2) 167 ft @ 12°C

$\Delta L = 0.478\,ft$

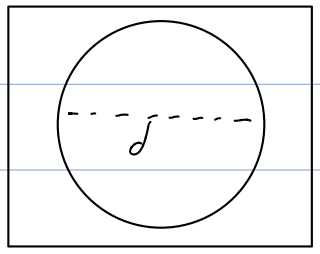
$\Delta L = L_0 \alpha \Delta T$

$0.478\,ft = 167\,ft\,(1.2\times10^{-5}\,°C^{-1})(T_f - 12°C)$

$T_f - 12°C = 23.84$

$T_f = 35.8°C$

5)



$d = 1.32\ cm$

@ 25°C

$\alpha = 1.2 \times 10^{-5}\ °C^{-1}$

$\gamma = 2\alpha$

a) $A = \pi r^2$

$r = 0.66$

$A = 1.368\ cm^2$

b) $\Delta A = A_0\ \gamma\ \Delta T$

$\Delta A = 1.368\ (2(1.2 \times 10^{-5}\ °C^{-1}))(175° - 25°)$

$\Delta A = 0.004925$

$A_f = A_i + \Delta A$

$A_f = 1.373\ cm^2$

4) $\Delta Q = mc\Delta T$

water: $\Delta Q = 1.7\,kg\,(4186)\,(70°C)$

$\Delta Q = 498,134$

kettle: $\Delta Q = 1.3\,kg\,(900)(70°C)$

$\Delta Q = 81,900$

Total: $\Delta Q = 498,134 + 81,900$

$\Delta Q = 580034\ J$

5) $26.3\,N = 2.68\,kg$

$\Delta Q = mc\,\Delta T$

$$c = \frac{\Delta Q}{m\,\Delta T}$$

$$c = \frac{1.4 \times 10^{4}\,J}{2.68\,kg\,(17^{\circ}C)}$$

$$c = 307\ \frac{J}{kg \cdot K}$$

5)

0.260 kg

18.0°C

$\Delta Q = \Delta Q_{18° \to 0°} + \Delta Q_{water \to ice}$

$\Delta Q = mc\Delta T$

$= 0.26\,(4186)(-18)$

$\Delta Q_{18° \to 0°} = -19590\ J$

$0.26 kg \left(334\ J/kg\right)$

$\Delta Q_{water \to ice} = 86.84$

1.06×10^5

$\left(\frac{1\ Btu}{4190\ J}\right)$

1.06 ww

106000. J

25.30 Btu

260 g by -18°C

0.5732 lb by -64.4°F

36.9 btu

+ 82.5

165 btu

7) $m_{Cu} = 0.5\ kg$ $\quad m_{water} = 0.170\ kg$ $\quad m_{Fe} = 0.25\ kg$

$T_{Cu_i} = 20°C$ $\quad T_{water_i} = 20°C$ $\quad T_{Fe_i} = 85°C$

$$\Delta Q_{Cu} + \Delta Q_{water} + \Delta Q_{Fe} = \emptyset$$

$$m_{Cu} C_{Cu} \Delta T + m_{water} C_{water} \Delta T + m_{Fe} C_{Fe} \Delta T = \emptyset$$

$$[0.5\ kg\ (390\ \tfrac{J}{kg°C})(T_f - 20°C)] + [0.170\ kg\ (4186)(T_f - 20°C)] + [0.25\ kg\ (470)(T_f - 85°C)] = \emptyset$$

$$195\ T_f - 3900 + 711.6\ T_f - 14{,}232 + 117.5\ T_f - 9987 = \emptyset$$

$$1024.1\ T_f - 28{,}119 = \emptyset$$

$$1024.1\ T_f = 28{,}119$$

$$T_f = 27.5\ °C$$

8) He $V = 3.50\,L$

$P = 0.170$ atm

$T = 37°C = 310°K$

$PV = nRT$

$$\frac{P_i V_i}{T_i} = nR = \frac{P_f V_f}{T_f} = \frac{(2P_i)(2V_i)}{T_f}$$

$$\frac{(0.17\text{ atm})(3.50\,L)}{310°K} = \frac{(2(0.17))(2(3.5))}{T_f}$$

$T_f = 1240°K$

$= 967°C$

$PV = nRT$

$n = \frac{PV}{RT}$

$R = 0.08205\ \frac{L \cdot atm}{mol \cdot °K}$

$$\frac{(0.17\text{ atm})(3.5\,L)}{\left(0.08205\ \frac{L \cdot atm}{mol \cdot °K}\right)(310°K)} = 0.0234\ mol$$

$0.0234\ mol\ (4.00\ g/mol) = 0.0936\ g$

9) Tank rupture problem

$PV = nRT$

$(103\ atm)(3.01\ L) = (11.1\ mol)\left(0.08205 \frac{L \cdot atm}{mol \cdot K}\right) T_f$

$T_f = 340.41 K$

$= 67.41°C$

10) $V_i = 0.650\ m^3$ $V_f = 0.530\ m^3$

$T_i = 22°C = 295°K$ $T_f = 161°C = 434°K$

$P_i = 6.50 \times 10^3\ Pa$ $P_f = ?$

$$\frac{P_i V_i}{T_i} = \frac{P_f V_f}{T_f}$$

$$\frac{(6.50 \times 10^3\ Pa)(0.650\ m^3)}{295°K} = \frac{P_f (0.530\ m^3)}{434°K}$$

$P_f = 11,727\ Pa$

$= 11.7 \times 10^3\ Pa$