**Homework #6: Chemistry 1013 Spring 2012**

**Due Friday 9 March in class 15 pts**

**6.1.** We have previously associated salts with the property of melting only at high temperatures. Sodium chloride, for example, melts at ~800 C and boils atr a still higher temperature of ~1475 oC. However, in chapter 4.1, Waldron begins with a discussion about `ionic liquids’ which are salts that are liquid at room temperature and which boil at temperatures as alow as 200 oC. One example she uses is **[bmin]+[PF6]-.**

1. Briefly describe why the latte salt is so much more low melting than NaCl.

*The much greater size of the ions involved lowers the net electrostatic attraction between the cation and anion hence lowering the melting point of* ***[bmin]+[PF6]-.***

1. What is `peculiar’ about the anion PF6 -? 9hint: see Figure 4.2 and count the valence electrons around P.) *6 bonds to P means 12 electrons around which breaks the octet rule*
2. What is one useful, practical application of ionic liquids like **[bmin]+[PF6]-?**

*Can be used to extract heavy metals from contaminated water since it is sufficiently ionic to dissolve metals, but does not easily mix with water.(see pg 128)*

**6.2.** Sketch the interaction between (hint: this is similar to problem 3 on page 160)

1. Mg2+ and water b) PO43- (phosphate anion) and water





**6.3.** Briefly explain the physiological benefits of drinking Gatorade after extreme physical exertion.

*It replaces the fluid and salt therein that is lost when exercise causes you to sweat.*

**6.4** My Big Boy tomatoes reside in upstate soil with ~0.1 grams NaCl/liter soil.

The average salt concentration inside my tomatoes is 0.3 grams NaCl/liter tomato. Given that the tomato cells are semi-permeable to just water, predict whether my tomatoes will shrivel or expand and why (2 pts)

*My tomatoes will swell since their initial salt content is higher than the surround soil, so that water from that source will move into the tomato cells in an attempt to dilute them, causing the cells* *to enlarge. (see pp 143-144 on osmosis)*

**6.6.** pH and pOH problems (see pp 149-153 of text also)

a) What is the pH of an acid solution containing 0.003 M H+? *-log (0.003)=2.52*

b) What is the pOH of the above solution? *14-2.52= 11.48*

c) The pH of blood is ~7.25. What is the concentration of H+ implied by this?

*[H+]= Antilog (-7.25) = 10-7.25 =5.62 \*10-8*

d) The pOH of liquid Drano is 0.1. What is the concentration of OH- implied by this?

*10-0.1  = 0.794 =[OH- ]*