

Solve the following problems. Write the numerical answer on the blank space provided. Please show your work.

1. Calculate the number of moles of argon gas in sealed pressurized container at 170 K. The pressure is 10 bar and the volume is 10 L.

Solution:

$$n = \frac{PV}{RT} = \frac{(10^6 \text{ Pa})(0.01 \text{ m}^3)}{(8.31 \text{ J/mol}\cdot\text{K})(170 \text{ K})} \approx 7$$

Answer 7 moles

2. Calculate the molar kinetic energy of the argon atoms at 170 K.

Solution:

$$E = \frac{3}{2}RT = (1.5)(8.31 \text{ J/mol}\cdot\text{K})(170 \text{ K}) = 2120 \text{ J/mol} = 2.12 \text{ kJ/mol}$$

Answer 2120 J/mol

3. Calculate the pressure of a cubic lead brick that has a mass of 11.34 kg. and dimensions of 0.1 m x 0.1 m x 0.1 m.

Solution: Don't be fooled by the fact that we gave you the dimensions of volume. For the pressure calculation you need the area. Fortunately, no matter how you place the cube on the ground the area is the same  $A = 0.1 \text{ m} \times 0.1 \text{ m} = 0.01 \text{ m}^2$ .

$$P = \frac{F}{A} = \frac{(11.34 \text{ kg})(9.8 \text{ m/s}^2)}{0.01 \text{ m}^2} = 1.1 \times 10^4 \text{ Pa} \approx 0.11 \text{ atm}$$

Answer 0.11 atm