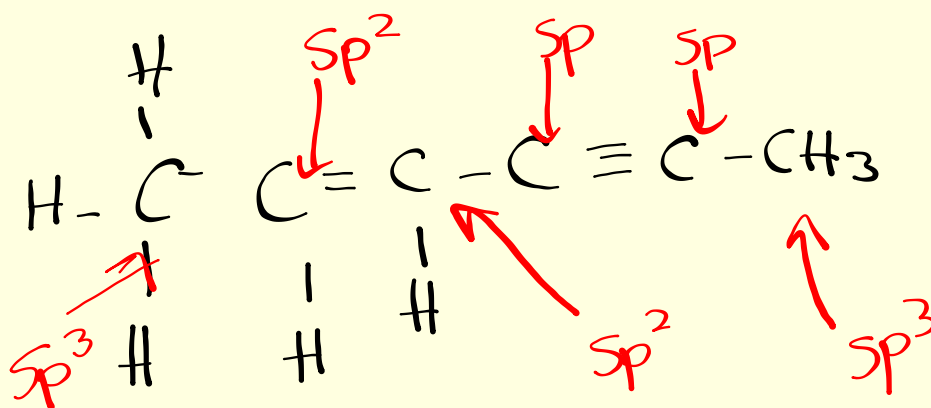
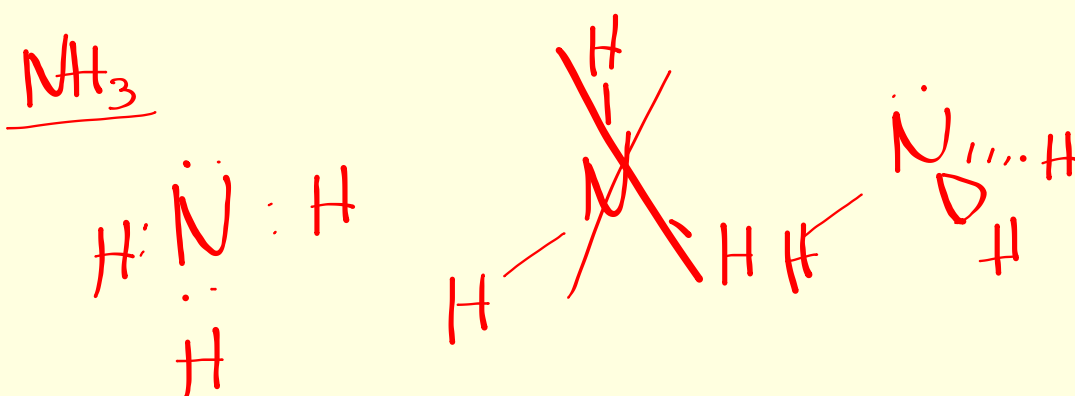
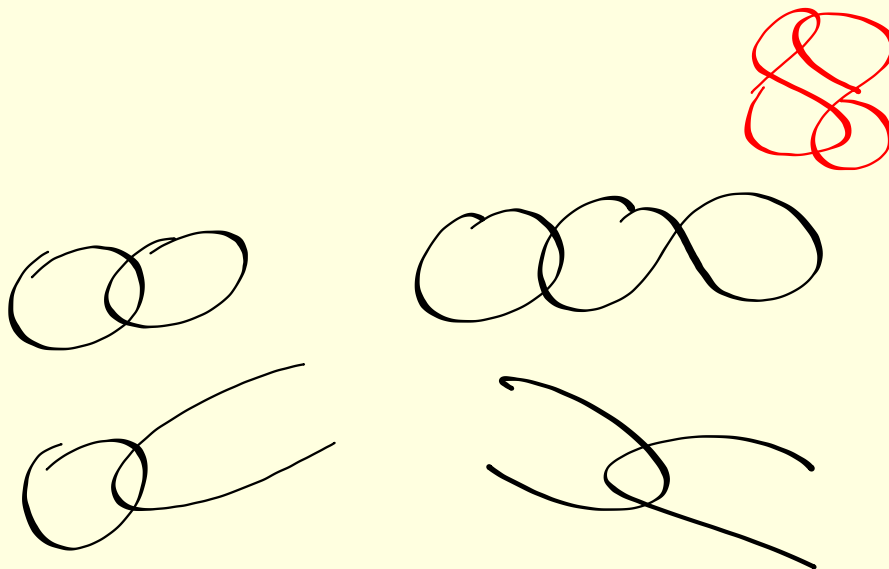


# Worksheet 8.3



**Single bonds** $4sp^3 (s + p_x + p_y + p_z)$ 

- sigma bonds

tetrahedral, pyramidal, bent

**Double bonds** $3sp^2 (s + p_x + p_y)$ 

- 3 sigma bonds

 $p_z$ 

- pi bond

trigonal planar

**Triple bonds** $2sp (s + p_x)$ 

- 2 sigma bonds

 $p_y, p_z$ 

- 2 pi bonds

linear

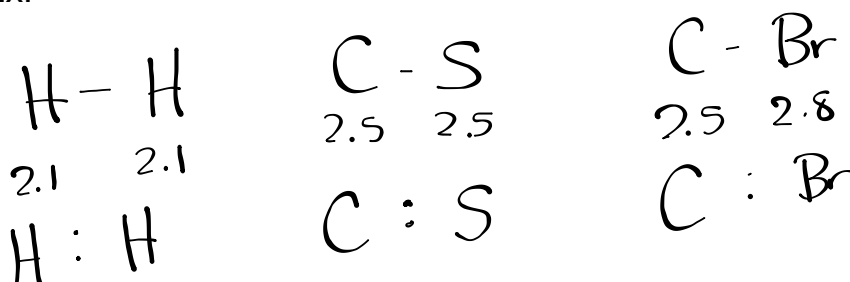
# Bond Polarity

- In covalent bonds, the bonding pairs of electrons are shared between atoms.
- Two nuclei 'pull' the electrons. Amount of 'pull' is dependent on the atoms' electronegativities.

## Nonpolar covalent bond

Bond that forms when the atoms in the bond pull equally, and the electrons are shared equally.

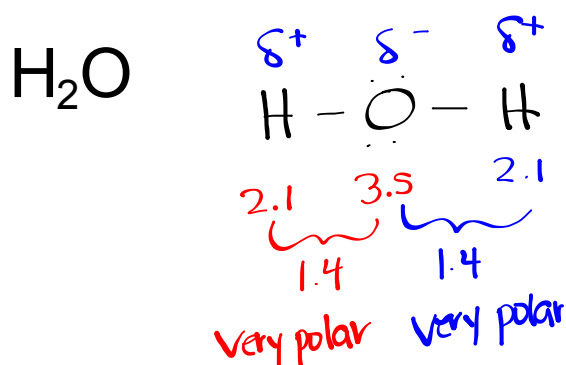
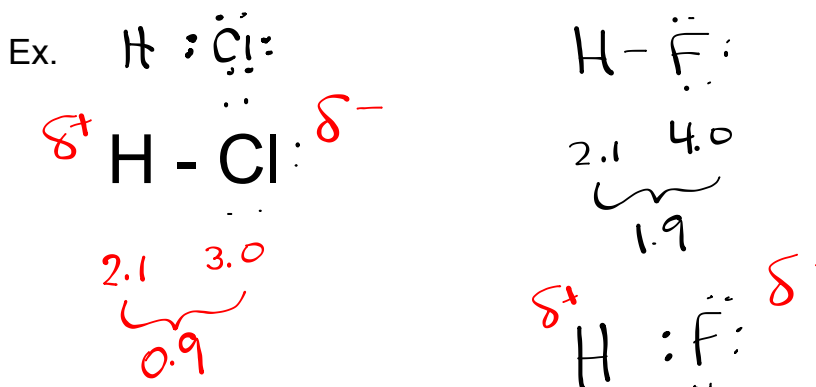
Ex.

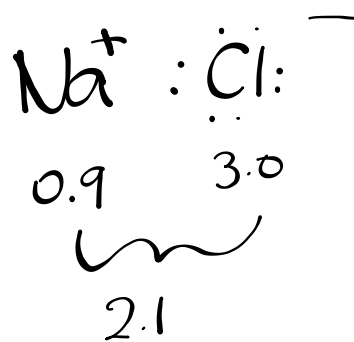


## Polar covalent bond

Bond that forms when the electrons are shared unequally

- More electronegative atom attracts electrons more strongly and gains a slightly negative charge. Less electronegative atom has a slightly positive charge.





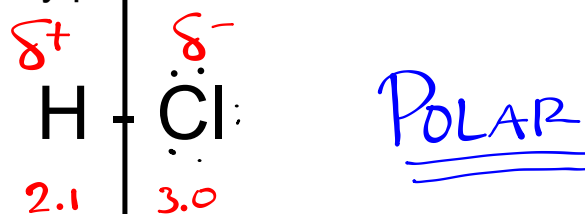
**Table 6.3 Electronegativity Differences and Bond Types**

<b>Electronegativity difference range</b>	<b>Most probable type of bond</b>	<b>Example</b>
<b>0.0-0.4</b>	<b>Nonpolar covalent</b>	<b>H - H (0.0)</b>
<b>0.4-1.0</b>	<b>Moderately polar covalent</b>	<b>H - Cl (0.9)</b>
<b>1.0-2.0</b>	<b>Very polar covalent</b>	<b>H - F (1.9)</b>
<b>≥ 2.0</b>	<b>Ionic</b>	<b>Na<sup>+</sup> Cl<sup>-</sup> (2.1)</b>

**\* No sharp boundary between ionic and covalent**

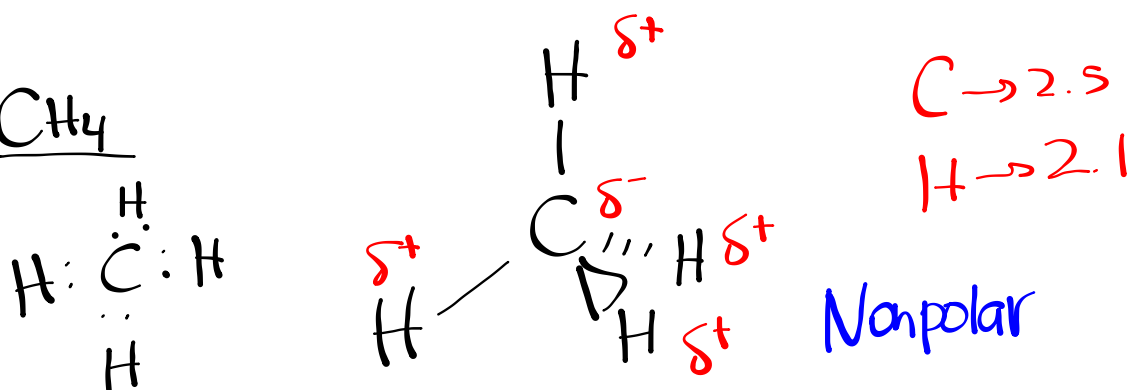
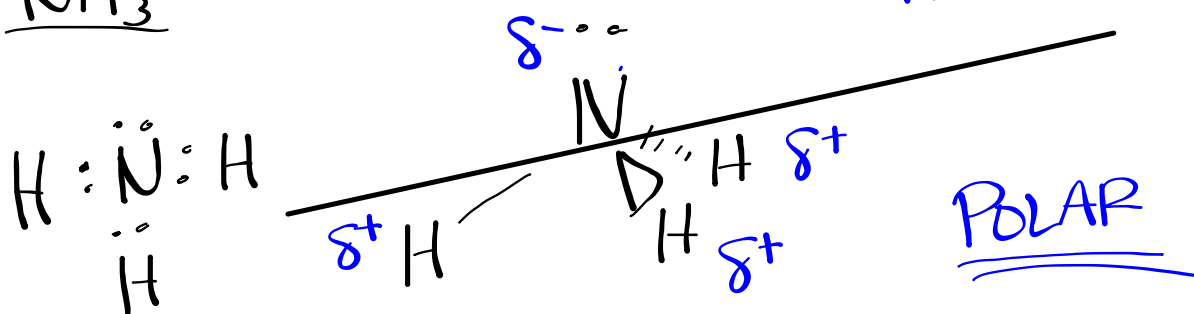
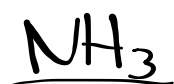
# Polar Molecules

In a polar molecule, one end of the molecule is slightly negative, and the other end is slightly positive.



-Partial charges are often called charged regions or poles.

A molecule with two poles is called a **dipole**.



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Table 6.2

Electronegativity Values for Selected Elements

<b>H</b> 2.1						
<b>Li</b> 1.0	<b>Be</b> 1.5	<b>B</b> 2.0	<b>C</b> 2.5	<b>N</b> 3.0	<b>O</b> 3.5	<b>F</b> 4.0
<b>Na</b> 0.9	<b>Mg</b> 1.2	<b>Al</b> 1.5	<b>Si</b> 1.8	<b>P</b> 2.1	<b>S</b> 2.5	<b>Cl</b> 3.0
<b>K</b> 0.8	<b>Ca</b> 1.0	<b>Ga</b> 1.6	<b>Ge</b> 1.8	<b>As</b> 2.0	<b>Se</b> 2.4	<b>Br</b> 2.8
<b>Rb</b> 0.8	<b>Sr</b> 1.0	<b>In</b> 1.7	<b>Sn</b> 1.8	<b>Sb</b> 1.9	<b>Te</b> 2.1	<b>I</b> 2.5
<b>Cs</b> 0.7	<b>Ba</b> 0.9	<b>Tl</b> 1.8	<b>Pb</b> 1.9	<b>Bi</b> 1.9		.