

Announcements – Lecture XVI – Monday, June 17th

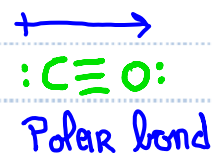
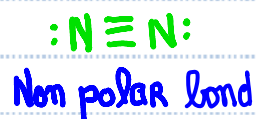
5th LAB: TUE, JUN 18th, 1:30-4:30



8.6 Molecular Polarity

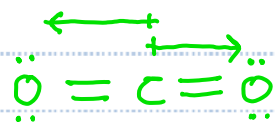
Bond Polarity

POLAR BOND: Is there a difference in electronegativity between the atoms forming the bond? ... yes ... polar bond

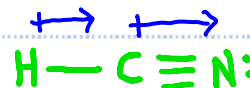


MOLECULAR POLARITY:

\sum Polar bonds (vector sum) = 0 or > 0
Non polar or Polar



$\Sigma = 0$
Non polar

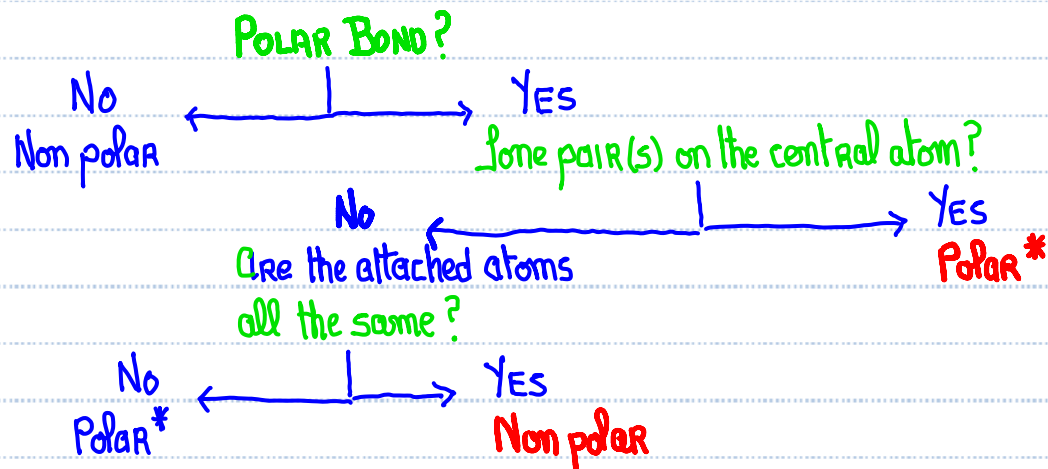


$\Sigma > 0$
Polar

8.6 Molecular Polarity

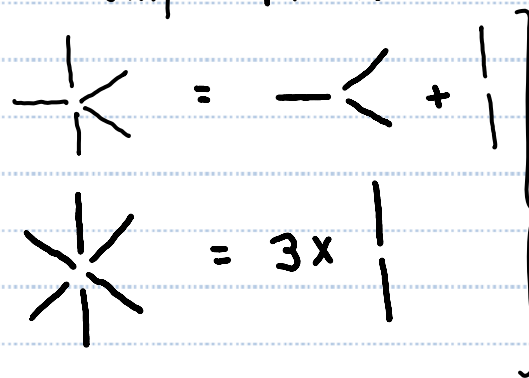
A: Molecular Polarity

With regards to the Lewis Structure:



* True if the Electron Pair Geometry is ... Linear, Trigonal planar, or Tetrahedron

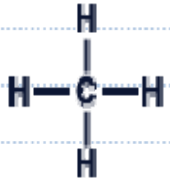
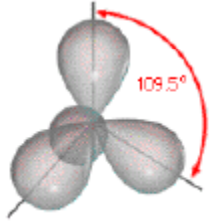
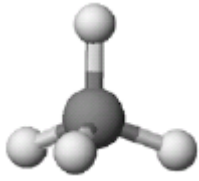
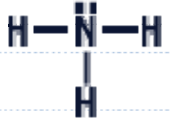
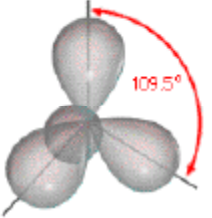


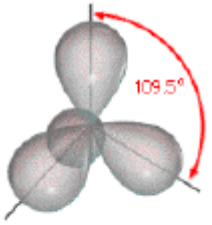
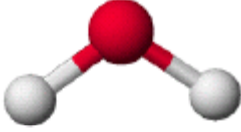
The Electron Pair Geometries ... Trigonal bipyramid and the Octahedron can be considered non unique structures:



These may require a closer look to determine whether they are polar or nonpolar.

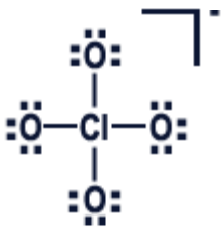
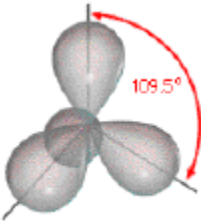
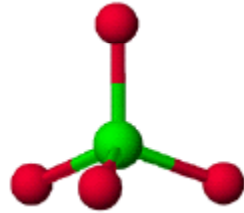
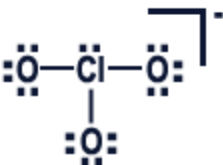
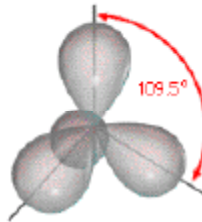
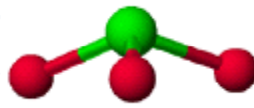
8.6 Molecular Polarity

A: Molecular Polarity -- Tetrahedron

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Polarity
CH_4 	AX_4E_0	 <p>Tetrahedron</p>	 <p>Tetrahedron</p>	Non polar
NH_3 	AX_3E_1	 <p>Tetrahedron</p>	 <p>Trigonal pyramid</p>	Polar
H_2O 	AX_2E_2	 <p>Tetrahedron</p>	 <p>Bent/Angular 109°</p>	Polar

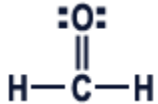
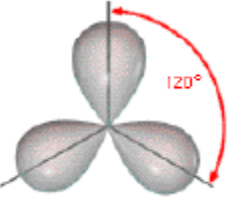
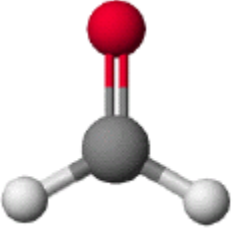
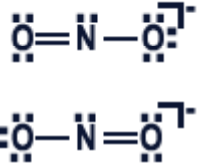
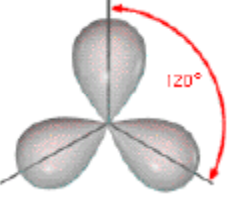
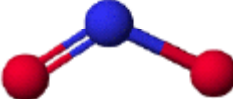
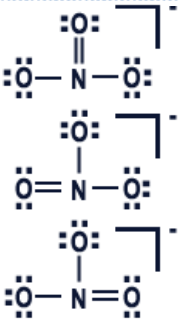
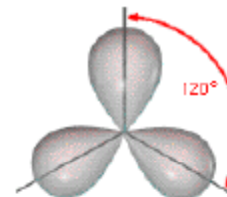
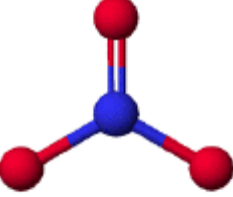
8.6 Molecular Polarity

A: Molecular Polarity – Tetrahedron

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Polarity
ClO_4^- 	AX_4E_0	 <p>Tetrahedron</p>	 <p>Tetrahedron</p>	Non polar
ClO_3^- 	AX_3E_1	 <p>Tetrahedron</p>	 <p>Trigonal pyramid</p>	Polar

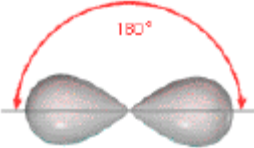

8.6 Molecular Polarity

A: Molecular Polarity – Trigonal Planar

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Polarity
H_2CO 	AX_3E_0	 <p>Trigonal Planar</p>	 <p>Trigonal Planar</p>	Polar
NO_2^- 	AX_2E_1	 <p>Trigonal Planar</p>	 <p>Bent/Angular 120°</p>	Polar
NO_3^- 	AX_3E_0	 <p>Trigonal Planar</p>	 <p>Trigonal Planar</p>	Non polar


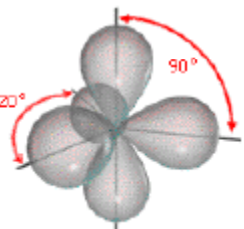

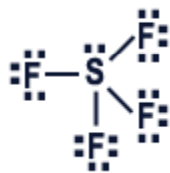
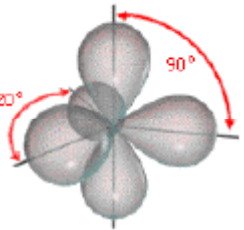

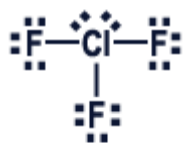
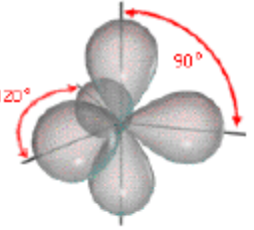
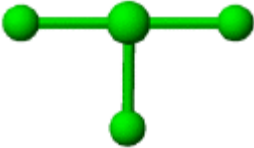
8.6 Molecular Polarity

A: Molecular Polarity – Linear

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Polarity
<p>HCN</p> <p>$\text{H}-\text{C}\equiv\text{N}:$</p>	AX_2E_0	 <p>Linear</p>	 <p>Linear</p>	Polar


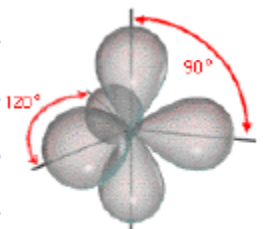

8.6 Molecular Polarity

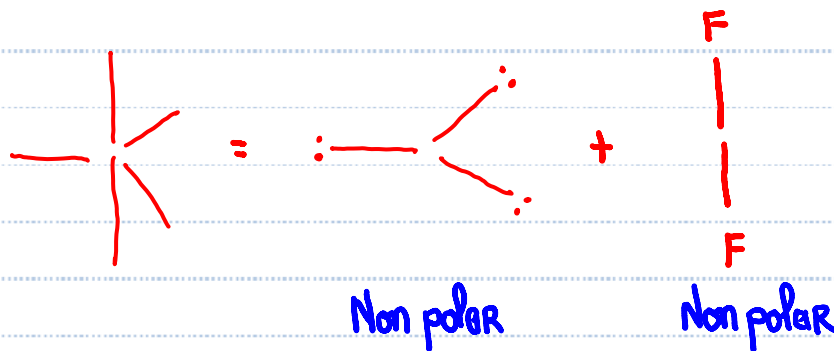
A: Molecular Polarity – Trigonal Bipyramid

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Polarity
PF_5 	AX_5E_0	 <p>Trigonal Bipyramid</p>	 <p>Trigonal Bipyramid</p>	Non polar
SF_4 	AX_4E_1	 <p>Trigonal Bipyramid</p>	 <p>Seesaw</p>	Polar
ClF_3 	AX_3E_2	 <p>Trigonal Bipyramid</p>	 <p>T-shaped</p>	Polar

8.6 Molecular Polarity


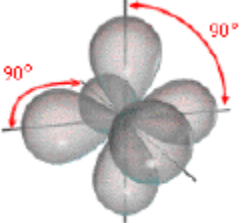
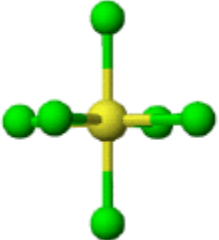
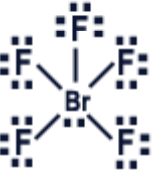
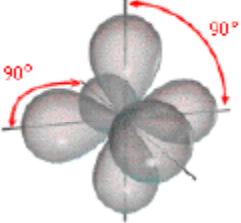
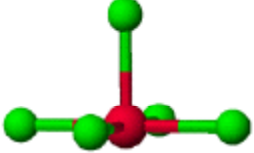

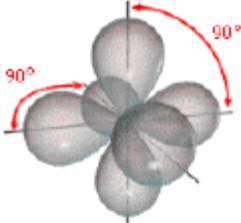

A: Molecular Polarity – Trigonal Bipyramid

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Polarity
XeF_2 	AX_2E_3	 Trigonal Bipyramid	 Linear	Non polar!



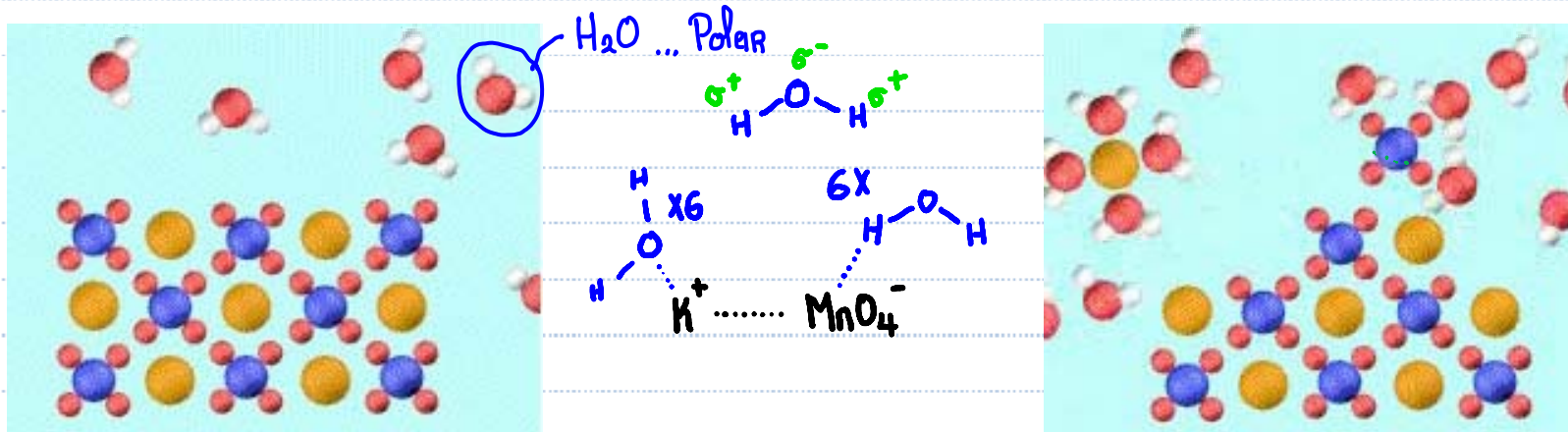
8.6 Molecular Polarity

A: Molecular Polarity – Octahedron

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Polarity
SF_6 	AX_6E_0	 Octahedron	 Octahedron	Non polar
BrF_5 	AX_5E_1	 Octahedron	 Square Pyramid	Polar
XeF_4 	AX_4E_2	 Octahedron	 Square Planar	Non polar!

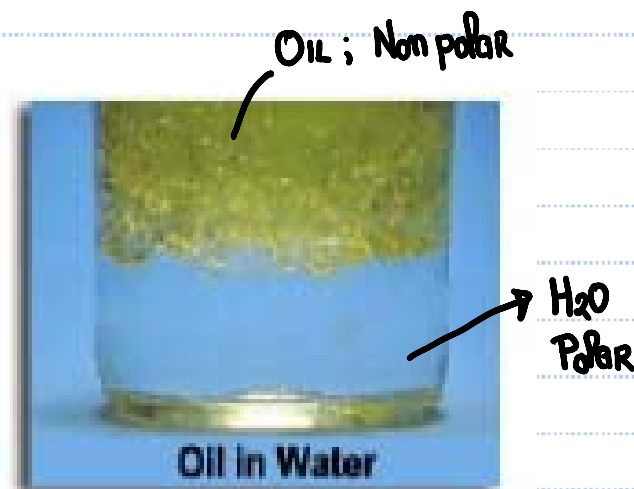
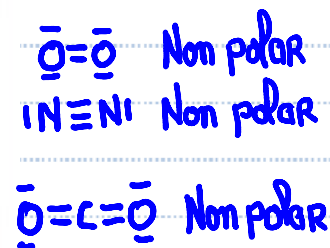
8.6 Molecular Polarity

Some Consequences of Molecular Polarity -- Solubility



Solubility of Some Common Substances		
Compound	Solubility in H_2O g/100mL	
NaCl	35.7	0°C
O ₂	4.5x10 ⁻³	18°C
N ₂	2.0x10 ⁻³	18°C
NH ₃	89.5	0°C
CO ₂	0.179	18°C
HCl	72.1	20°C

POLAR



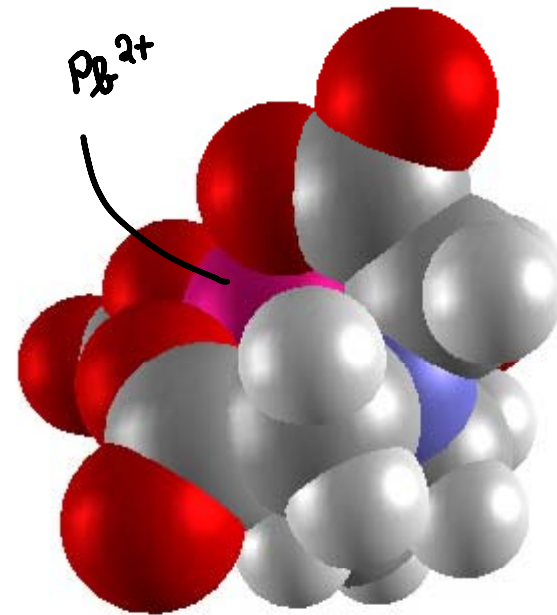
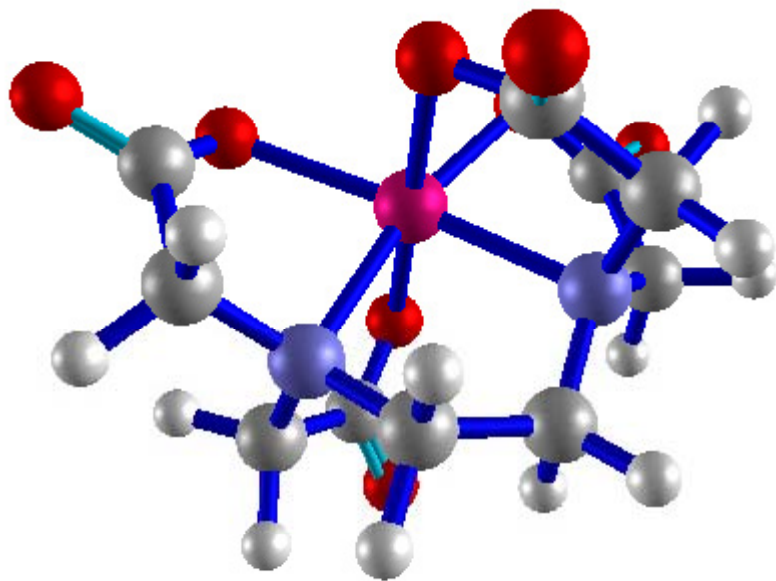
"like dissolves like"

8.6 Molecular Polarity

Some Consequences of Molecular Polarity – Chelating Agents

Salad dressings ... lead poisoning ... Chelating therapy

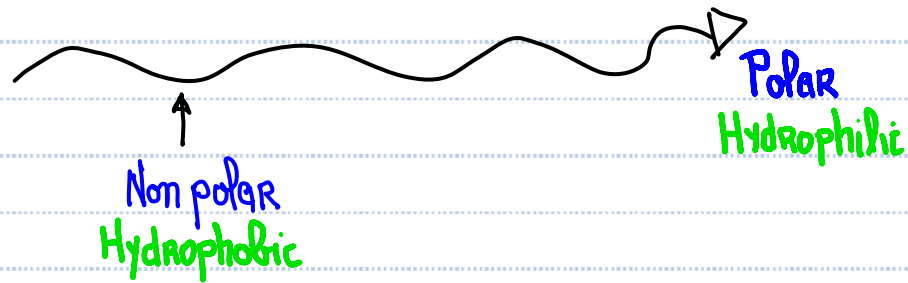
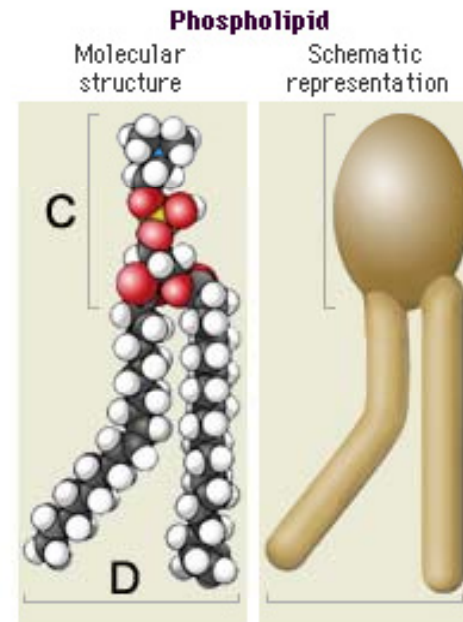
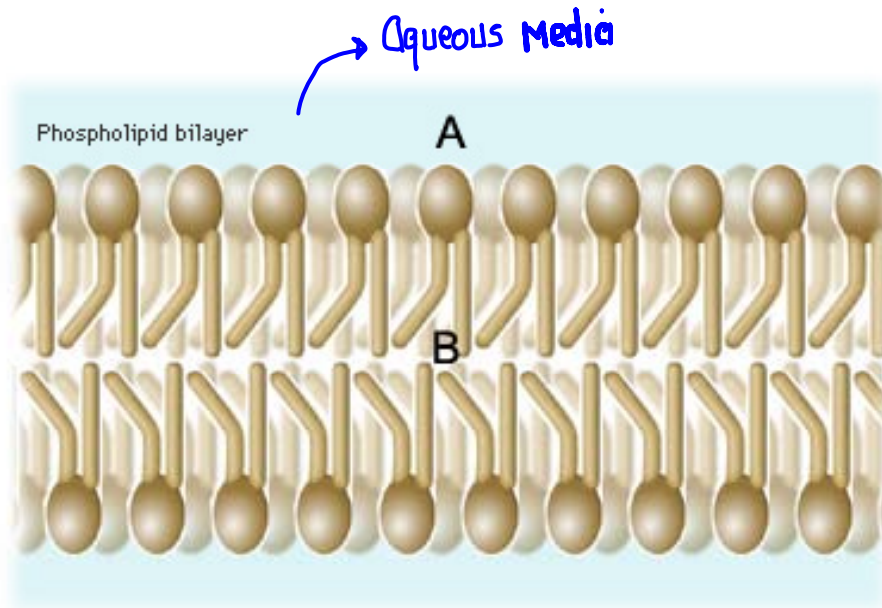
EDTA: ethylenediaminetetraacetic acid



8.6

Molecular Polarity

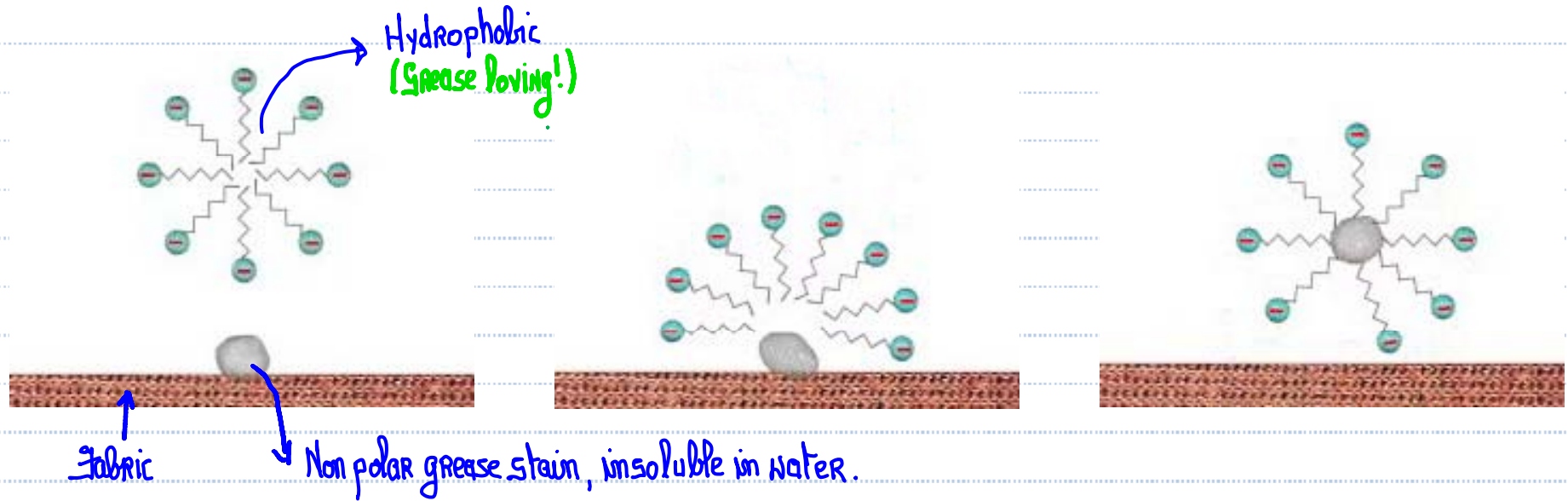
Some Consequences of Molecular Polarity -- Membranes



8.6

Molecular Polarity

Some Consequences of Molecular Polarity – Detergents

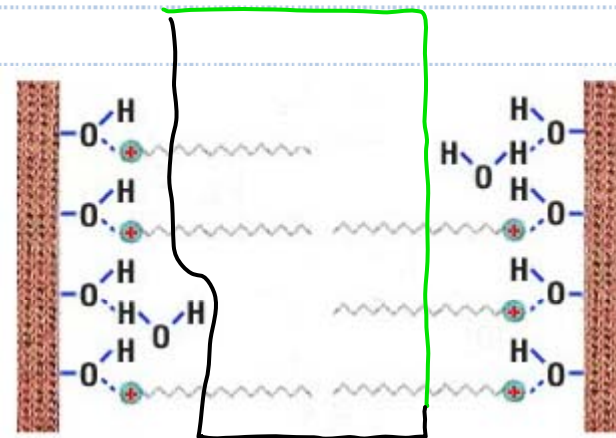
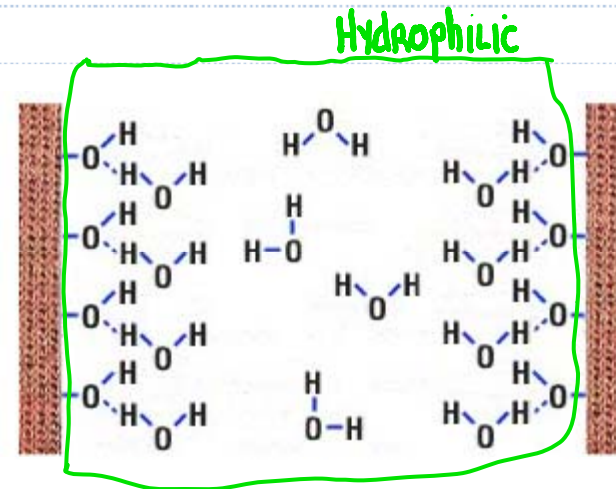
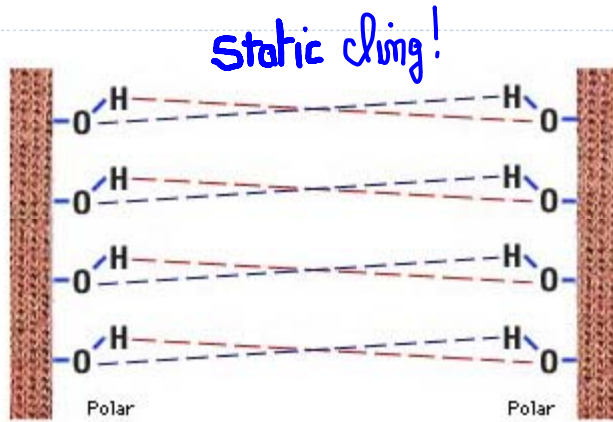


How might the reverse of this process be of use in medicine?

8.6

Molecular Polarity

Some Consequences of Molecular Polarity – Fabric Softener



We use lotions for ?