

6. at STP $3 \text{ mol} = 3(22.4 \text{ L}) = 67.2 \text{ L}$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$
$$\frac{(101.3 \text{ kPa})(67.2 \text{ L})}{273 \text{ K}} = \frac{(100 \text{ kPa}) V_2}{297 \text{ K}}$$
$$V = \underline{74 \text{ L}}$$

7. at STP $0.654 \text{ mol} = 0.654(22.4 \text{ L}) = 14.65 \text{ L}$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$
$$\frac{(1 \text{ atm})(14.65 \text{ L})}{273 \text{ K}} = \frac{(1.95 \text{ atm})(12.30 \text{ L})}{T_2}$$
$$T = \underline{447 \text{ K}} \text{ or } \underline{174^\circ \text{C}}$$

8. molar mass $\text{H}_2 = 2(1.01) = 2.02 \text{ g}$

$$\begin{array}{r} 1 \text{ mol} \quad 2.02 \text{ g} \\ \times \quad 1.09 \text{ g} \\ \hline 0.54 \text{ mol} \end{array}$$

at STP $0.54 \text{ mol} = 0.54(22.4 \text{ L}) = 12.096 \text{ L}$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$
$$\frac{(1 \text{ atm})(12.096 \text{ L})}{273 \text{ K}} = \frac{P(2.00 \text{ L})}{293 \text{ K}}$$
$$P = \underline{6.49 \text{ atm}}$$

9. molar mass Argon = 39.9 g

$$\begin{array}{r} 1 \text{ mol} \quad 39.9 \text{ g} \\ \times \quad 20.0 \text{ g} \\ \hline 0.50 \text{ mol} \end{array}$$

at STP $0.5 \text{ mol} = 0.5(22.4 \text{ L}) = \underline{11.2 \text{ L}}$ *Hilary*

10. molar mass of $\text{NO}_2 = (14\text{g}) + 2(16\text{g}) = 48\text{g}$

$$\begin{array}{r} 1 \text{ mol} \quad 48\text{g} \\ \times \quad 32\text{g} \\ \hline 0.67 \text{ mol} \end{array}$$

at STP $0.67 \text{ mol} = 0.67(22.4\text{L}) = 14.93 \text{ L}$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{(1\text{atm})(14.93\text{L})}{273\text{K}} = \frac{(3.12\text{atm})V}{291\text{K}}$$

$$\underline{V = 5.1 \text{ L}}$$

11. How many moles do we have?

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{(1\text{atm})V}{273\text{K}} = \frac{(60\text{atm})(7.5\text{L})}{308.5\text{K}}$$

$$V = 398.2 \text{ L}$$

$$\begin{array}{r} 1 \text{ mol} \quad 22.4 \text{ L} \\ \times \quad 398.2 \text{ L} \\ \hline 17.8 \text{ mol} \end{array}$$

so, how many molecules is this?

$$17.8 \text{ mol} (6.02 \times 10^{23} \text{ molecules}) = 1.07 \times 10^{25} \text{ molecules}$$

and finally, molecular mass

$$\begin{array}{r} 1.07 \times 10^{25} \text{ molecules} \quad 35.44\text{g} \\ \times \quad 1 \text{ molecule} \\ \hline \end{array}$$

$$\underline{3.3 \times 10^{-24} \text{ g/molecule}}$$