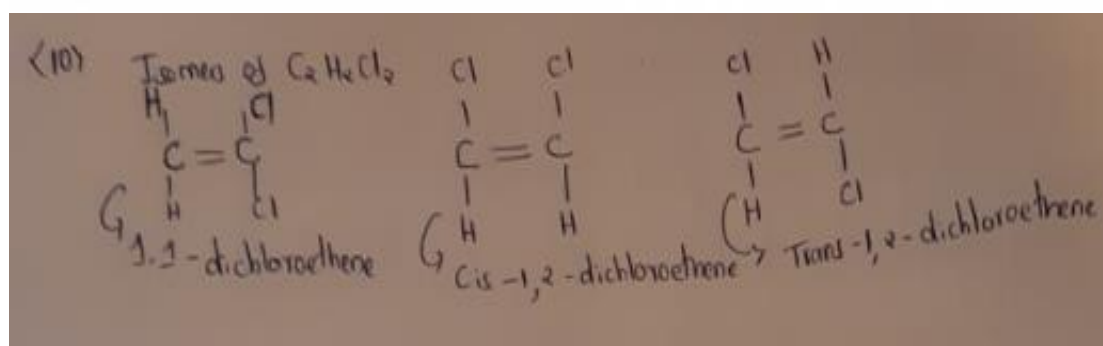
b. $\text{C}_4\text{H}_8\text{Cl}_2$



9. Using the following format for the structure of cyclopentane, give the structure for all three isomers of 1,2-dichlorocyclopentane.

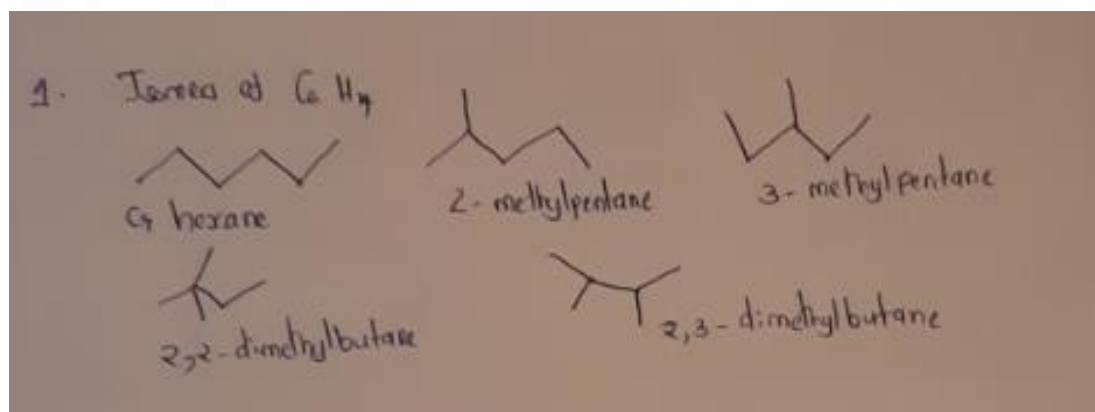


10. Give the structures and names of all isomers of $C_2H_2Cl_2$.

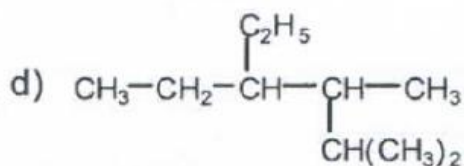
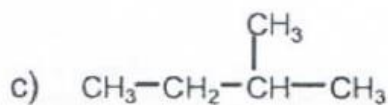
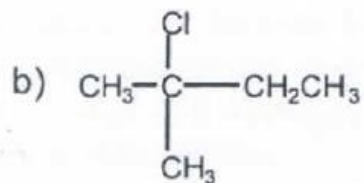
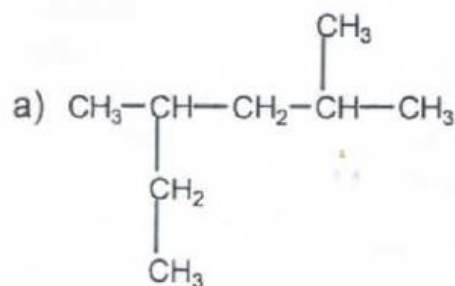


Additional Questions

1. Draw and name all isomers of the alkane C_6H_{14} .

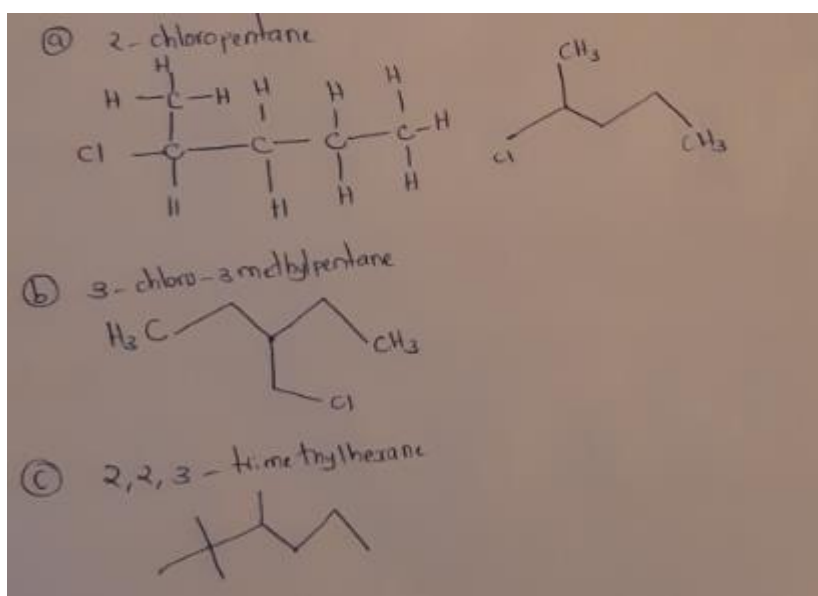


2. Give the correct IUPAC name for each of the four compounds:



- a. 2,4-dimethylpentane
- b. 2-Chlorobutane
- c. 2-Methylbutane
- d. 3-ethyl-2,4-Dimethyl heptane

3. Draw the structural formulas for the following:



d. structure of 4-ethyl-2,2-dimethyl hexane

