[TP] Which of the following molecules are not polar?

17% 1. $BFCl_2$, whose shape is trigonal-planar, like that of BF_3
17% 2. SCl_2, which is a bent molecule, like H_2O
17% 3. NH_2Cl, whose shape is trigonal-pyramidal, like that of NH_3
17% 4. OCS, which is a linear molecule, like CO_2
17% 5. All of the above are nonpolar
17% 6. All of the above are polar

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Lecture 16 CH101 A2 (MWF 11:15 am)

Friday, October 12, 2018

For today ...
- Polarity
- Dipole-dipole vs. temporary dipole (dispersion)

Next lecture: Putting it all together: Relative boiling point; Practice: Intermolecular forces; Dissolving ionic solids; solubility rules

Memorize: solubility guidelines fig 6.28, p 181

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Dipole-dipole attraction

Molecules must be "polar"

What makes a molecule polar is unequal sharing of electron clouds.

Sharing tendency is proportional to electronegativity difference.

The greater the difference of electronegativities,
the more unequal the sharing,
the more polar the shared electron cloud.

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Electronegativity χ: Relative pull

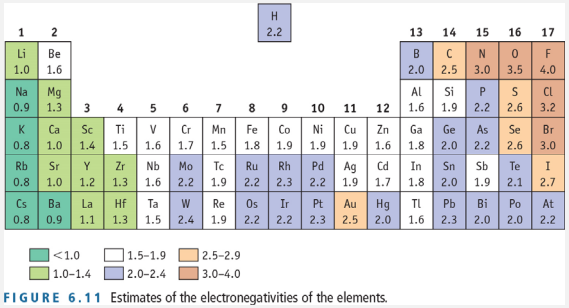

FIGURE 6.11 Estimates of the electronegativities of the elements.

The larger χ the more piggish the atom

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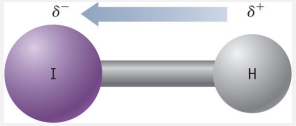
The more different the χ's, the more polar the bond



- If two bonded atoms are different, the one with larger χ gets more of the shared electron cloud
- Atom with larger χ has net negative charge; atom with smaller χ has net positive charge
- The larger the difference in χ, the greater the charge separation (unequal sharing of electron cloud)
- Result is a polar bonds

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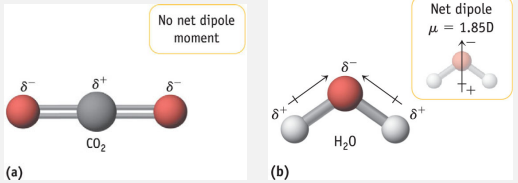
Molecular polarity

- If bond dipoles cancel, molecule is nonpolar
- If bond dipoles do not cancel, molecule is polar



Let's illustrate, for BF_3 and BH_2F

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Consider polarity of the following

- $BFCl_2$, whose shape is trigonal-planar, like that of BF_3
- SCl_2, which is a bent molecule, like H_2O
- NH_2Cl, whose shape is trigonal-pyramidal, like that of NH_3
- OCS, which is a linear molecule, like CO_2

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[TP] Which of the following molecules are not polar?

17% 1. $BFCl_2$, whose shape is trigonal-planar, like that of BF_3
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17% 4. OCS, which is a linear molecule, like CO_2
17% 5. All of the above are nonpolar
17% 6. All of the above are polar

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[Quiz] Which of the following statements is true about carbon dioxide, O=C=O?

25% 1. CO_2 contains polar bonds and is a polar molecule
25% 2. CO_2 contains polar bonds, but is not a polar molecule
25% 3. CO_2 does not contain polar bonds and is not a polar molecule
25% 4. CO_2 does not contain polar bonds but is a polar molecule

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Dipole-dipole versus dispersion

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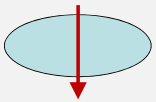
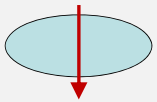
Permanent dipoles

Sketch a second molecule arranged so that it ...

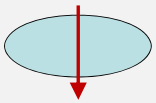
attracts maximally



repels maximally



neither attracts nor repels



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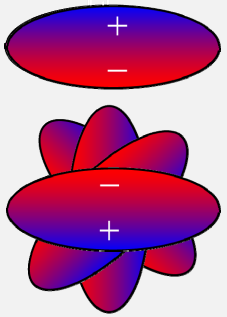
Dipole can be attractive or repulsive



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