

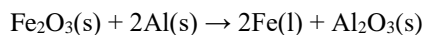
# Exercise 3.10

## Stoichiometry

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Per: \_\_\_\_\_

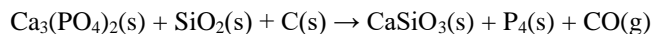
1. Over the years the thermite reaction has been used for welding railroad rails, in incendiary bombs, and to ignite solid-fuel rocket motors. The reaction is:



What masses of iron(III) oxide and aluminum must be used to produce 15.0 g of iron? What is the maximum mass of aluminum oxide that could be produced?

Mass of $\text{Fe}_2\text{O}_3$ : _____
Mass of Al: _____
Mass of $\text{Al}_2\text{O}_3$ : _____

2. Phosphorus can be prepared from calcium phosphate by the following reaction:



a. Balance the equation: \_\_\_\_\_

- b. Phosphorite is a mineral that contains calcium phosphate plus other non-phosphorus-containing compounds. What is the maximum amount of  $\text{P}_4$  that can be produced from 1.0 kg of phosphorite if the phosphorite sample is 75%  $\text{Ca}_3(\text{PO}_4)_2$  by mass?

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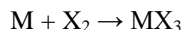
3. A 0.4230 g sample of impure sodium nitrate was heated, converting all the sodium nitrate to 0.2864 g of sodium nitrite and oxygen gas. Determine the percent of sodium nitrate in the original sample.

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4. An element X forms both a dichloride ( $\text{XCl}_2$ ) and a tetrachloride ( $\text{XCl}_4$ ). Treatment of 10.00 g  $\text{XCl}_2$  with excess  $\text{Cl}_2$  forms 12.55 g  $\text{XCl}_4$ . Calculate the atomic mass of X, and identify X.

Atomic mass of X: _____
X ? : _____

5. An ionic compound  $\text{MX}_3$  is prepared according to the following unbalanced chemical equation:



A 0.105 g sample of  $\text{X}_2$  contains  $8.92 \times 10^{20}$  molecules. The compound  $\text{MX}_3$  consists of 54.47% X by mass. What the identities of M and X, and what is the correct name for  $\text{MX}_3$ ?

Formula: _____
Name: _____