

## Answer on Question #43563 - Chemistry - Physical Chemistry

### Question:

What would be the volume of 76 g of fluorine gas ( molar mass equal to 38 g/mol) at a pressure of 0.821 atm and a temperature of 27 degree Celsius?

- a) 30L
- b) 60 L
- c) 90 L
- d) 600 L

### Answer:

The ideal gas equation is:

$$PV = nRT$$

where **P** is the absolute pressure (atm), **V** is the volume of gas (L), **n** is number of moles of F<sub>2</sub>, **T** is the thermodynamic temperature (K), R is the gas constant with value  $0.0821 \frac{\text{L atm}}{\text{mol K}}$ .

$$n = \frac{m}{M}$$

where *m* – is mass of F<sub>2</sub>, *M* – is molecular mass of F<sub>2</sub> and it is 38 g/mol.

Then

$$V = \frac{nRT}{P} = \frac{mRT}{MP}$$

$$V = \frac{76 \text{ g} * 0.0821 \frac{\text{L atm}}{\text{mol K}} * (273+27) \text{ K}}{38 \frac{\text{g}}{\text{mol}} * 0.821 \text{ atm}} = 60 \text{ L}$$

**Answer:** b) 60 L