17 | 5, 11, 15, 27, 31

Chapter 17

17-5. $T_F = \frac{9}{5}T_c + 32 = 104^\circ$

11. $\Delta L = .002\,cm$ $\quad \alpha = \frac{12\times10^{-6}}{^\circ C}$ $\quad L_o = 1.871\,cm$
$T_F = 20^\circ C$

$\Delta L = \alpha L_o \Delta T$
$\Delta L = \alpha L_o (T_F - T_i)$

$.002\,cm = \frac{12\times10^{-6}}{^\circ C}(1.871\,cm)(20^\circ C - T_i)$

$.002\,cm = 4.49\times10^{-4}\,cm - \left(\frac{2.24\times10^{-5}}{^\circ C}\right)T_i$

$T_i = -69^\circ C$

15. $\Delta T = 170^\circ C$ $\quad \beta = \frac{1\times10^{-6}}{^\circ C}$ $\quad V_o = \frac{4}{3}\pi r^3$

$\Delta V = \beta V_o \Delta T$ $\quad = 351\,cm^3$

$\Delta V = \frac{1\times10^{-6}}{^\circ C}(351\,cm^3)(170^\circ C) = .0600\,cm^3$

27. $T_c = -273^\circ$ $\quad T_F = \frac{9}{5}T_c + 32 = -459^\circ F$

31. $\frac{V}{n} = \frac{RT}{P} = \frac{22.4L}{mole}$ (all gasses, see pg 457)

O_2 has $\frac{32\,grams}{mole}$ so $\frac{32g}{22.4L} = \frac{m}{V} = \frac{1.43\,Kg}{m^3}$

#39. $PV = nRT$

$P_i = 2.45\ \text{Atm} \quad V_i = 61.5\ L \quad T_i = 291\ K$

n stays same so

$$\frac{P_i V_i}{R T_i} = \frac{P_F V_F}{R T_F} \Rightarrow \frac{P_i V_i}{T_i} = \frac{P_F V_F}{T_F}$$

$$\frac{(2.45\ \text{Atm})(61.5\ L)}{(291\ K)} = \frac{P_F\ (48.8\ L)}{(323\ K)}$$

$P_F = 3.43\ \text{Atm}$

45. $PV = nRT$

$PV = \frac{N}{N_A} RT$ Let $T \approx 300\ K$ $V = 2\ L$ $P = 1\ \text{ATM}$

$$(1\ \text{ATM})(2L) = \frac{N}{6.02 \times 10^{23}} \left(\frac{.082\ \text{Atm}\ L}{(K\ \text{mol})}\right)(300)$$

$\simeq 5 \times 10^{22}$ molecules

ch (18.7) $V_{rms} = \sqrt{\frac{3 K_B T}{m}} = \sqrt{\frac{3 K_B PV}{m n R}} = \sqrt{\frac{3PV}{m n N_A}}$

double pressure → V_{rms} is multiplied by $\sqrt{2}$

18.17. Vapor

java physlet 20.3

All 3 cases T is different but it comes to ~ equilibrium so $T_{Left} \simeq T_{Right}$

$K_{Left} \simeq K_{Right}$

$V_{green} < V_{Blue}$

so $m_{green} > m_{Blue}$

$V_{yellow} > V_{Blue}$

so $m_{yellow} < m_{Blue}$

$V_{purple} \simeq V_{Blue}$

so $m_{purple} \simeq m_{Blue}$