Quiz 12.2 – Enthalpies of Phase Change and Heating Curves

Name: Key

Question 1

Solid paraffin wax has a specific heat of $2.5\frac{J}{g\,K}$. If $300.0\ J$ of heat are added to $15.25\ g$ of paraffin wax, how much will the temperature raise?

$q = m\,C\,\Delta T \qquad 300.0\ J = 15.25\ g \cdot 2.5\frac{J}{g\,K} \cdot \Delta T$

$\Delta T = 7.9\ K \ (or\ 7.9\ ^\circ C)$

Question 2

Paraffin wax has a melting point of $37\ ^\circ C$, and $\Delta H_{fus} = 210\frac{J}{g}$. How many J of heat are required to melt $5.75\ g$ of paraffin wax?

$q = m \cdot \Delta H \qquad q = 5.75\ g \cdot \frac{210\ J}{g} = 1200\ J$

Question 3

Table 12.3 in your textbook gives the necessary values to answer this question

$38.0\ kJ$ of heat are removed from a $10.0\ g$ sample of steam (water vapor) at $250.0\ ^\circ C$. Give the total energy for each of the steps labeled A through E on the cooling curve below, and give the final phase and temperature of the water

q remaining

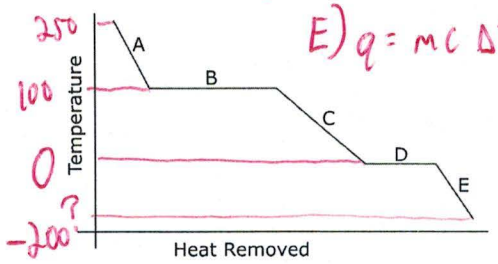
A) $q = mC\Delta T = 10.0\ g \cdot 2.042\ \frac{J}{g\,^\circ C} \cdot -150\ ^\circ C = -3,063\ J$ → $-34.44\ kJ$

B) $q = m\,\Delta H = 10.0\ g \cdot -2,260\ J/g = -22,600\ J = -22.6\ kJ$ → $-12.34\ kJ$

C) $q = m\,C\,\Delta T = 10.0\ g \cdot 4.184 \cdot -100\ ^\circ C = -4184\ J = -4.184\ kJ$ → $-8.153\ kJ$

D) $q = m\Delta H = 10.0\ g \cdot -334\ J/g = -3340\ J = -3.34\ kJ$ → $-4.183\ kJ$

E



E) $q = mC\Delta T \qquad -4183\ J = 10.0\ g \cdot 2.087\ \frac{J}{g\,^\circ C} \cdot \Delta T$

$\Delta T = -200\ ^\circ C$

$T = -200\ ^\circ C$