

Stoichiometry with Gases

STP = "Standard Temperature and Pressure"

Standard Temperature = 273 K

Standard Pressure = 1.00 atm = 101.325 kPa = 760 mm Hg = 760 torr

1 mL = 1 cm³ = 1 cc

Kelvin = Celsius + 273

The Universal Gas Constant R = 8.314 L·kPa/mol·K = 0.0821 L·atm/mol·K = 62.4 L·Torr/moleK

1. Consider the following reaction:



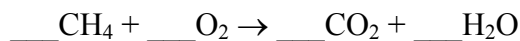
What volume of O₂ can be formed from 100.0 g of HgO at STP?

2. Consider the following reaction:



What mass of KClO₃ is needed to make 5.00L of O₂ at STP?

3. Methane is burned according to the following equation:



What volume of CO₂ at 745 torr and 24°C is collected by burning 25.00 g of CH₄?

4. If 90.0 g of water are decomposed into hydrogen gas and oxygen gas at 25.0°C and standard pressure...
- A) What volume of hydrogen will be produced?
 - B) What volume of oxygen will be produced?
5. Ethane gas, C₂H₆, burns in air and produces carbon dioxide gas and water vapor. Assume all measurements are made at STP.
- A) What volume of carbon dioxide are formed if 12.0 L of ethane are burned?
 - B) How many moles of water vapor are formed?
 - C) How many grams of oxygen gas will be needed?
6. Ammonia gas is formed by the decomposition of NH₄Cl. HCl is the other product.
- A) Write the equation for the chemical reaction.
 - B) What volume of NH₃ forms from 25.0 g of NH₄Cl at STP?
 - C) What volume of HCl forms from 25.0 g of NH₄Cl at STP?
 - D) Why are the answers to B and C are what they are?
 - E) How many grams of NH₄Cl are needed to make 15.0L of NH₃ at 27°C and 0.950 atm?