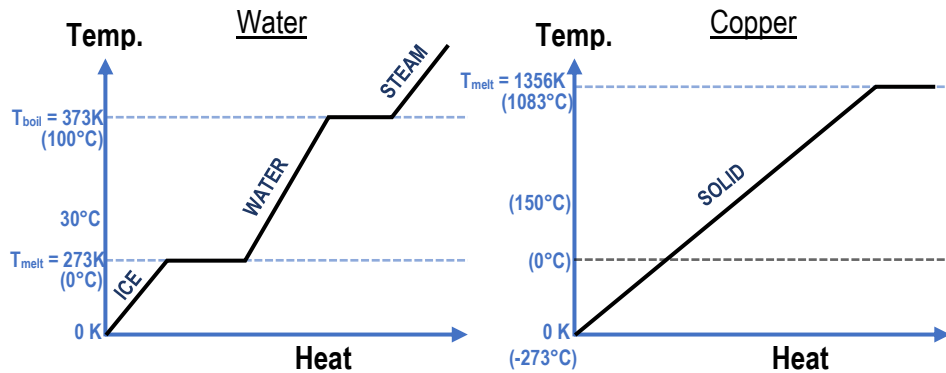


CONCEPT: EQUILIBRIUM TEMPERATURE IN CALORIMETRY PROBLEMS WITH PHASE CHANGES

- In some calorimetry problems with temperature & phase changes, you'll have to calculate the equilibrium temperature.
 - In these problems, you'll have to *figure out* # of $mc\Delta T$ OR mL terms in the $Q_A = -Q_B$.

EXAMPLE: A 2kg pot made of copper is initially at 150°C. You pour 0.1kg of 30°C water into the pot, then close the lid to prevent steam from escaping. **a)** Calculate the final temperature of the pot & water. **b)** Calculate how much (if any) water turned into steam.



CALORIMETRY
0) Draw T vs. Q diagram, identify T_i 's & T_f 's
1) Write $Q_A = -Q_B$
2) Calculate T_f , assume no phase change (IF $T_f < T_{ph.change}$, skip step 3 and Solve) (IF $T_f > T_{ph.change}$, write $Q_A = -Q_B$ with $Q = mL$ term)
3) Compare $ Q_A $ & $ Q_B $, assume $T_f = T_{ph.change}$ (IF $ Q_A > Q_B $, $T_f = T_{ph.change}$, solve for Target) (IF $ Q_A < Q_B $, add $Q = mc\Delta T$ term to Q_A)
4) Solve for Target

SPECIFIC & LATENT HEATS
$Q = mc\Delta T$
$Q = mL$
$c_{water} = 4186 \text{ J/(kg}\cdot\text{K)}$
$c_{copper} = 390 \text{ J/(kg}\cdot\text{K)}$
$L_{v,water} = 2.256 \times 10^6 \text{ J/kg (liq} \rightarrow \text{gas)}$
$T_f = \frac{m_1 c_1 T_{1i} + m_2 c_2 T_{2i} + \dots}{m_1 c_1 + m_2 c_2 + \dots}$