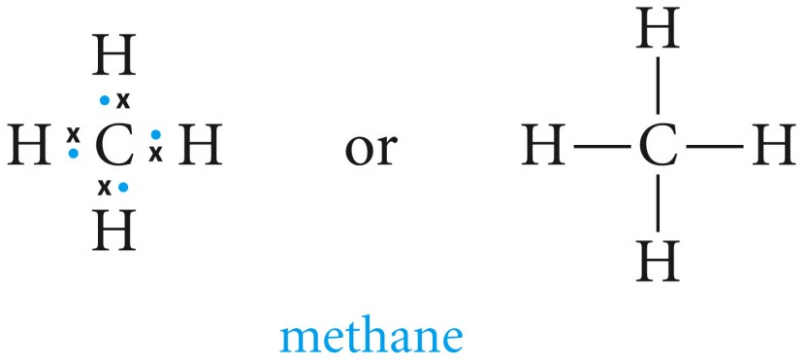
Chapter 1

Bonding and Isomerism L2

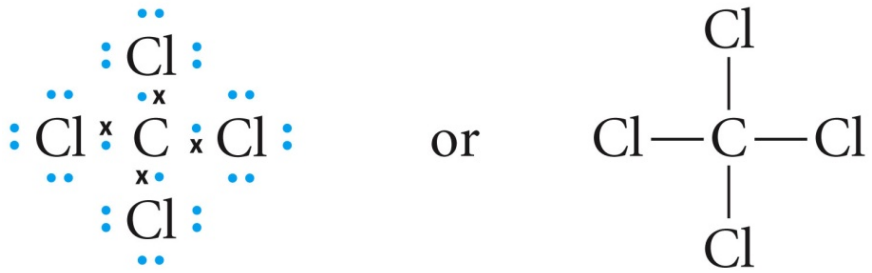
Important Announcements

- Labs begin today for sections 1 and 2, please bring to lab all your laptops, tablets, smartphones, iPods, iPads etc. You will be taking technology survey online.
- Experiment 1 is Determination of vitamin C, please print and read this experiemnt before you come to lab.
- If you are having any technology problems relating to clickers, Endnote, Dropbox etc., Please contact Dr. Bennett @ Jacqueline.bennett@oneonta.edu or send a text to 347-674-2436.

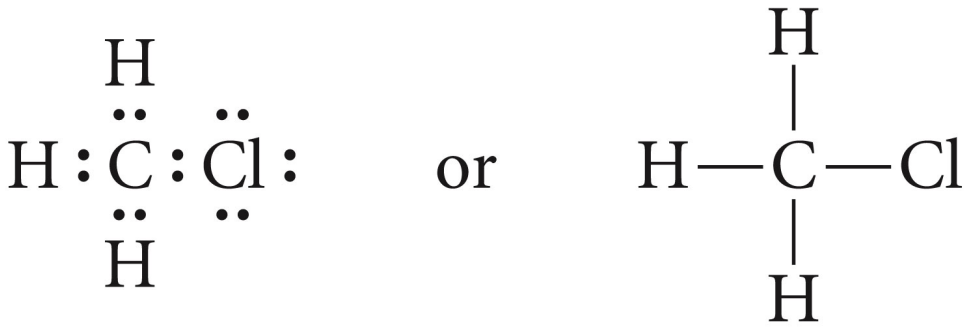
Carbon and the Covalent Bond



methane

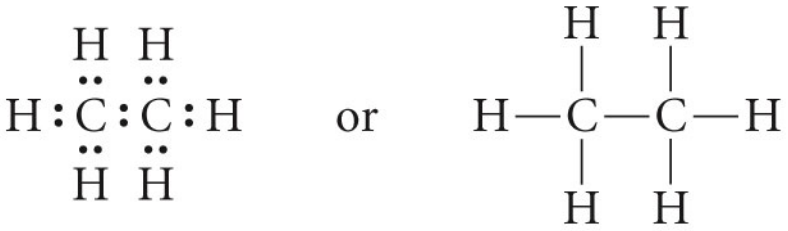


tetrachloromethane
(carbon tetrachloride)

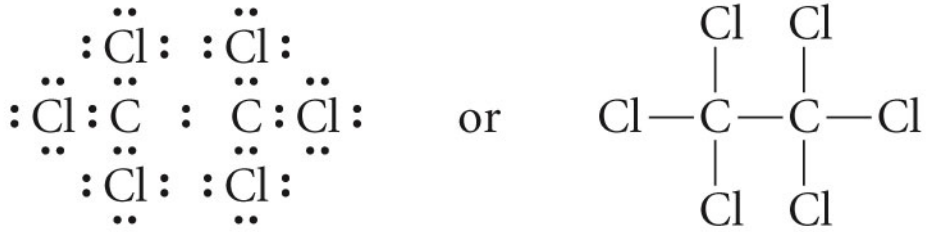


Draw the structures of dichloromethane and trichloromethane (chloroform)

Carbon-Carbon Single Bonds

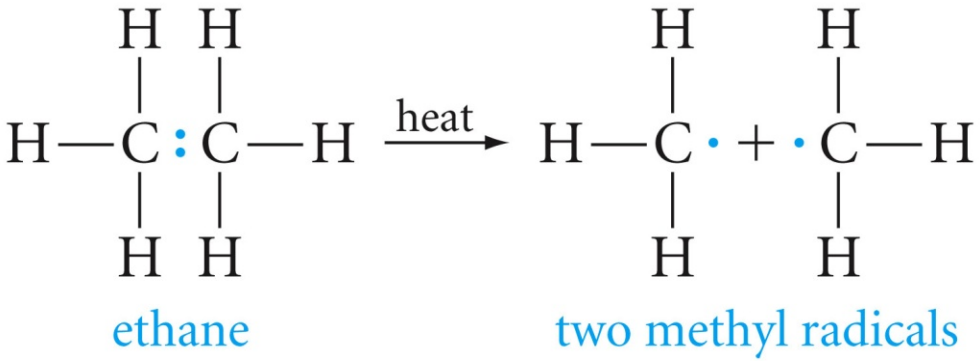


ethane



hexachloroethane

C-C	1.54 Å
H-H	0.74 Å
C-H	1.09 Å
Cl-Cl	1.98 Å



A radical is a molecular fragment with an odd number of electrons

Polar Covalent Bonds

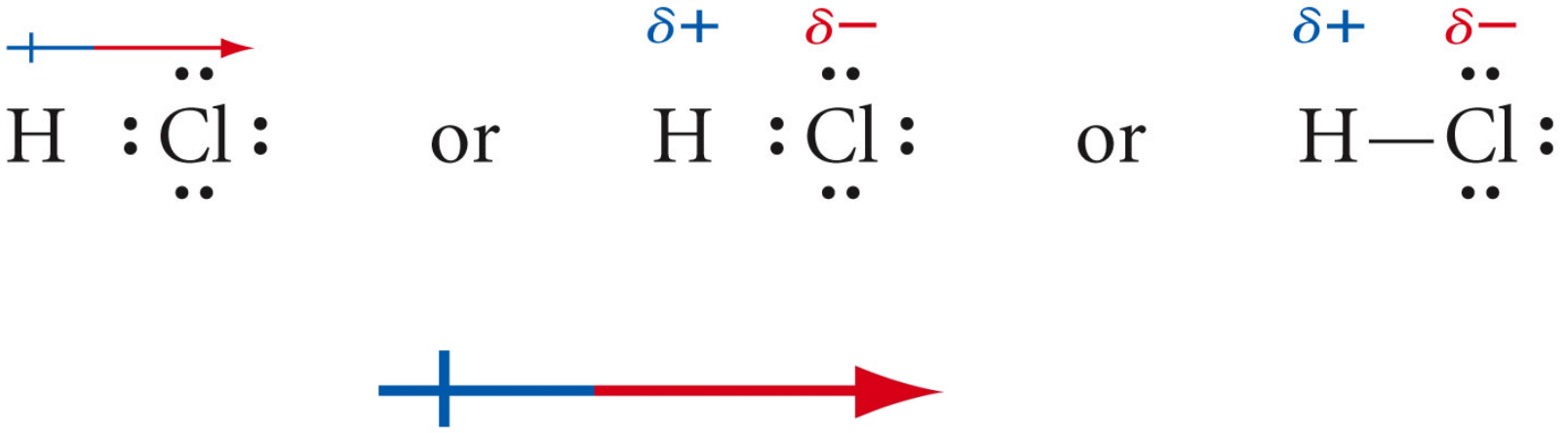


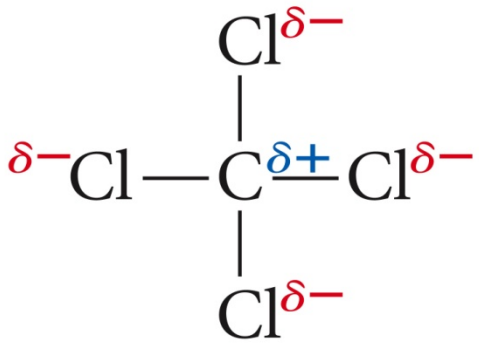
Table 1.4 Electronegativities of Some Common Elements

Group

I	II	III	IV	V	VI	VII
H 2.2						
Li 1.0	Be 1.6	B 2.0	C 2.5	N 3.0	O 3.4	F 4.0
Na 0.9	Mg 1.3	Al 1.6	Si 1.9	P 2.2	S 2.6	Cl 3.2
K 0.8	Ca 1.0					Br 3.0
						I 2.7

< 1.0	1.5–1.9	2.5–2.9
1.0–1.4	2.0–2.4	3.0–3.4

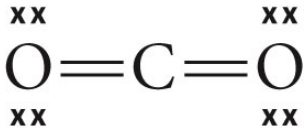
Bond polarization in tetrachloromethane



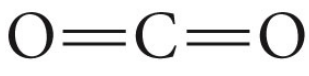
Draw the structure of the refrigerant dichlorodifluoromethane CCl_2F_2 and indicate the polarity of the bonds. (Prob. 1.11)

Multiple Covalent Bonds

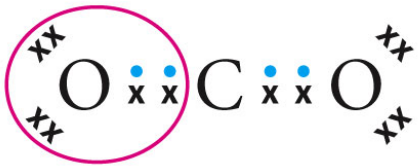
or

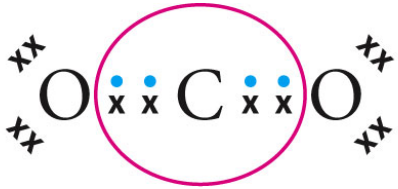


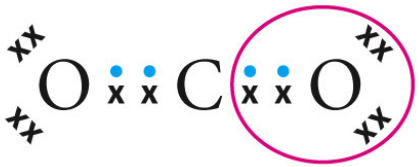
or



A B C



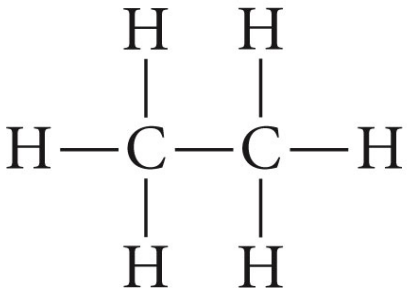




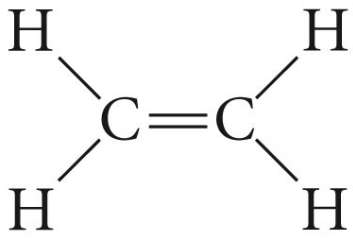
hydrogen cyanide

Determine What, if anything is wrong with the following electron arrangement for carbon dioxide

Carbon atoms connect to one another in single, double and triple bonds in hydrocarbons and other organic compounds



ethane



ethene
(ethylene)

ethyne
(acetylene)

Valence

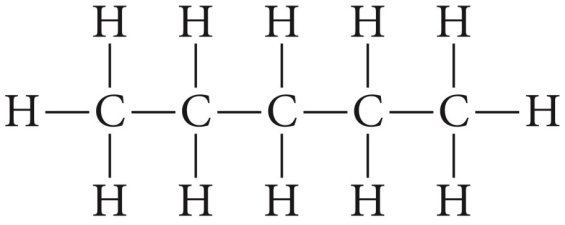
This is the number of bonds that an atom of the element can form. For none metals, this number usually corresponds to the number electrons needed to fill the valence shell.

Table 1.5 Valences of Common Elements

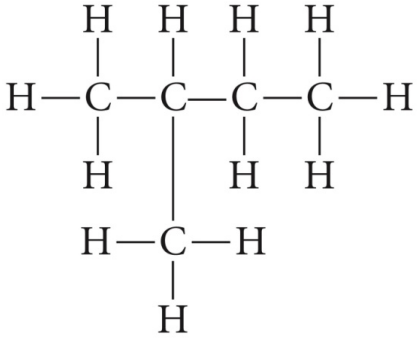
Element	H·	·C·	·N:	·O:	:F:	:Cl:
Valence	1	4	3	2	1	1

Writing Structural Formulas

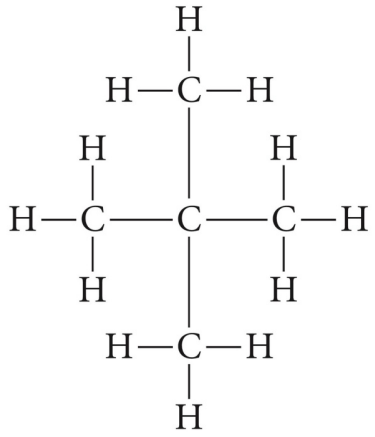
Use C_5H_{12} for example



pentane, bp 36°C

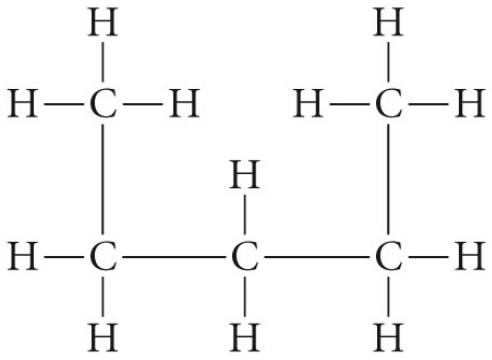


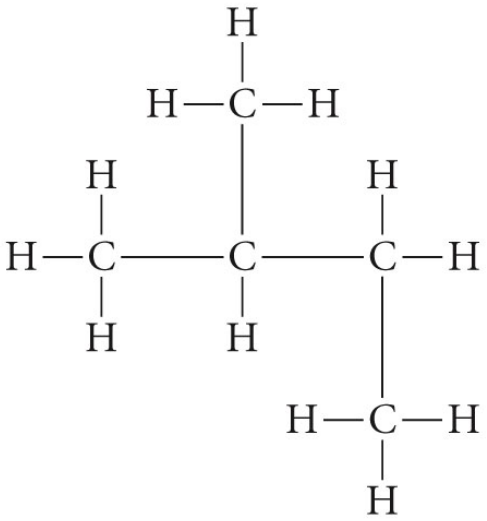
2-methylbutane, bp 28°C
(isopentane)

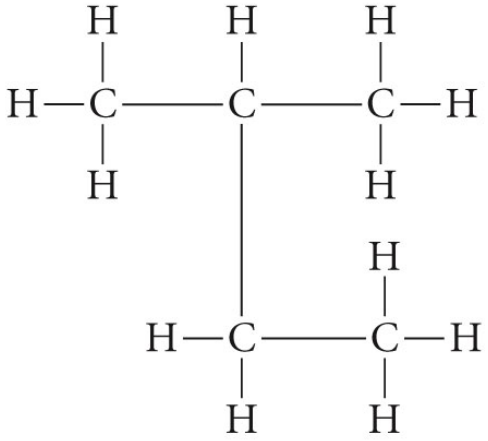


2,2-dimethylpropane, bp 10°C
(neopentane)

Which of the isomers of C5H12 does each of the following structural formulas correspond?

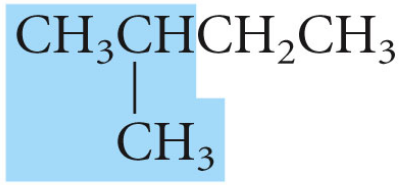




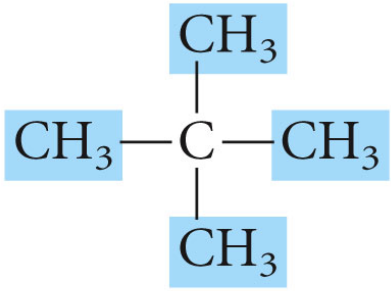


Abbreviated Formulas

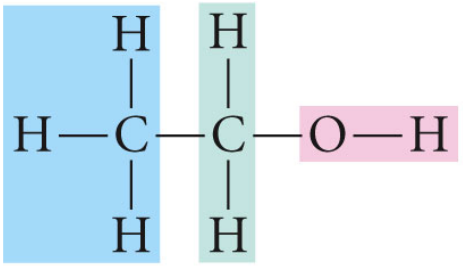
n-pentane



isopentane



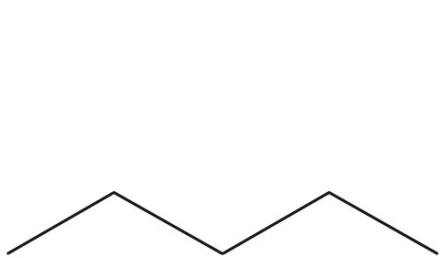
neopentane



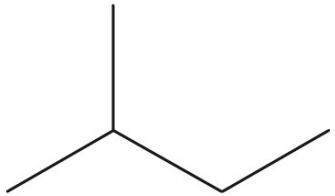
to

or

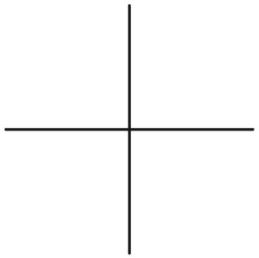
Line Segment Formulas



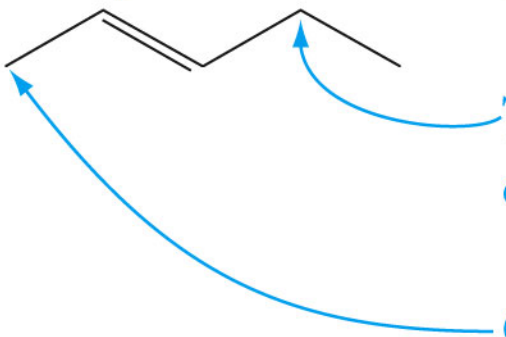
n-pentane



isopentane



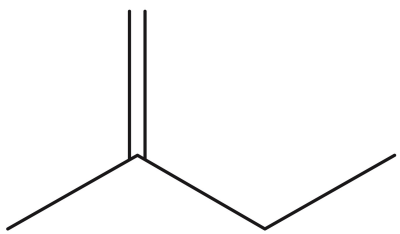
neopentane



Three line segments emanate from this point; therefore, this carbon has one hydrogen (4 − 3 = 1) attached to it.

Two line segments emanate from this point; therefore, this carbon has two hydrogens (4 − 2 = 2) attached to it.

One line segment emanates from this point; therefore, this carbon has three hydrogens (4 − 1 = 3) attached to it.



Write a more detailed structural for the compound shown.