CONCEPT: PROPERTIES OF WATER

●Water (H_2O): *polar*, *bent* molecule with two _____ covalent bonds & two _____-_____ of electrons.

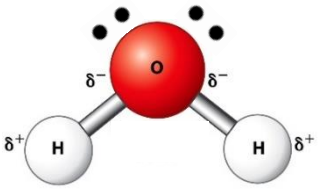
□ Each H_2O forms up to ____ hydrogen bonds with neighboring molecules.

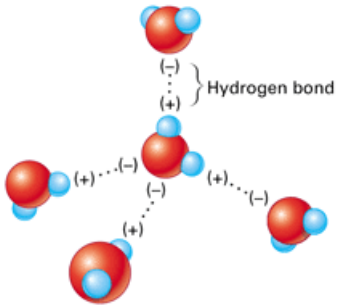
●Abundance & strength of _____ bonds in water accounts for many of its unique properties:

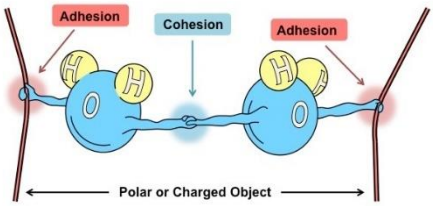
□ ____ boiling point □ ____ Heat Capacity □ ____ density of solid ice (crystal formation)

□ ____ melting point □ ____ Heat of Vaporization □ Strong surface tension (*cohesion* + adhesion)

EXAMPLE:







Solubility

●*Solubility*: the property of a _____ to be dissolved by a *solvent*.

●H_2O is the biological solvent that interacts with other polar substances & dissolves _____.

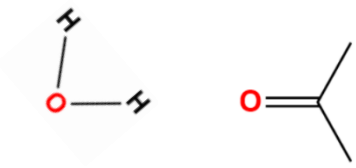
□ *Electrolytes*: molecules that dissociate to form ions & form dipole-dipole interactions with H_2O.

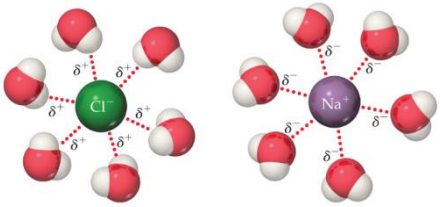
□ _____ electrolytes have a shell/layer of H_2O molecules surrounding them (*hydration shell*).

●Water has a high _____ constant.

□ H_2O is perfect for dissolving proteins, carbohydrates, & nucleic acids (but not _____).

EXAMPLE:





Water vs. Methane

●Compare H_2O to a molecule of similar molecular weight & size, methane (CH_4):

Water	Methane
1) Chemical Formula: H_2O	1) Chemical Formula: CH_4
2) Molar Mass: _____ g/mole	2) Molar Mass: 16.04 g/mole
3) Boiling Point: _____°C	3) Boiling Point: -161.5°C
4) Melting Point: _____°C	4) Melting Point: -182°C
5) Heat Capacity: 4.186 joules/g*K	5) Heat Capacity: 2.19 joules/g*K
6) Heat of Vaporization: 40.7 kJ/mole	6) Heat of Vaporization: 8.19 kJ/mole
7) Liquid Density (0°C): _____ g/mL	7) Liquid Density (-162°C): 0.42 g/mL
8) Solid Ice Density (0°C): 0.92 g/mL	8) Solid Density (-253°C): 0.52 g/mL
9) Dielectric Constant (25°C): 80	9) Dielectric Constant (25°C): 1.7

CONCEPT: PROPERTIES OF WATER

PRACTICE: Water stuck to the glass window shield of a car is an example of what?

a) High Surface Tension
b) Adhesion
c) Cohesion
d) High Heat Capacity

PRACTICE: Rank the following compounds according to increasing water solubility:

i) CH_3-CH_2-CH_2-CH_3
ii) CH_3-CH_2-O-CH_2-CH_3
iii) CH_3-CH_2-OH
iv) CH_3-OH

a) i < iii < iv < ii
b) i < ii < iv < iii
c) iii < iv < ii < i
d) i < ii < iii < iv
e) None of the above are correct.