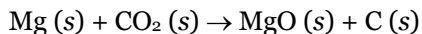
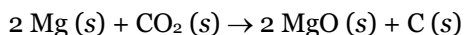


Exercise 01**Name:** _____ **Key**

Consider the unbalanced reaction:

If 15.0 g of Mg reacts with 25.0 g of CO₂, what mass of MgO can be produced?

First, balance the chemical equation:



Second, determine the limiting reactant:

Method 1	Method 2
$15.0 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.31 \text{ g Mg}} = 0.617 \text{ mol Mg}$ $25.0 \text{ g CO}_2 \times \frac{1 \text{ mol CO}_2}{44.01 \text{ g CO}_2} = 0.568 \text{ mol CO}_2$	$15.0 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.31 \text{ g Mg}} \times \frac{2 \text{ mol MgO}}{2 \text{ mol Mg}} = 0.617 \text{ mol MgO}$ $25.0 \text{ g CO}_2 \times \frac{1 \text{ mol CO}_2}{44.01 \text{ g CO}_2} \times \frac{2 \text{ mol MgO}}{1 \text{ mol CO}_2} = 1.14 \text{ mol MgO}$
Method 3	
$15.0 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.31 \text{ g Mg}} \times \frac{1 \text{ mol CO}_2}{2 \text{ mol Mg}} = 0.309 \text{ mol CO}_2$	

Method 1: Expected Mg:CO ₂ = 2:1, but have 1.09:1 Method 2: 15.0 g Mg makes less products than 25.0 g CO ₂ Method 3: Have more CO ₂ than we need	∴ Mg limiting reactant
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Finally, determine the theoretical yield of MgO from the limiting reactant:

$$15.0 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.31 \text{ g Mg}} \times \frac{2 \text{ mol MgO}}{2 \text{ mol Mg}} \times \frac{40.31 \text{ g MgO}}{1 \text{ mol MgO}} = \mathbf{24.9 \text{ g MgO}}$$