CHEMISTRY

POLAR MOLECULES

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Recall: *by subtracting electronegativities, the bond type can be determined.*

1.8 and above	1.7 and below	
Ionic Bond	Covalent Bond	
	0.0 – 0.4	0.5 – 1.7
	Pure Covalent	***Polar Covalent***

Polar Covalent molecules still share electrons but not evenly. This results in electrons spending more time orbiting one atom verses the other; creating a slight pole or charge.

Ex: Consider the chemical bond between carbon and chlorine:

Since chlorine has a stronger hold on the electrons, a slightly negative charge is created around the chlorine (δ^-), and because the electrons spend less time around the carbon, a slightly positive charge is created (δ^+).

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Ex: Consider the chemical bonds in a water molecule:

These slight charges, or poles, will have an effect on the chemical properties of the molecule (*Ex: Hydrogen Bonding)*.

Hydrogen Bonding exists because neighbouring water molecules attract each other because of the slight charges that exist at the poles of the molecule. This hydrogen bonding gives compounds like water the ability to stick together (surface tension).

This "Stickyness" is what keeps the molecules in close proximity to one another (like a liquid) but not fixed (like in a solid). As such, polar molecules are often liquids at room temperature.

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Not all "polar" molecules have this ability. In fact, some polar molecules have poles that cancel out. Creating a non-polar molecule

Ex: *Carbon Dioxide*

Because the molecule is symmetrical, the poles cancel each other out.

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Homework

Pg. 63 #10 - 12

10. T/I Predict whether the bond between each pair of atoms will be non-polar covalent, slightly polar covalent, polar covalent, or mostly ionic.

a. carbon and fluorine
b. oxygen and nitrogen
c. chlorine and chlorine
d. copper and oxygen
e. silicon and hydrogen
f. sodium and fluorine
g. iron and oxygen
h. manganese and oxygen

11. T/I For each polar and slightly polar covalent bond in question 10, indicate the locations of the partial positive and partial negative charges. Explain how you made each decision.

12. T/I Arrange the bonds in each group below in order of increasing polarity.

a. hydrogen bonded to chlorine, oxygen bonded to nitrogen, carbon bonded to sulfur, sodium bonded to chlorine

b. carbon bonded to chlorine, magnesium bonded to chlorine, phosphorus bonded to oxygen, nitrogen bonded to nitrogen

1 K/U Determine ΔEN for each bond. Is the bond ionic, covalent, or polar covalent?

(a) B—F
(b) C—H
(c) Na—Cl
(d) Si—O
(e) S—O
(f) C—Cl

2 K/U For each polar covalent bond in question 1, label the partial negative and partial positive charges on each end.

6 I A molecule of chloroform, $CHCl_3$, has the same shape as a molecule of methane, CH_4. However, methane's boiling point is –164°C and chloroform's boiling point is 62°C. Explain the difference between the two boiling points.