

Inorganic Chemistry

Chapter 7 Homework-DUE Friday Nov. 19, 2010 @ 8 AM

For your own benefit do Chapter 7 Problems: 1-9, 15-17, 23-25, 27-33, 34a, 35

Answer the following on a separate page to turn in for a grade. **Please do your own work.**

1. Absolute hardness can be calculated by the following formula: $\eta = \frac{E_i - E_{ea}}{2}$

Calculate η values for Li^+ and Na^+ . Does the trend make sense with what you'd expect? Explain.

2. What is the order of solubility for the following? Explain the results in terms of hardness and softness. (Hint: seek out K_{sp} values and *cite your source*. Hint#2: you may want to actually solve for the solubility using the K_{sp} value...see CHM 112/321 notes.)



3. Calculate the pK_{a1} , pK_{a2} , and pK_{a3} values for arsenic acid (H_3AsO_4) using Pauling's rules. Look up values in a reputable source (cite your source!). Do you feel the numbers are reasonably close to the experimental values? Explain.

4. Show (i.e., give reaction(s)) why a 1 molar solution of AlCl_3 is acidic in terms of Brønsted acidity.

5. Classify each of the compounds below as an acidic, basic, or amphoteric oxide, then provide chemical reactions for each, backing up your claim.

- (a) sulfur trioxide
- (b) sodium oxide
- (c) indium oxide

6. The most common source of mercury is cinnabar (HgS), whereas Zn and Cd are found as sulfides, carbonates, silicates, and oxides. Why?

7. The values of pK_a for $\text{CH}_3\text{CO}_2\text{H}$ and $\text{CF}_3\text{CO}_2\text{H}$ are 4.75 and 0.23, respectively. Suggest a reason for this difference.

8. Draw the structures of 12-crown-4 and 15-crown-5.

9. A link to a video about the pseudoscience *homeopathy* has been posted on my website. To what degree of dilution do practitioners think is the "optimum" effectiveness for homeopathic remedies? (Give your answer as (a) a power of 10 and (b) a more descriptive mode—use the example explained in the video.) Do you think this dilution factor is ever achieved?