SOLUTIONS TO PROBLEMS
(back of handout)

Review: Heat Transfer in Temperature and Phase Change

1. a) $Q = m \cdot c \cdot \Delta t$

$= 236\,g \cdot 4.18 \frac{J}{g \cdot °C} \cdot (-65°)$

$= \underline{\underline{-64\,121\ J}}$

b) $Q = mc\Delta t$

$= 225 \times 4.18 \frac{J}{g \cdot °C} \times 86°C$

$= \underline{\underline{80\,900\ J}}$

2. a) $Q = m \cdot c \cdot \Delta t$

$67700\,J = 450\,g \times 4.18 \frac{J}{g \cdot K} \times \Delta t$

$\Delta t = \frac{67700\ \cancel{J}}{450\,\cancel{g} \times 4.18 \frac{\cancel{J}}{\cancel{g} \cdot K}}$

$= 36°$

$\therefore t_f = 36° + 12°$

$= \underline{\underline{48°C}}$

b) $m = \frac{Q}{c \cdot \Delta t}$

$= \frac{29030\ J}{4.18 \frac{J}{g \cdot K} \times 62°}$

$= \underline{\underline{112\,g}}$

3. $Q_{lost} = Q_{gained}$

$m \cdot c \cdot \Delta t = m \cdot c \cdot \Delta t$

$335\,\cancel{kg} \cdot \frac{4184\,\cancel{J}}{\cancel{kg}\cdot K} \cdot (100°C - t_f) = 850\,\cancel{kg} \cdot \frac{4184\,\cancel{J}}{\cancel{kg}\cdot K}(t_f - 10°C$

$33500°C - 335\,t_f = 850\,t_f - 8500°C$

$33500°C + 8500°C = 850t_f + 335\,t_f$

$t_f = \frac{42000}{1185}$

$= \underline{\underline{35.4°C}}$

4. (Al) $Q_{lost} = Q_{gained\ (liquid)}$

$m \cdot c \cdot \Delta t = m \cdot c \cdot \Delta t$

$775\,\cancel{g}\left(0.9\,\frac{J}{\cancel{g}\cdot K}\right)(120-36) = 2450g \cdot c \cdot (36-25)$

$697.5\,(84) = 26950\,c$

$c = 2.174\,\frac{J}{g\cdot K}$

5. a) $Q = m \times L_f$

$= 100g \times 334.2\,\frac{J}{g}$

$= \underline{3.34 \times 10^4\ J}$

$L_f = \boxed{6.02\,\frac{kJ}{mol}}$

$\frac{6.02kJ}{mol} \times \frac{mol}{18.0154g}$

$= \frac{33416\ kJ/g}{}$

$= \boxed{334.2\ J/g}$

b) $Q = m \cdot L_v$

$= 11.9897 \times 40.8\,\frac{kJ}{mol}$

$= \underline{\underline{489\ kJ}}$

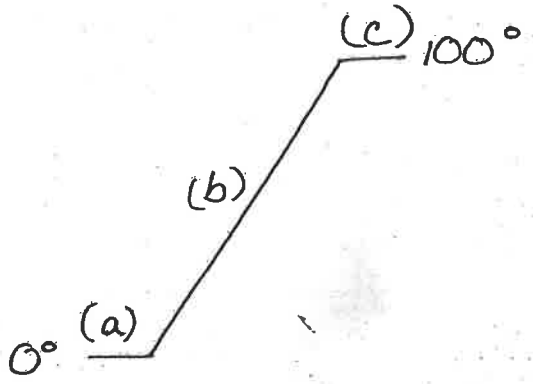
$L_v = 40.8\ kJ/mol$

$216g\ H_2O$

$\Rightarrow 216g \times \frac{1\,mol}{18.0154g}$

$= 11.9897\ mol\ H_2O$

6.



a) $Q = m \cdot L_f$

$= 414\,g \times 6.02\,\frac{kJ}{mol} \times \frac{mol}{18.0154\,g}$

$= 138.35\ kJ$

b) $Q = m \cdot c \cdot \Delta t$

$= 414\,g \times 4.184\,\frac{J}{g \cdot K} \times 100$

$= 173.05\ kJ$

c) $Q = m \cdot L_v$

$= 414\,g \times 40.8\,\frac{kJ}{mol} \times \frac{mol}{18.0154\,g}$

$= 937.6\ kJ$

$\therefore$ Total = a) + b) + c)

$= 138.35 + 173.05 + 937.6$

$= 1250\ kJ$