A reservoir of volume 5 liters contains oxygen at N.T.P what is the mass of oxygen which should be pumped to the reservoir to raise the pressure to 4000,000 Pascal without changing the temperature, given that the molecular weight of oxygen is 32.

$$V = 5 \cdot 10^{-3} m^3, P_1 = 1.01 \cdot 10^5 Pa, T = 273K, P_2 = 4000000 Pa = 4 \cdot 10^6 Pa,$$

$$M = 32 \cdot 10^{-3} \frac{kg}{mol}, R = 8.31 \frac{J}{kg \cdot K};$$

$$\Delta m - ?$$

Clapeyron Equation:

$$P_1 V = \frac{m_1}{M} RT;$$

Clapeyron Equation after pumping to the reservoir same mass of oxygen:

$$P_2 V = \frac{m_2}{M} RT;$$

$$(P_2 - P_1)V = \frac{RT}{M}(m_2 - m_1);$$

$$\Delta m = m_2 - m_1;$$

$$\Delta m = \frac{(P_2 - P_1)VM}{RT}.$$

$$\Delta m = \frac{(4 \cdot 10^6 - 1.01 \cdot 10^5)5 \cdot 10^{-3} \cdot 32 \cdot 10^{-3}}{8.31 \cdot 273} = 0.27(kg).$$

Answer:

$$\Delta m = 0.27 kg.$$