

Gases: exercises

1. A gas occupies 80 L when the pressure exerted is 2 atm. Calculate the pressure needed to decrease the volume to 10 L. Suppose that the temperature and the amount of matter remain unchanged.

Answer: $P=16$ atm

2. 50 mL of a gas are heated from 300 K to 400 K and the pressure changes from 100.000 Pa (initial) to 220.000 Pa (final). Calculate the final volume of that gas.

Answer: $V=30,3$ mL

3. Calculate the volume that occupies 100 g of butane in STP conditions. ($M=58$ g/mol).

Answer: $V=38,5$ L

4. In a container of 10 L of capacity we have hydrogen under the following conditions: the pressure is 2 atm and the temperature is 50 °C. Calculate how many moles of carbon dioxide we need to add to have a total pressure of 3 atm.

Answer: $n=0,38$ mol

5. In a container of 0.01 m³ of capacity we have the following components: 26 g of carbon dioxide and 2.5 moles of oxygen, O₂. The temperature is 30 °C. Calculate the partial pressures and the total pressure.

Atomic weights: C=12; O=16

Answers: 6.21 atm; 1.47 atm; 7.68 atm

6. Calculate the mass of methane, CH₄ gas, that we need to add to 100 g of carbon dioxide, CO₂, to have a gas mixture that occupies a volume of 80 L under the conditions of 2 atm of pressure and a temperature of 300 K. Calculate the density of the gas mixture.

Atomic weights: C=12, H=1, O=16

Answers: 67,68 g; 2,1 g/L