

\* #9 Volume conversion  
 \* Remember to convert units.  
 DISCUSS  
 \* how to find n from mass.  
 \* Talk about sig figs

14.4 Practice Problems

①  $V = ?$   
 $m = 100. \text{g}$   
 $P = \frac{1.50 \text{ atm}}{1} \cdot \frac{101.3 \text{ kPa}}{1 \text{ atm}} = 151.95$   
 $T = 25^\circ\text{C} + 273.15 = 298 \text{ K}$   
 $PV = nRT$   
 $151.95 V = 3.13 \text{ mol} \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (298 \text{ K})$   
 $V = 51.0 \text{ L} \text{ or } 51 \text{ L}$

$n = ?$   
 $\frac{100. \text{g O}_2}{1} \cdot \frac{1 \text{ mole O}_2}{32.0 \text{ g O}_2} = 3.13 \text{ mol O}_2 = n$

②  $V_1 = 225 \text{ L}$   
 $P_1 = .94 \text{ atm}$   
 $T_1 = 25^\circ\text{C} + 273.15 = 298 \text{ K}$   
 $P_2 = .99 \text{ atm}$   
 $T_2 = 0^\circ\text{C} + 273.15 = 273 \text{ K}$   
 $V_2 = ?$   
 $\frac{V_1 P_1}{T_1} = \frac{V_2 P_2}{T_2}$   
 $\frac{225 \text{ L} (.94 \text{ atm})}{298 \text{ K}} = \frac{V_2 (.99 \text{ atm})}{273 \text{ K}}$   
 $V_2 = 195.71 \dots \text{ } \boxed{200 \text{ L}}$

③  $V_1 = 515 \text{ cm}^3$   
 $P_1 = 107.4 \text{ kPa}$   
 $T_1 = 38.6^\circ\text{C} + 273.15 = 311.75 = 311.8 \text{ K}$   
 $T_2 = ?^\circ\text{C}$   
 $P_2 = 635.7 \text{ kPa}$   
 $V_2 = 644 \text{ cm}^3$   
 $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$   
 $\frac{107.4 \text{ kPa} (515 \text{ cm}^3)}{311.8 \text{ K}} = \frac{635.7 \text{ kPa} (644 \text{ cm}^3)}{T_2}$   
 $T_2 = 2307.8 \rightarrow 2308 \text{ K} - 273.15 = 2034.85 \rightarrow \boxed{2030^\circ\text{C}}$

④  $m = .2494 \text{ g} \rightarrow n = ?$   
 $P = \frac{1.26 \text{ atm}}{1} \cdot \frac{101.3 \text{ kPa}}{1 \text{ atm}} = 127.6 \text{ kPa}$   
 $V = 1.250 \text{ L}$   
 $T = ?^\circ\text{C}$   
 $\frac{.2494 \text{ g He}}{4.00 \text{ g He}} \cdot \frac{1 \text{ mol He}}{1} = .06235 \text{ mol}$   
 $PV = nRT$   
 $127.6 \text{ kPa} (1.250 \text{ L}) = .06235 \text{ mol} \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (T)$   
 $T = 307.831 \rightarrow 308 \text{ K} - 273.15 = 34.85 = \boxed{35^\circ\text{C}}$

⑤  $V = 75.0 \text{ L}$

$T = 23.24^\circ\text{C} + 273.15 = 296.39 \text{ K}$

$P = 7667 \text{ kPa}$

$n = ?$

$PV = nRT$

$7667 \text{ kPa} (75.0 \text{ L}) = n \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (296.39 \text{ K})$

$n = 233 \text{ mol}$

⑥  $m = ? \text{ g}$

$V = 475 \text{ L}$

$T = 273.15 \text{ K}$

$P = 1.00 \text{ atm}$

$= 101.3 \text{ kPa}$

$PV = nRT$

$101.3 \text{ kPa} (475 \text{ L}) = n \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (273.15 \text{ K})$

$n = 0.0212 \text{ mol}$

$0.0212 \text{ mol} \cdot \frac{39.95 \text{ g Ar}}{1 \text{ mol}}$

$= 0.847 \text{ g}$

⑦  $m = 1.28 \text{ g} \rightarrow n \Rightarrow \frac{1.28 \text{ g CO}_2}{44.01 \text{ g CO}_2} = 0.0291 \text{ moles}$

$V = 5.00 \text{ L}$

$T = 35.10^\circ\text{C} + 273 = 308.1 \text{ K}$

$P = ? \text{ kPa}$

$PV = nRT$

$P (5.00 \text{ L}) = 0.0291 \text{ mol} \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (308.1 \text{ K})$

$P = 14.9 \text{ kPa}$

⑧  $V = 0.25 \text{ L}$

$PV = nRT$

$T = 273.15 \text{ K}$

$P = 1.00 \text{ atm} = 101.3 \text{ kPa}$

$n = ?$

$101.3 \text{ kPa} (0.25 \text{ L}) = n \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (273.15 \text{ K})$

$n = 0.011 \text{ moles}$

Volume Conversion

⑨  $V = 0.308 \text{ m}^3$

$T = 325 \text{ K}$

$P = 149 \text{ kPa}$

$n = ?$

$149 \text{ kPa} (308 \text{ L}) = n \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (325 \text{ K}) \Rightarrow n = 16.99 \text{ moles}$

$= 17.0 \text{ mol}$

$\frac{0.308 \text{ m}^3}{1} \cdot \frac{10 \text{ dm}}{1 \text{ m}} \cdot \frac{10 \text{ dm}}{1 \text{ m}} \cdot \frac{1 \text{ L}}{1 \text{ dm}^3} = 308 \text{ L}$

$PV = nRT \Rightarrow P (45.4 \text{ L}) = 0.625 \text{ mol} \left( \frac{8.31 \text{ L kPa}}{\text{K mol}} \right) (254 \text{ K})$

⑩  $P = ?$

$n = 0.625 \text{ mol}$

$V = 45.4 \text{ L}$

$T = -24.0^\circ\text{C} + 273 = 254 \text{ K}$

$P = 29.057 \rightarrow 29.06 \text{ kPa}$