Homework - Worksheet

$m = 80.0\,g$

$H_{fus} = 6.01\,\frac{kJ}{mol}$

$\Delta H_{fus} = ?$

$\Delta H_{fus} = n H_{fus}$

$\Delta H_{fus} = \left(\frac{80.0\,g}{18.02\,g/mol}\right)\left(6.01\,\frac{kJ}{mol}\right)$

$\boxed{\Delta H_{fus} = 26.7\,kJ}$

Heat (q)

- change in kinetic energy
- measures transfer of energy when there are temperature changes (heating or cooling)

Enthalpy (H)

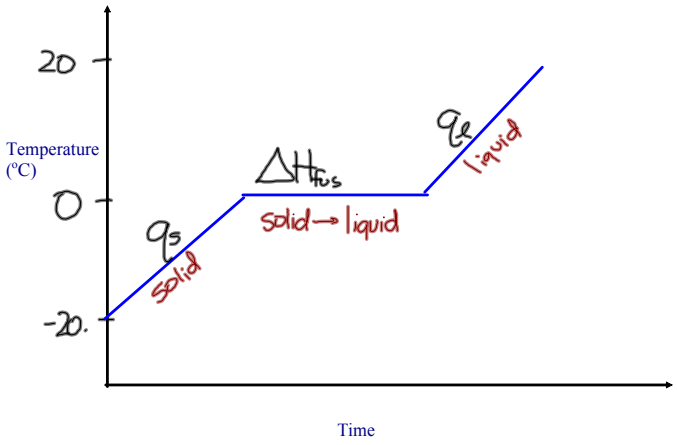
- measures potential energy
- change in energy transfer when system is at constant pressure and same initial and final temperatures

What we've looked at so far...

- Energy changes when the temperature changes
  (heating water from 20°C to 50°C)
- Energy changes when the temperature remains the same.
  (melting of ice at 0°C)

What if you heat 10. g of ice at -20.°C until it is water at 20.°C?

Heating Curve of Water



$$\Delta E_T = q_s + \Delta H_{fus} + q_\ell$$

$q_s = mC\Delta T$

$q_s = (10.g)\left(2.01\frac{J}{g\cdot°C}\right)(20.°C)$

$q_s = 402\ J$

$\Delta H_{fus} = n H_{fus}$

$\Delta H_{fus} = \left(\frac{10.g}{18.02\ g/mol}\right)\left(6.01\frac{kJ}{mol}\right)$

$\Delta H_{fus} = 3335\ kJ$

$q_\ell = mC\Delta T$

$q_\ell = (10.g)\left(4.19\frac{J}{g\cdot°C}\right)(20.°C)$

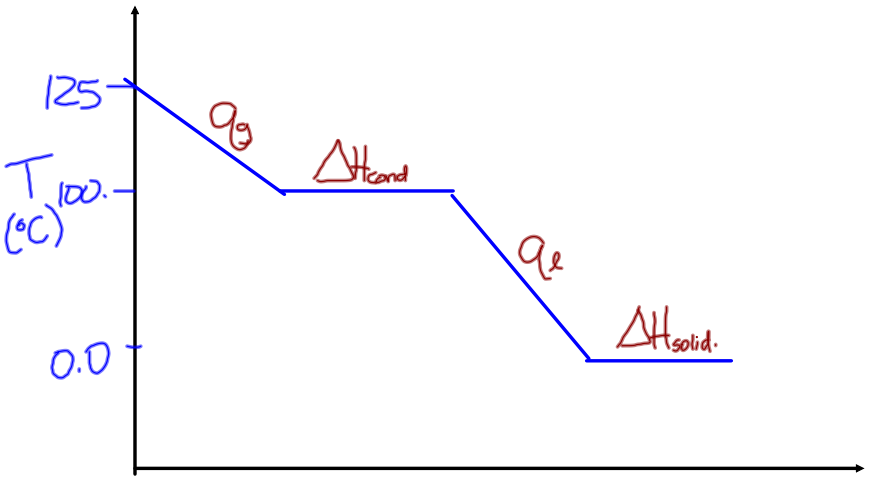
$q_\ell = 838\ J$

$\Delta E_T = q_s + \Delta H_{fus} + q_\ell$

$\Delta E_T = (402J) + (3335J) + (838J)$

$\boxed{\Delta E_T = 4600\ J}$

Calculate the total energy change if 2.50 g of steam at 125.0°C is completely converted to ice at 0.0°C.



$\Delta E_T = q_g + \Delta H_{cond} + q_\ell + \Delta H_{solid}$

$q_g = mC\Delta T$

$q_g = (2.50\,g)\left(2.01\,\frac{J}{g\cdot°C}\right)(-25°C)$

$q_g = -125.63\,J$

$\Delta H_{cond} = n H_{cond}$

$\Delta H_{cond} = \left(\frac{2.50\,g}{18.02\,g/mol}\right)\left(-40.7\,\frac{kJ}{mol}\right)$

$\Delta H_{cond} = -5.650\,kJ$

$q_\ell = mC\Delta T$

$q_\ell = (2.50\,g)\left(4.19\,\frac{J}{g°C}\right)(-100.°C)$

$q_\ell = -1047.5\,J$

$\Delta H_{solid} = n H_{solid}$

$\Delta H_{solid} = \left(\frac{2.50\,g}{18.02\,g/mol}\right)\left(-6.01\,\frac{kJ}{mol}\right)$

$\Delta H_{solid} = -0.834\,kJ$

$\Delta E_T = q_g + \Delta H_{cond} + q_\ell + \Delta H_{solid}$

$\Delta E_T = -(0.12563\,kJ) + (-5.650\,kJ) + (-1.0475\,kJ) + (-0.834\,kJ)$

$\boxed{\Delta E_T = -7.66\,kJ}$

Worksheet