

Problem 1.9

What is the volume of one mole of air, at room temperature and 1 atm pressure?

Solution

Air at room temperature and atmospheric pressure obeys the ideal gas law.

$$PV = nRT$$

Divide both sides by P to solve for V . Note that room temperature is 25°C, or 298.15 K.

$$V = \frac{nRT}{P} = \frac{(1 \text{ mol}) \left(0.0821 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}\right) (298.15 \text{ K})}{1 \text{ atm}} \approx 24.5 \text{ L}$$