Ideal Gas Law Problems

How many moles of gas are contained in 890.0 mL at 21.0 °C and 750.0 mm Hg pressure?

$\frac{750\ mm\ Hg}{760\ mm\ Hg} \times \frac{1\ atm}{} = 0.98\ atm$

$P = 0.98$, $V = .890\ L$, $n = ?$, $R = 0.0821$, $T = 294$

$0.98(.890) = n(0.0821)(294)$

$n = \frac{0.98(.890)}{(0.0821)(294)} =$

$n = 0.036\ mol$

1.09 g of H_2 is contained in a 2.00 L container at 20.0 °C. What is the pressure in this container in mm Hg?

$\frac{1.09\ g\ H_2}{2\ g\ H_2} \times \frac{1\ mol\ H_2}{} = 0.545\ mol\ H_2$

$P = ?$, $V = 2$, $n = 0.545\ mol$, $R = 0.0821$, $T = 293\ K$

$P(2) = 0.545(0.0821)(293)$

$P = \frac{0.545(0.0821)(293)}{2} = 6.56\ atm$

K Atm

* Calculate the volume 3.00 moles of a gas will occupy at 24.0 °C and 762.4 mm Hg.

$P = 762.4\ mm\ Hg$, $V = ?$, $n = 3.00$, $T = 24°C + 273 = 297\ K$

$\frac{762.4\ mm\ Hg}{760\ mm\ Hg} \times \frac{1\ Atm}{} = 1.0003$ (1 atm)

$1V = 3(0.0821)(297)$

$V = 73.15\ L$

What volume will 20.0 g of Argon occupy at STP?

$\frac{20.0\ g\ Ag}{40\ g} \times \frac{1\ mol\ Ag}{1\ mol\ Ag} \times \frac{22.4\ L}{} = 11.2\ L\ Ag$

How many moles of gas would be present in a gas trapped within a 100.0 mL vessel at 25.0 °C at a pressure of 2.50 atmospheres?

$P = 2.50$, $V = .100\ L$, $n = ?$, $R = 0.0821$, $T = 298$

$2.5(0.100) = n(0.0821)(298)$

$n = \frac{2.5(.1)}{.0821(298)} = 0.01\ mol$

How many moles of a gas would be present in a gas trapped within a 37.0 liter vessel at 80.00 °C at a pressure of 2.50 atm?

$P = 2.50$, $V = 37.0$, $n = ?$, $R = 0.0821$, $T = 353$

$2.5(37) = n(0.0821)(353)$

$n = \frac{2.5(37)}{0.0821(353)} = 3.19\ mol$

If the number of moles of a gas are doubled at the same temperature and pressure, will the volume increase or decrease?

Volume of gas will also double.

What volume will 1.27 moles of helium gas occupy at STP?

$P = 1$, $V = ?$, $n = 1.27$, $R = 0.0821$, $T = 273$

$1V = 1.27(0.0821)(273)$

$= 28.46\ L$