PHYS 321 Chemical Reactions Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Equations of chemical reactions make use of the following:  
a. Conservation of mass and b. Dalton’s law of molar proportions

1. In the Kroll process of making titanium (Ti), titanium tetrachloride (TiCl4) reacts with magnesium (Mg) and forms magnesium chloride (MgCl2) and titanium. How much titanium will be produced, if 200 kg of titanium tetrachloride and 25 kg of magnesium are used?

2. Uranium metal can be produced by the reaction of uranium tetrafluoride (UF4) with magnesium (Mg) in a sealed reactor heated to 700ºC. The by-product is magnesium fluoride (MgF2). To ensure that all the magnesium is consumed in the reaction, the reactor is charged with excess UF4, specifically 10% more than the stoichiometric requirement of the reaction. To produce 222 kg of U, how much UF4 and Mg must be introduced into the reactor? Express your answers in kg.