Water Homework #1 Answers

1. Water molecules are polar because they don't have radial symmetry.
2. The surface of water is said to be like a skin or membrane because the water very strongly hydrogen bonds to itself but not to the air. Most water molecules are hydrogen bonded all around, at the surface they bond unevenly.

3. Surfactants are surface acting agents, or surface active agents, they are molecules that can get between hydrogen bonds at the surface of water, creating gaps, or breaks in the surface tension.
4. Specific heat capacity is specific to the substance, it's a constant. Heat capacity is the ability to transfer heat energy. Two drops of boiling water on your hand is a different experience than two liters of boiling water. Both have the same specific heat capacity but very different heat capacities.

5. $q=mH_V$ q= (5.0g)(2260 J/g) q= 11300 J q= 11,000 J with 2sf = 11 kJ
6. $q=mH_F$ q=(245g)(334 J/g) q= 81830 J q= 81,800 J with 3sf = 81.8 Kj

7. Ionic compounds dissociate in water. Water molecules re-orient towards them, putting the negative oxygen towards the cations, and positive hydrogen towards the anions.

Water HW #2 Answers

1. $q=mH_V$ q=(1001g)(2260 J/g) q= 2,262,260 J q= 2,262,000 J with 4sf = 2262 kJ

2. q=mHF q=(1001g)(334 J/g) q= 334,334 J q= 334,300 J with 4sf = 334.3 kJ

3. $q=mC\Delta T$ q=(1001g)(4.18J/g·K)(15.0 K) q=62762.7 J q=62800 J with 3sf = 62.8 kJ

4. Liquid water has many hydrogen bonds but enough kinetic energy to keep those molecules moving anyway. Solid water is so cold, has such low kinetic energy that these hydrogen bonds are now strong enough to hold the water molecules in 6 molecule rings, forming ice, which because of the space between the 6 molecules, is now less dense than the liquid. More rarely 4-12 molecule rings can form, but six molecules is "normal" for ice rings.

5. A. unsaturated, 100 mL H_2O at 70°C can hold about 62 grams NH_4Cl

   B. 100 mL H_2O at 90°C can hold about 10 grams NH_3

   C. 100 mL H_2O at 10°C can hold about 80 grams $NaNO_3$

   D. Create the proportion at the proper temperature with the solubility amounts from table G

at 10° $\frac{KI}{H_2O}$	$\frac{135\text{ grams}}{100\text{ mL}}$	$\frac{X\text{ grams}}{50\text{ mL}}$	X = 65.5 grams KI

   E. Do the same sort of set up at the correct temperature, do the cross multiplication to solve the proportion for the new solution size. Just like above in D.

at 60° $\frac{KCl}{H_2O}$	$\frac{45\text{ grams}}{100\text{ mL}}$	$\frac{X\text{ grams}}{2000\text{ mL}}$	100X = 90000 X = 900 g KCl