

Exercise #1.4 - Gas Laws

1) A 40-liter cylinder contains methane (CH_4) at a pressure of 15 atmospheres and a temperature of 25°C .

(a) Assuming the gas behaves ideally, how many grams of gas are contained in the cylinder?

(b) If the cylinder is heated to a temperature of 100°C , how much does the pressure increase?

(at wt: $\text{C}=12$; $\text{H}=1$) [392 g; 18.8 atm]

3) Two containers with volumes of 2.079 L and 1.687 L, containing two gasses at pressures of 7.82 atm and 5.90 atm, respectively, are connected. Calculate the partial pressures of the two gases and the final pressure.

[4.32 atm; 2.64 atm; 6.96 atm]

4) A mixture of 12.4 g of N_2 and 12.4 g of O_2 exerts a pressure of 1.23 atm. Calculate the partial pressure of O_2 and N_2 in the mixture.

(at wt $\text{N}=14$, $\text{O}=16$) [$p(\text{N}_2) = 0.66$ atm; $p(\text{O}_2) = 0.57$ atm]

5) Calculate the partial pressure of ammonia and the total pressure in a 1.89 L container containing 1.71 g of a mixture of ammonia and methane, 89.3% methane by weight, at 45°C .

(Molar mass of ammonia = 17 g/mol; Molar mass of methane = 16 g/mol) [0.15 atm; 1.48 atm]