Ch 14
Specific Heat
Energy Conductivity
Version A

(1) $Q = m C_s \Delta T$ = Energy (want Q)

Given: $\Delta T = -39.7C + 88C$ C = celsius.

$C_{Al} = 900$ $C_{H_2O} = 4186$ $\left[\frac{J}{kg \cdot deg}\right]$

$m_{Al} = .98$ [kg] $m_{H_2O} = .23$ [kg]

$\Sigma Q = Q_{Al} + Q_{H_2O} = Q_{Net}$
(sum)

$$\begin{array}{r} 88.0 \\ -39.7 \\ \hline 48.3 = \Delta T \end{array}$$

$= (.98)(900)(48.3) + (.23)(4186)(48.3)$

$= 4.26E4 + 4.65E4 = \boxed{8.91 \times 10^4 \text{ J}} = Q_{NET}$

(2) What fraction of ΣQ went into Aluminum?

$f = \frac{Q_{AL}}{Q_{AL} + Q_{H_2O}} = \frac{4.26}{8.91} = .478 \approx \boxed{.48}$ No units

(3) $mgh = Q_{Net} \rightarrow h = \frac{Q_{Net}}{(.98 + .23)(9.8)} = \frac{8.91E4}{(1.21)(9.8)} =$

mass: .98+.23 ; ↑ g

$\rightarrow h = 7.5 \times 10^3$ m

$\boxed{h = 7.5 \text{ km}}$

(4) $\dot{Q} = \frac{kA}{d} \Delta T$ given: $A = L^2$ decrease L by 1.46
increase d by 2.31

$\dot{Q} = (\text{const}) \frac{L^2}{d}$

(Adopt units where
$\dot{Q}_1 = L_1 = d_1 = 1 \Rightarrow \dot{Q} = \frac{L^2}{d}$
$L_2 = (1.46)^{-1}$ and $d_2 = 2.31$

$\dot{Q}_2 = \frac{1.46^{-2}}{2.31}$

$\dot{Q}_2 = .2031 \rightarrow$ $\boxed{\text{Decrease}}$ by $(.2031)^{-1} = \boxed{4.92 \text{ (factor)}}$