13.2

a) The oxygen atom of water is associated with the ion
b) The ion-dipole forces between Li+ and water are stronger than the forces between $K^+$ and water because $Li^+$ is a smaller ion, allowing the water molecules to get closer to the ions.

13.3

a) These ionic solid will have different solubilities in water because the strength of the lattice is inversely related to solubility
b) The solid with the lower lattice energy will be more soluble

13.5 Beaker (b) represents a saturated solution, as it represents a solid in contact with its solution, showing that no more solid will dissolve into the solvent.

13.7 Vitamin $B_6$ contains several -OH groups, making it highly polar and, therefore, attractive to polar water molecules. As such, $B_6$ is water soluble. In contrast, vitamin E only has one -OH group. Instead, contains a long non-polar hydrocarbon "tail," making it largely non-polar and, therefore soluble in non-polar fats.

13.14

a) False. NaCl does not dissolve in non polar benzene because benzene doesn't form strong interactions with salt's ions.
b) True
c) True

13.15

a)induced dipole / induced dipole b) hydrogen bonding
c) ion/dipole d) dipole/dipole

13.17 $\Delta H_{soln}$ represents to overall enthalpy change during solution formation. Since exothermic processes tend to happen spontaneously, I expect this salt to be very soluble.

13.23a) This is a supersaturated solution.
b) Adding a seed crystal of solute will cause crystallization to begin. Solutions supersaturate because not enough solute particles with proper alignment exist to allow crystallization to occur. Add the seed crystal provides a surface upon which crystallization can occur.

13.25a) unsaturated b) saturated c) saturated d) unsaturated

13.27

a) Given that glycerol and water both have -OH groups present, I would expect the resulting hydrogen forces to allow glycerol and water to be miscible in all proportions.
b) Glycerol and water exhibit induced dipole and hydrogen forces together.

13.29 Of these solvents, toluene is the best solvent for nonpolar solutes because nonpolar solutes dissolve most readily in nonpolar solvents like highly symmetrical toluene.

13.35

a) False
b) True
c) False
d) True