# GAS LAWS PROBLEMS

1.   The volume of a large gas tank, sealed except for the necessary gas fittings, could not be determined by normal calculations because of its irregular shape. A vessel which contains 50.0 L of neon at 25°C and 99.7 kPa was connected to the tank and the valve between them opened, allowing the neon to escape into the larger tank. After distributing itself uniformly through the total volume of the system, the neon pressure was 10.6 kPa. Calculate the volume of the larger tank.

2.   A 2.0 g sample of gas occupies 8.4 L at 20°C and 1.0 atm of pressure.
        A) What is its volume at 91°C and a pressure of $1.013 \cdot 10^5$ kPa?
        B) What is its density at 91°C?

3.   A mole of water vapour at 150°V and 250 kPa occupies 14.1 dm^3. What volume would the mole of water occupy at 0°C and 101.0 kPa?

4.   Calculate the mass of 40.0 L of NO gas at standard conditions.

5.   1.00 g of Mg is dropped into a litre of hydrochloric acid.
        A) Write the balanced chemical equation for the reaction. (Is it a redox Reaction?)
        B) What volume will the evolved hydrogen occupy at STP?

6.   Calculate the average molar mass of air if the density of air is 1.239 g/L at STP.

7.   The hydrogen gas in a 0.002 m^3 steel container at 25C was under a pressure of 405.2 kPa. How many moles of hydrogen were in the cylinder?

8.   If 14.0 g of nitrogen, 0.400 g of hydrogen, and 16.0 g of oxygen are put into a 1.00 L container at 27°C, what is the total pressure? What are the partial pressures of each gas?

9.   When ammonium nitrate in aqueous solution is heated, the following reaction occurs:

$$NH_4^+{}_{(aq)} \quad + \quad NO_2^-{}_{(aq)} \quad \longrightarrow \quad N_{2(g)} \quad + \quad 2H_2O_{(l)}$$
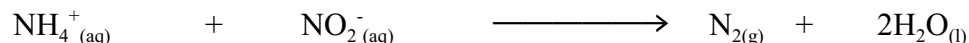
If the nitrogen evolved is collected over water at 23°C and 99.4 kPa total pressure, how much ammonium nitrite would have to react to evolve 2.50 L of wet gas? (Partial pressure of water vapour at 23°C = 2.82 kPa)

10.   In the Haber process, nitrogen and hydrogen are reacted to form ammonia. What volume of hydrogen must react to produce 400 cm^3 of ammonia, assuming both were measured at the same temperature and pressure?