Ch. 13 Review

1) Boyle's Law $P_1V_1 = P_2V_2$

$P_1 = 97.5\ kPa$
$V_1 = 90.0\ mL$
$P_2 = x$
$V_2 = 70.0\ mL$

$(97.5)(90.0) = (x)(70.0)$

$\boxed{x = 125.3\ kPa}$

2) Dalton's Law $P_T = P_A + P_B + P_C$

$P_T = 96.4\ kPa$
$P_{He} = 13.5\ kPa$
$P_{O_2} = 29.3\ kPa$
$P_{Methane} = x$

$96.4 = 13.5 + 29.3 + x$

$\boxed{x = 53.6\ kPa}$

3) Charles' Law $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ or $V_1T_2 = V_2T_1$

$V_1 = 560\ mL$ $V_2 = 400.0\ mL$
$T_1 = 120 + 273 = 393$ $T_2 = x$

$\frac{560}{393} = \frac{400}{x}$

$\boxed{x = 281\ K}$

4) Guy-Lusaac's Law $\frac{P_1}{T_1} = \frac{P_2}{T_2}$ or $P_1T_2 = P_2T_1$

$P_1 = 210.0\ kPa$ $P_2 = x$
$T_1 = 20 + 273 = 293\ K$ $T_2 = 35 + 273 = 308\ K$

$\frac{210.0}{293} = \frac{x}{308}$

$\boxed{x = 221\ kPa}$

5) Combined Gas Law $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ or $P_1V_1T_2 = P_2V_2T_1$

$P_1 = 0.982$ atm $P_2 = 0.965$ atm

$V_1 = 0.550$ L $V_2 = x$

$T_1 = 21 + 273 = 294$K $T_2 = 15 + 273 = 288$

$$\frac{(0.982)(0.550)}{294} = \frac{(0.965)(x)}{288}$$

$x = 0.548$ L

6) Boyle's Law $P_1V_1 = P_2V_2$

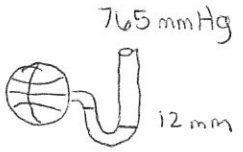
$P_1 = 675$ torr $P_2 = x$

$V_1 = 1$ $V_2 = 2$

$(675)(1) = (x)(2)$

$x = 337.5$ torr

7)



765 mmHg $- 12 = 753$ mmHg

8) Ideal $PV = nRT$

$P = 1$ atm $R = 0.0821$

$V = 0.250$ L $T = 0°C + 273 = 273$K

$n = x$

$(1)(0.250) = (x)(0.0821)(273)$

$x = 0.0112$ mol CH_4

$0.0112 \text{ mol } CH_4 \times \frac{16.0 \text{ g}}{1 \text{ mol } CH_4} = 0.179 \text{ g } CH_4$

9. (a) $2.67 \text{ atm} \times \frac{101.3 \text{ kPa}}{1 \text{ atm}} = 270$ kPa (b) $694 \text{ torr} \times \frac{1 \text{ atm}}{760 \text{ torr}} = 0.913$ atm (c) $4,976.5 \text{ Pa} \times \frac{1 \text{ kPa}}{1000 \text{ Pa}}$

4.976 kPa

10) Ideal $PV = nRT$

$P = 106$ kPa

$V = 0.845$ L

$n = 1.87$ g $\equiv 1.87 \text{ g } N_2 \times \frac{1 \text{ mol } N_2}{28.0 \text{ g } N_2} = 0.0668$ mol

$R = 8.31$

$(106)(0.845) = (0.0668)(8.31)(x)$

$x = 161$ K

$°C = 161 - 273 = -112°C$