

WORKSHOP 8

Name: _____

The Ideal Gas Law and Stoichiometry

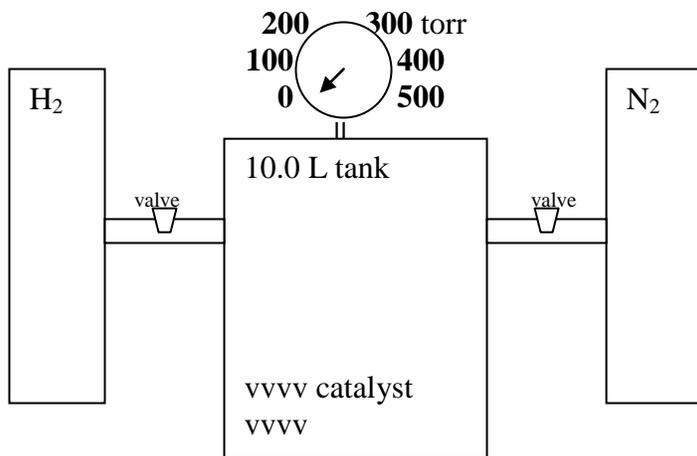
Section _____

$PV = nRT$ 1 mole at STP = 22.4 L recall: moles (n) = g / molar mass

1. 55.0 mL of nitrogen gas at STP weighs how many grams?
2. An unknown gas has a density of 1.12 g/L at STP. What is the molar mass of the unknown gas?
3. What is the molar mass of a gas if 1.070 g of a gas that occupies 264 mL at 100.0°C and 768 torr?
4. Butane gas, C_4H_{10} , reacts with oxygen gas to produce gaseous carbon dioxide and liquid water. Write the balanced equation for this reaction. What volume of CO_2 is produced at STP from 5.00 g O_2 and 10.0 L of butane (at STP)? Identify the limiting reactant.
5. What is the density of dihydrogen sulfide gas on the surface of Venus, where typical conditions are 500°C at a pressure of 90.0 atm?

6. Read about Dalton's Law of Partial Pressures.

A 10.0 L tank with no gas was attached to two tanks, one containing hydrogen gas, and the other nitrogen gas.



When the valve on the right was opened, nitrogen was let into the empty tank until the pressure reached 100 torr. Then the valve was closed, and the valve on the left was opened and just enough hydrogen entered into the tank and mixed with the nitrogen. Under the influence of the catalyst, a reaction produced ammonia at a temperature of 600 K, until the pressure came to a constant value. (All the reactants were consumed, and only ammonia remained.) Assume T is constant.

a) Write an equation for the reaction.

b) After enough hydrogen, sufficient to react with the nitrogen, was let into the tank, what was the total pressure in the tank (before the reaction started)?

c) What was the pressure in the tank after the reaction was finished? (Draw a little arrow on the gauge on the diagram to indicate the pressure after reaction.)