

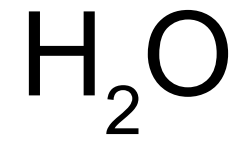
# Announcements

To join clicker to class today  
(Clickers with LCD display  
join automatically):

- Turn on the Clicker (the red LED comes on).
- Push “Join” button followed by “20” followed by the “Send” button (switches to flashing green LED if successful).
- Will start last section on Wednesday.
- Suggested reading and problems will be e-mailed to you.
- Last exam 1 week from Friday.
- Discussion quiz this week will cover everything since last exam through today's lecture.
- Next week you will have an analytical reasoning quiz in discussion.

# Review

- Attractions explain properties of liquids (surface tension, meniscus, capillary action, viscosity).
- Properties of liquids determined by intermolecular interactions.
- Ion-ion interactions and Lattice energy:  $U = k(q_1q_2/d)$ 
  - U is energy per mole of formula units (e.g. mole of NaCl or  $\text{CaCl}_2$ , etc)
  - k = a constant that accounts for geometry and the factor of  $N_A$
- Solubility of ionic compounds depends on the balance between the energy released by solvation (hydration) of ions and the energy necessary separate the ions.



Chang Fig. 12.31

Chang Fig. 12.30

# Raoult's Law of Vapor Pressure

- Raoult's Law:  $P_{\text{vap}} = X_{\text{solvent}} P^{\circ}_{\text{solvent}}$ 
  - $P_{\text{vap}}$  = vapor pressure of solvent above the solution
  - $X_{\text{solvent}}$  = mole fraction of solvent particles in the solution
    - note  $n_{\text{tot}} = n_{\text{solv}} + in_{\text{solute}}$  (may include + & - ions)
    - $X_{\text{solvent}} = n_{\text{solv}} / (n_{\text{solv}} + in_{\text{solute}})$
  - $P^{\circ}_{\text{solvent}}$  = vapor pressure of pure solvent at the temperature of interest.
- Implication: increasing non-volatile solute concentration lowers the vapor pressure of the solvent.

# Blocking of evaporation by solute

Chang Fig. 13.9