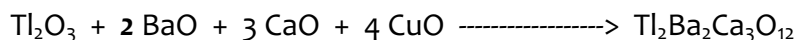# Homework Set 6
*(Distributed 10/12/15; Due on 10/19/16)*

Read Chapters 9 & 10 in Zumdahl and complete the listed questions from the text: Chapter 9: 19, 30, 36, 40, 42, 49; Chapter 10: 23, 42, 44; as well as the following problems:

A. In the production of superconductors, the reaction shown is being studied:

$$Tl_2O_3 + \mathbf{2}\, BaO + 3\, CaO + 4\, CuO \longrightarrow Tl_2Ba_2Ca_3O_{12}$$

What mass of the product can be made using 5.0 g of CaO and the necessary amounts of the other reagents?

B. The Sabatier reaction uses hydrogen gas to generate water on Space stations:

$$CO_2(g) + 4\, H_2(g) \longrightarrow H_2O(l) + CH4(g)$$
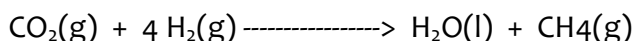
How many grams of water can be made when 2.0 Liters of hydrogen (density = 0.070 g/L) is used?

C. Antacids, such as $CaCO_3$, are used to neutralize excess stomach acid, HCl:

$$CaCO_3 + 2\ HCl \longrightarrow CaCl_2 + CO_2 + H2O$$
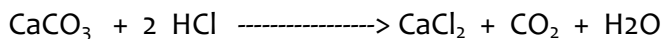
How many grams of HCl are neutralized by 400 mg of $CaCO_3$? How many grams of CO2 is produced?

D. Butane combusts with oxygen to generate carbon dioxide and water. It is a volatile fuel often used in camping stoves:

$$2\ C_4H_{10} + 13\ O_2 \longrightarrow 8\ CO_2 + 10\ H_2O + 5756\ kJoules$$

If 7.0 g of butane in gasoline combusts, how much heat energy is released?