

- Many gases are available for use in compressed gas cylinders, in which they are stored at high pressures. Calculate the mass of oxygen gas that can be stored at 20 °C and 170 atm pressure in a cylinder with a volume of 60.0 L.

Using the ideal gas law, $PV = nRT$, the number of moles that can be stored is:

$$n = \frac{PV}{RT} = \frac{(170) \times (60.0)}{(0.08206) \times (20 + 273)} = 424 \text{ mol}$$

As the molar mass of O_2 is $(2 \times 16.00) = 32.00$, this corresponds to a mass of:

$$\text{mass} = \text{number of moles} \times \text{molar mass} = 424 \times 32.00 = 13600 \text{ g} = 13.6 \text{ kg}$$

Answer: 13.6 kg