Announcements – Lecture XIII – Tuesday, Oct 27th

1. **Fourth Lab – Saturday, October 31st … 1-4pm … ISB 155/160 (A-E)**

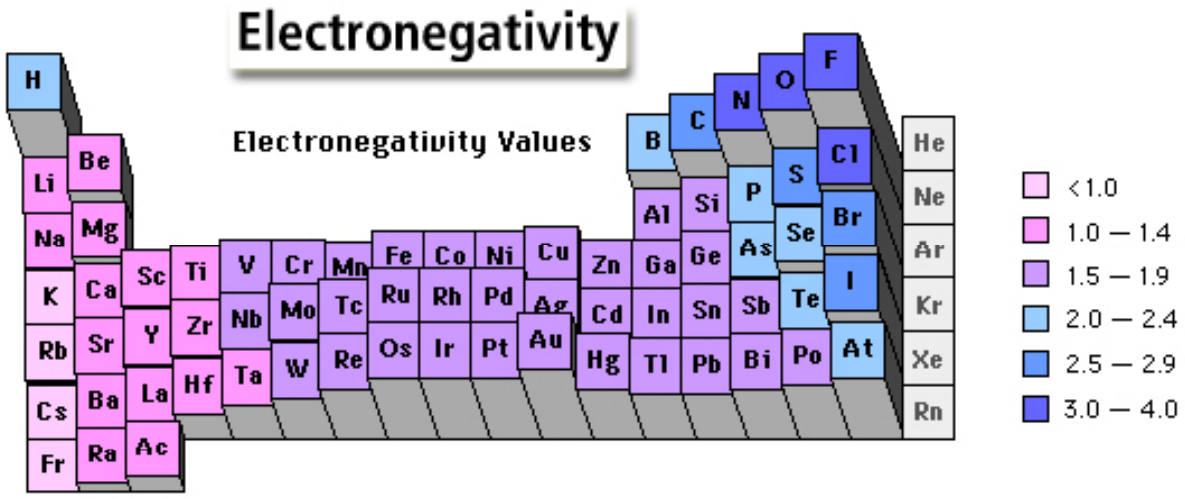
   a) Print lab prior to coming to lab -- use the 'Print Friendly Version' located on the top left hand side of the page – this is the version that contains the 'Data Sheet' that you will hand in upon completing the lab.

   b) Third set of Lab Owls will appear in Owl after this lab. There are a total of 4 sets of Lab Owls and they are worth 25% of the Lab Grade.

2. 

iClicker:
Choose any letter: A-E

3.11 How Do We Determine if a Molecule is Polar



? Polar bond ... difference in electronegative

$:N \equiv N:$

↳ Non polar bond.

$:C \equiv O:$

↳ Polar bond

$\longmapsto$

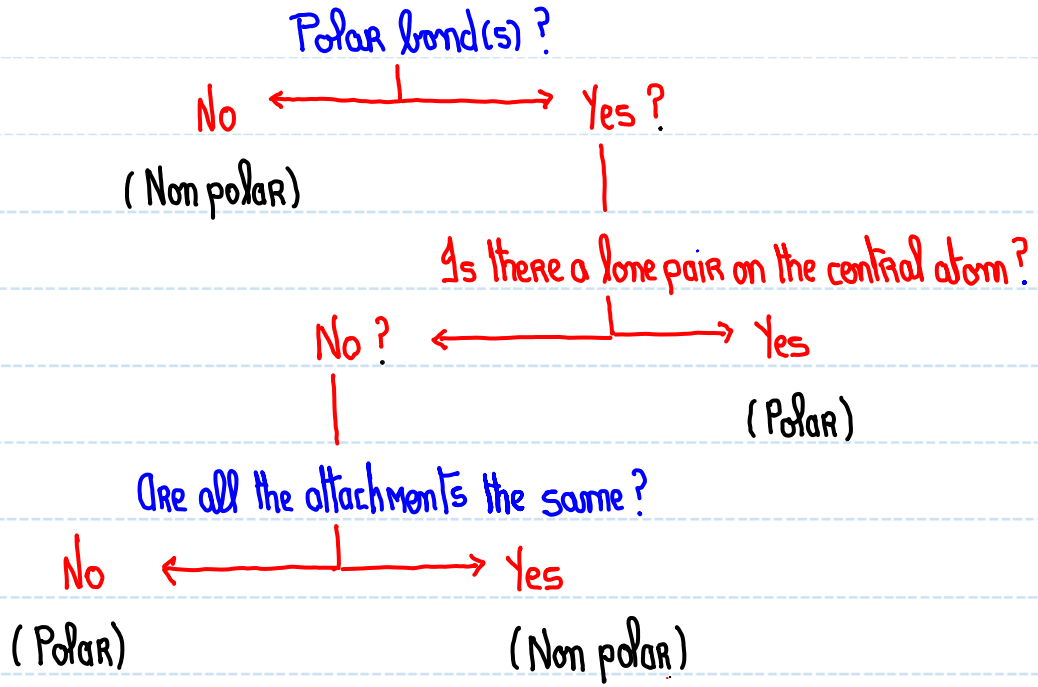
$:C \equiv O:$ → Oxygen more electronegative

Polar molecule

3.11 How Do We Determine if a Molecule is Polar

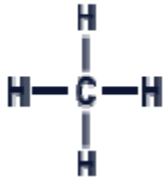
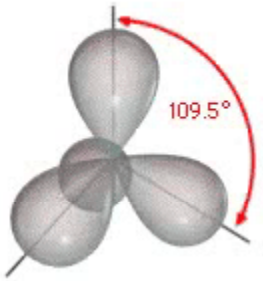
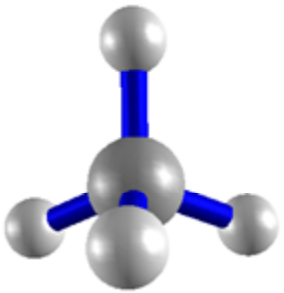
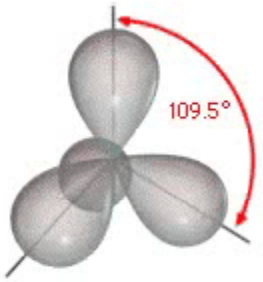
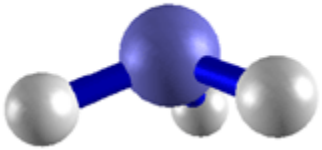
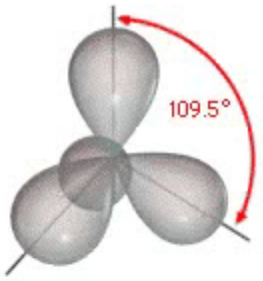
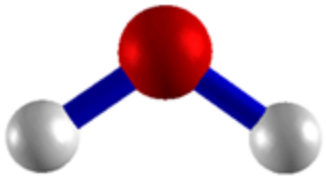
If the vector sum of the polar bonds is $\neq 0$ then the molecule is polar.

The following series of questions work to determine molecular polarity for simple molecules whose X+E = 2, 3, or 4.



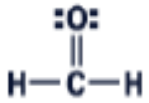
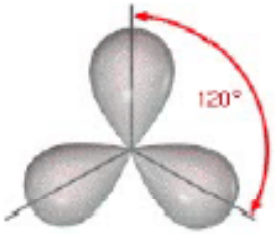
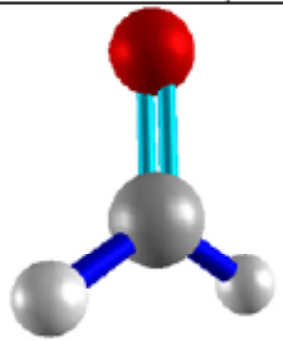
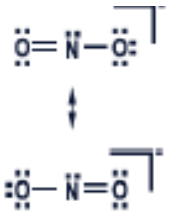
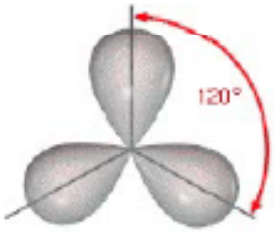
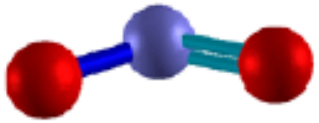
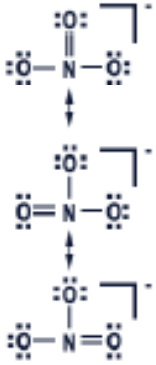
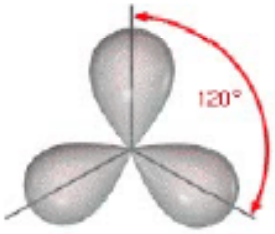
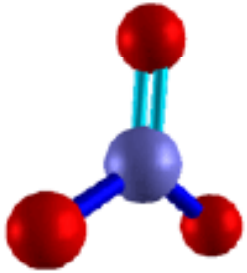
3.11 How Do We Determine if a Molecule is Polar

Molecular Geometry Worksheet ... Fall 2008 ... Whelan ... Page 1

Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
CH_4 	AX_4E_0	4	 Tetrahedron	 Tetrahedron	~109°	NP
NH_3 	AX_3E_1	4	 Tetrahedron	 Trigonal pyramid	~109°	P
H_2O 	AX_2E_2	4	 Tetrahedron	 Bent/Angular (109°)	~109°	P

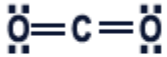
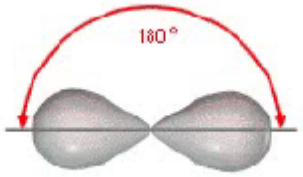
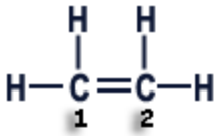
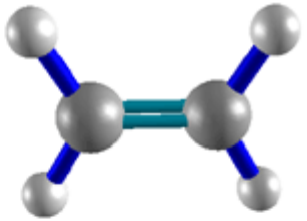
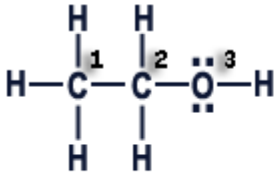
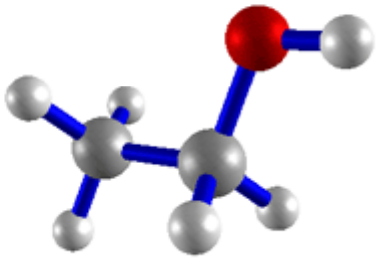
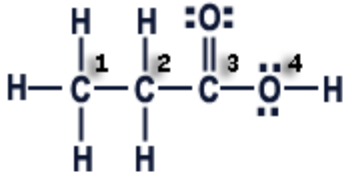
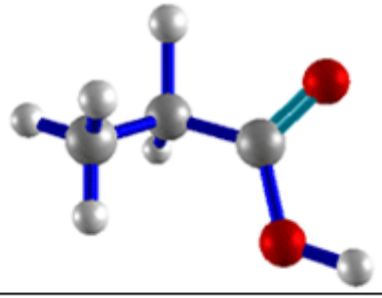
3.11 How Do We Determine if a Molecule is Polar

Molecular Geometry Worksheet … Fall 2008 … Whelan … Page 2

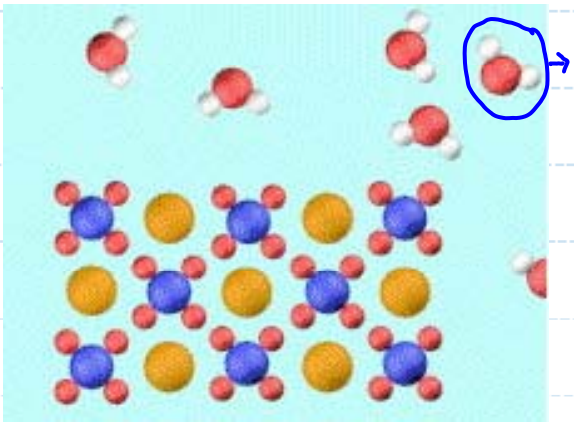
Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
H_2CO 	AX_3E_0	3	 Trigonal planar	 Trigonal planar	120°	P
NO_2^- 	AX_2E_1 AX_2E_1	3 3	 Trigonal planar	 Bent/Angular (120°)	120°	P
NO_3^- 	AX_3E_0 AX_3E_0 AX_3E_0	3 3 3	 Trigonal planar	 Trigonal planar	120°	NP

3.11 How Do We Determine if a Molecule is Polar

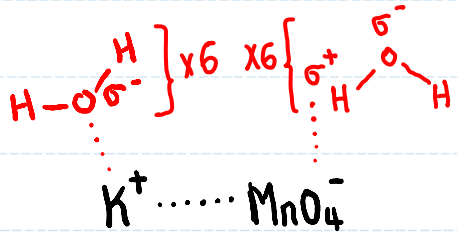
Molecular Geometry Worksheet ... Fall 2008 ... Whelan ... Page 3

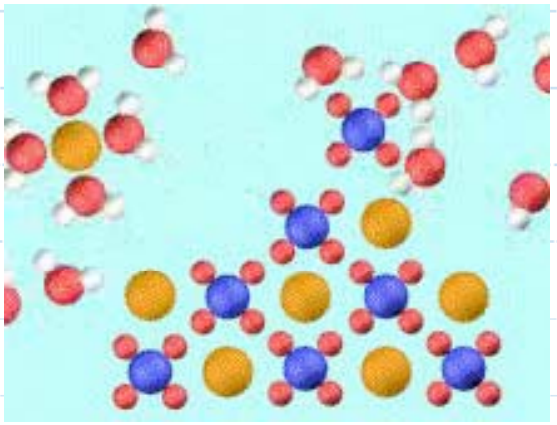
Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
CO_2 	AX_2	2	 Linear	 Linear	180°	NP
C_2H_4 	1: AX_3E_0 2: AX_3E_0	3 3	1: Trigonal planar 2: Trigonal planar		1: 120° 2: 120°	
C_2H_5OH 	1: AX_4E_0 2: AX_4E_0 3: AX_2E_2	4 4 4	1: Tetrahedron 2: Tetrahedron 3: Tetrahedron		1: ~109° 2: ~109° 3: ~109°	
C_2H_5COOH 	1: AX_4E_0 2: AX_4E_0 3: AX_3E_0 4: AX_2E_2	4 4 3 4	1: Tetrahedron 2: Tetrahedron 3: Trigonal planar 4: Tetrahedron		1: ~109° 2: ~109° 3: 120° 4: ~109°	

3.11 Consequence of Molecular Polarity



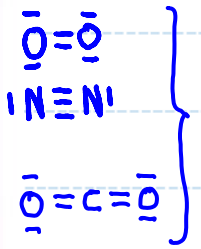
→ H_2O ... polar





Solubility of Some Common Substances		
Compound	Solubility in H_2O g/100mL	
NaCl	35.7	0°C
O_2	4.5×10^{-3}	18°C
N_2	2.0×10^{-3}	18°C
NH_3	89.5	0°C
CO_2	0.179	18°C
HCl	72.1	20°C

→ Polar



Non polar.

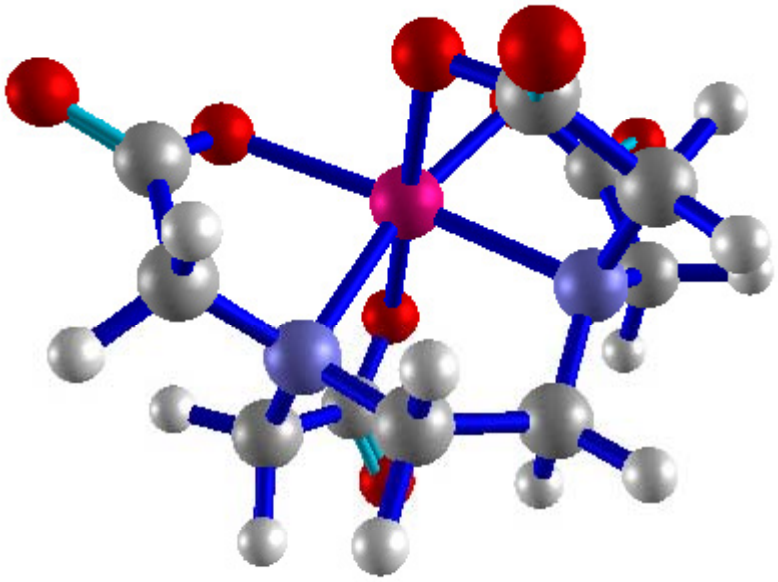
"Like dissolves like"

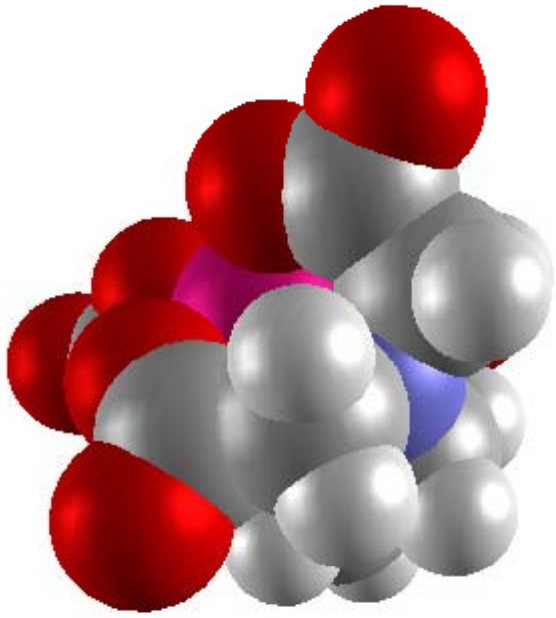
3.11 Consequence of Molecular Polarity

Salad dressings ... Lead poisoning ... Chelating therapy

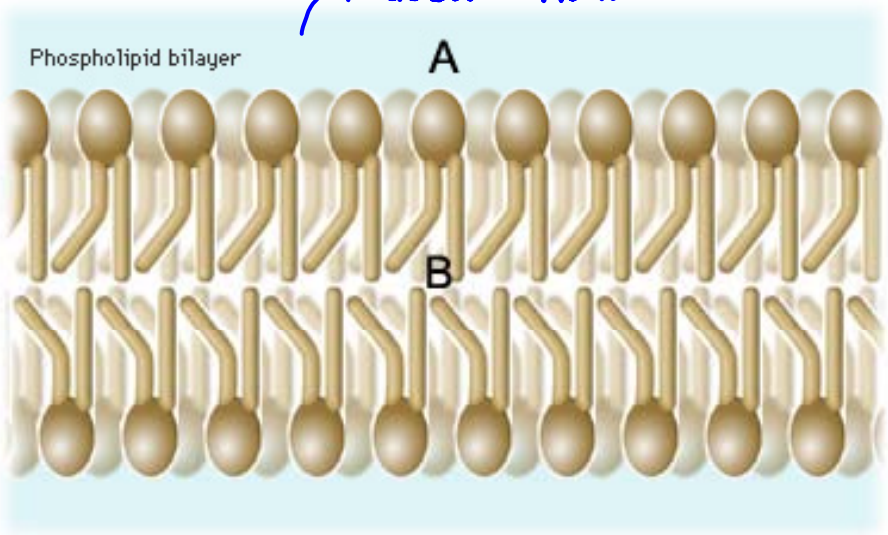
EDTA: Ethylenediaminetetraacetic acid.

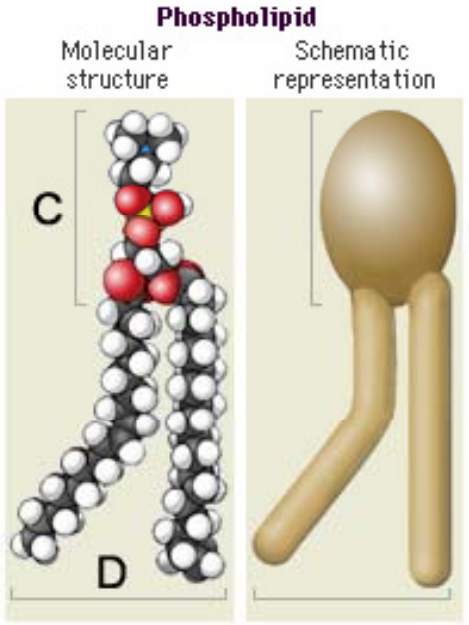
See class web site ... Lead Poisoning

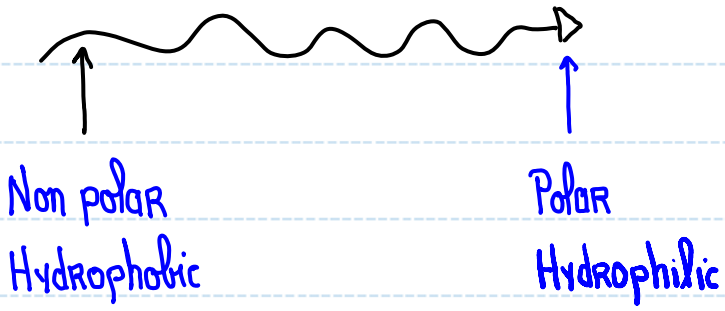




3.11 Consequence of Molecular Polarity

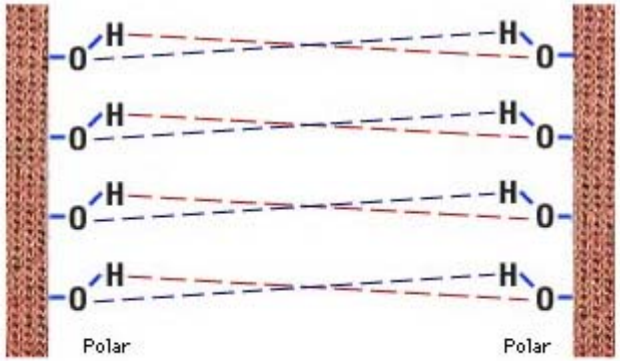


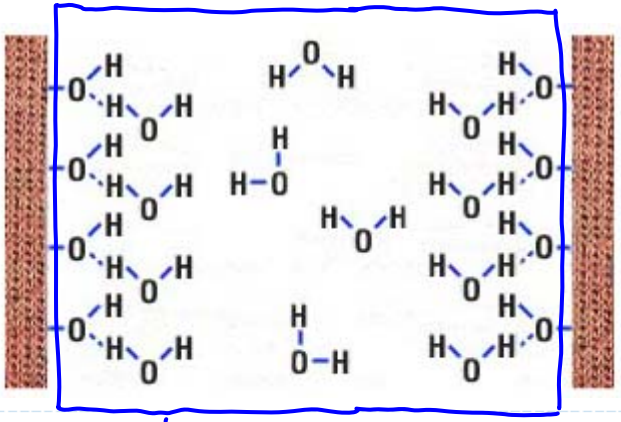




3.11 Consequence of Molecular Polarity

Static cling!

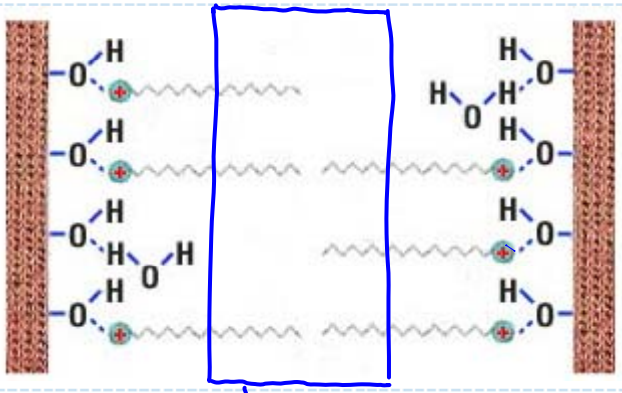




↳ Hydrophilic

Oh so soft!

fabric softner



↳ Hydrophobic