

# Stoichiometry Calculations

## Part A

Write balanced chemical equations for the following reactions. These reactions will be the basis for all other questions on this worksheet.

1.  $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$
2.  $\text{Li}_3\text{N} + \text{H}_2\text{O} \rightarrow \text{LiOH} + \text{NH}_3$
3.  $\text{Na}_2\text{CO}_3 + \text{HCl} \rightarrow \text{H}_2\text{O} + \text{CO}_2 + \text{NaCl}$
4. methane ( $\text{CH}_4$ ) burns in air to produce carbon dioxide and water
5. iron (II) sulfide reacts with oxygen to produce iron (III) oxide and sulfur dioxide
6. nitrogen monoxide reacts with oxygen to produce nitrogen dioxide

## Part B: Mole – Mole Calculations

1. How many moles of sulfuric acid are required to react with 23.4 moles of sodium hydroxide?
2. How many moles of each of the products will be formed when 374.56 moles of hydrochloric acid reacts with sodium carbonate?
3. How many moles of iron (II) sulfide are needed to produce 0.67 moles of iron (III) oxide?

## Part C: Mass – Mass Calculations

1. What mass of water is needed to react with 56 g of lithium nitride? How many grams of ammonia ( $\text{NH}_3$ ) will be produced?
2. Suppose you wanted to produce water by burning methane gas (not likely a great idea!). What mass of methane would you need to produce a glass of water (250 g)?
3. You want to produce 6500 g of nitrogen dioxide. How many grams of nitrogen monoxide and how many grams of oxygen will you need?
4. What mass of sulfur dioxide will be produced if you react 67.5 g of iron (II) sulfide with oxygen?

## Part D: Challenge Questions

1. You are trying to make soup while at school...enough to feed the whole student body for a week. However, you forgot the salt. This is not good. You visit the chemistry teacher who just happens to have sodium carbonate and hydrochloric acid on hand. If you normally add one and a half boxes of salt to this much soup and one box contains 1.85 pounds of salt, how many grams of sodium carbonate and hydrochloric acid do you need to borrow from the teacher? (1 kg is 2.2 pounds)
2. The only chemicals you have in your lab are 23 g of sodium hydroxide and enough sulfuric acid to react with it. How many grams of lithium nitride would you need to buy to produce as much  $\text{LiOH}$  as possible?