

Answer on Question #83646, Chemistry / General Chemistry

A commercial gas cylinder contains 75.0L of He at 15 bar pressure. Assuming ideal gas behaviour for isothermal expansion, how many 3.0L balloons at 1.1bar pressure can be filled by the gas in the cylinder ?

Solution

According to Boyle's Law:

The product of pressure and volume is a constant for a given mass of confined gas and this holds as long as the temperature is constant.

$$P_1V_1 = P_2V_2$$

Find the volume that gas from the cylinder would occupy at 1.1 bar:

$$V_2 = \frac{P_1V_1}{P_2};$$

$$V_2 = \frac{75 \times 15}{1.1} = 1022.7 \text{ (L)}$$

$$N(\text{balloons}) = \frac{1022.7}{3} = \mathbf{340.9}$$

Answer

340 balloons can be filled by the gas in cylinder.

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