Ideal Gas Law

$$PV = nRT$$

P = pressure (atm)
V = volume (L)
n = # mol (mol)
T = temperature (K)

R = ideal gas constant

$R = .08206 \frac{L \cdot atm}{mol \cdot K}$

(Ex) 1.33 mol of oxygen gas exerts .850 atm of pressure at 11.0°C. What is the volume of the gas?

$PV = nRT$

$P = .850\ atm$
$V = ?$
$n = 1.33\ mol$
$R = .08206 \frac{L\,atm}{mol\,K}$
$T = 11.0°C$
$+273$
$284\ K$

$\frac{(.850\ atm)V}{.850\ atm} = \frac{(1.33\ mol)(.08206 \frac{L\,atm}{mol\,K})(284\ K)}{.850\ atm}$

$V = 36.5\ L$

(Ex) .8765 mol of helium gas occupies 2.006 L of space at a pressure of 700.0 torr. What is the temperature of the helium gas?

$PV = nRT$

1 atm = 760 torr

$P = 700.0\ torr \left| \frac{1\ atm}{760\ torr} \right. = .9211\ atm$
$V = 2.006\ L$
$n = .8765\ mol$
$R = .08206 \frac{L\,atm}{mol\,K}$
$T = ?$

$\frac{(.9211\ atm)(2.006\ L)}{[(.8765\ mol)(.08206 \frac{L\,atm}{mol\,K})](.8765\ mol)(.08206 \frac{L\,atm}{mol\,K})} = \frac{(.8765\ mol)(.08206 \frac{L\,atm}{mol\,K})T}{[(.8765\ mol)(.08206 \frac{L\,atm}{mol\,K})](.8765\ mol)(.08206 \frac{L\,atm}{mol\,K})}$

$25.69\ K = T$

(Ex) 25.00g of fluorine gas fills a .750L container at 30.0°C. What is the pressure in the container?

$PV = nRT$

$P = ?$
$V = .750\,L$
$n = 25.00\,g\,F_2 = .6579\,mol$
$R = .08206 \frac{L\,atm}{mol\,K}$
$T = 30.0°C + 273 = 303\,K$

$25.00\,g\,F_2 \left| \frac{1\,mol}{38.00\,g} \right. = .6579\,mol$

MM $2 \times 19.00\,g = 38.00\,g$

$\frac{P(.750L)}{.750L} = \frac{(.6579\,mol)(.08206 \frac{L\,atm}{mol\,K})(303K)}{.750L}$

$P = 21.8\ atm$