

Chem 370 - Spring, 2019
Assignment 9

Reading Assignment

By now you should have read Chapters 11 and 12. Inasmuch as we will only spend one lecture on the material in Chapter 12, you need not be concerned with the details of transition metal reaction chemistry to the extent presented in the text. The following homework assignment on this material should give you an indication of the expected level of understanding. As previously indicated, read Chapter 8 primarily to supplement my notes on descriptive chemistry. In studying descriptive chemistry, you need to know the balanced equations for all the significant reactions presented in class that pertain to the characteristic chemistries of the main-group elements. On the next test, you will be presented with a number of reactants or names of reactions, for which you will be expected to supply the complete balanced equations. You only will be required to answer a certain number (e.g., 10 of 18) of the presented incomplete reactions, so you need not worry if you cannot remember some of them. Beyond specific reaction equations, you need to acquire a sense of group and periodic trends in reactivity and properties, and their underlying causes. You will be asked to write short essay answers to questions regarding certain of those trends and properties.

Homework Assignment

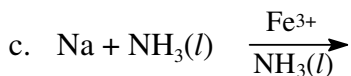
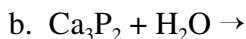
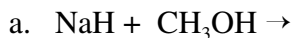
The material in this assignment will be covered on Test 3 (but *not* Test 2). We will review these homework problem in our class session on April 26th.

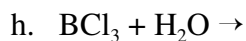
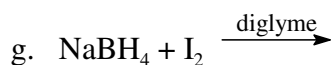
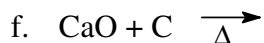
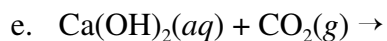
In Chapter 11, do problems 11.11 [11.10], 11.13 [11.11] (Look at Figure 11.8 to estimate the numerical value of Δ_o ; the Orgel diagram can be used instead of the full Tanabe-Sugano diagram to determine which band gives Δ_o), 11.14 (a, b, c only) [11.12 (a, b, c only)], 11.16 [11.14], 11.17 [11.15], 11.23 [11.21], 11.27 [11.25]. [Problem numbers in braces are for the 4th edition.]

In chapter 12, do problems 12.1, 12.2, 12.4, 12.16 (12.15), 12.20 (12.19) [Problem numbers in parentheses are for the 4th edition.]

In chapter 8, do problems 8.1, 8.2, 8.3, 8.5, and 8.9, as well as the problems given below. [The problem numbers are the same in the 4th edition.]

1. Complete and balance the following:





2. Write balanced equations for the following, including any necessary conditions (exact temperatures or pressures are *not* needed).

- The "water-gas shift reaction"
- Cracking of methane to produce hydrogen
- Synthesis of LiAlH_4
- Mg burning in a CO_2 atmosphere
- slaking of lime
- setting of Plaster of Paris
- cyanamide reaction
- Hall process
- Goldschmidt or thermite reaction
- synthesis of B-trichloroborazine

3. Draw structures for the following molecules. Give the point group of the molecule, and note any peculiar bonding features (type of bridge bond, Lewis-base active lone pair, etc.)

- borazine
- solid LiCH_3
- solid BeH_2
- aluminum trichloride
- boric acid