PV=nRT Worksheet

Name Key :)
Period
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R= 62.4 L mm Hg/ mol °K, R= 0.0821 L atm/ mol °K, R= 8.314 L kPa/ mol °K

1. At what temperature (in degrees Celsius) will 50.125 g of C02 occupy 35.0 liters at a pressure of 800 mm Hg?

$n = 50.125\ g\ CO_2 \left| \frac{1\ mol\ CO_2}{44\ g\ CO_2} \right. = 1.1392\ mol\ CO_2$

$P = 800\ mm\ Hg$

$V = 35\ L$

$R = 64.4\ \frac{L \cdot mm\ Hg}{mol \cdot K}$

$T = \frac{PV}{nR}$

$T = \frac{(800\ mm\ Hg)(35\ L)}{(1.1392\ mol\ CO_2)(62.4\ \frac{L \cdot mm\ Hg}{mol \cdot K})}$

$T = 393.89\ K$

-273

$T = 120.89°C$

2. What pressure will cause 25.0 g. of NH3 to occupy 30.0 liters when the temperature is 25°C?

$V = 30\ L$

$n = 25.0\ g\ NH_3 \left| \frac{1\ mol\ NH_3}{17\ g\ NH_3} \right. = 1.47059\ mol\ NH_3$

$R = 0.0821\ \frac{L \cdot atm}{mol \cdot K}$

$T = 25°C + 273 = 298K$

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

$P = \frac{(1.47059\ mol\ NH_3)(0.0821\ \frac{L \cdot atm}{mol \cdot K})(298K)}{30\ L}$

$P = 1.199\ atm$ or $911.47\ mm\ Hg$

3. What volume is occupied by 125.6 g. of S02 gas at a temperature of 20°C and a pressure of 650 mm Hg?

$n = 125.6\ g\ SO_2 \left| \frac{1\ mol\ SO_2}{64\ g\ SO_2} \right. = 1.9625\ mol\ SO_2$

$R = 62.4\ \frac{L \cdot mm\ Hg}{mol \cdot K}$

$T = 20°C + 273 = 293K$

$P = 650\ mm\ Hg$

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

$V = \frac{(1.9625\ mol\ SO_2)(62.4\ \frac{L \cdot mm\ Hg}{mol \cdot K})(293K)}{650\ mm\ Hg}$

$V = 55.20\ L$

4. At what temperature (°C) will 18.5 g of N2 occupy 25.6 liters at a pressure of 550 mm Hg?

$n = 18.5\ g\ N_2 \left| \frac{1\ mol\ N_2}{28\ g\ N_2} \right. = 0.6607\ mol\ N_2$

$V = 25.6\ L$

$P = 550\ mm\ Hg$

$R = 62.4\ \frac{L \cdot mm\ Hg}{mol \cdot K}$

$T = \frac{PV}{nR}$

$T = \frac{(550\ mm\ Hg)(25.6\ L)}{(0.6607\ mol)(62.4\ \frac{L \cdot mm\ Hg}{mol \cdot K})}$

$T = 341.52\ K$

-273

$T = 68.52°C$

5. What pressure will cause 45.6g of CH4 to occupy 65.0 liters at 15°C?

$n = 45.6\ g\ CH_4 \left| \frac{1\ mol\ CH_4}{16\ g\ CH_4} \right. = 2.85\ mol\ CH_4$

$V = 65\ L$

$T = 15°C + 273 = 288K$

$R = 62.4\ \frac{L \cdot mm\ Hg}{mol \cdot K}$

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

$P = \frac{(2.85\ mol)(62.4\ \frac{L \cdot mm\ Hg}{mol \cdot K})(288K)}{65\ L}$

$P = 787.97\ mm\ Hg$ or $1.037\ atm$