

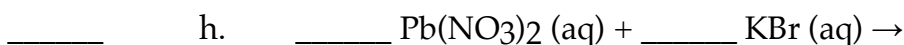
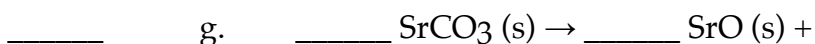
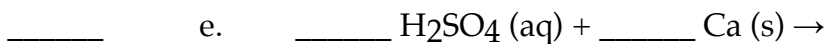
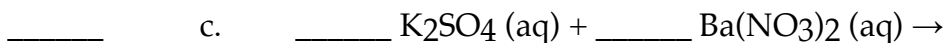
**Exercise 5: Balancing equations and performing stoichiometric calculations**

1. Balance the following reactions



2. **Complete** (by predicting the products) and **balance** each equation. Some of the products are given as a hint, but all of the equations are missing *at least* one product. Then determine the **reaction type**, and, using the key below, fill in the left column with the appropriate letter.

A = combination reaction; B = decomposition reaction; C = combustion reaction;  
D = single replacement (redox) reaction; E = double replacement reaction



All problems are based on the reaction of **magnesium chloride** with **sodium hydroxide**.

3. Predict the **products**.

4. Write a **balanced** chemical equation for the reaction.

5. Calculate the **percent composition** of all the elements in the magnesium-containing product.

6. How many **moles** of **each** product could be formed from 3.72 moles of sodium hydroxide?

7. How many **grams** of **each** product could be formed from 7.32 grams of magnesium chloride?

8. If the reaction is done with 3.72 moles of sodium hydroxide and from 7.32 grams of magnesium chloride, which is the **limiting reactant**?

9. What is the **theoretical yield** of the reaction with the quantities in question 6?

10. The balanced reaction is **endothermic** by 2.2 kJ/mole of magnesium chloride. How much **heat** energy is transferred with the reactant quantities in question 6?

11. Is the heat energy in question 10 **released** or **absorbed**?

12. If the reaction with the quantities in question 8 has a 97% yield, what is the **actual yield**?