Warm Up

Determine the enthalpy change associated with converting 250. g of water to ice at 0.0°C.

$\Delta H_{solid} = ?$

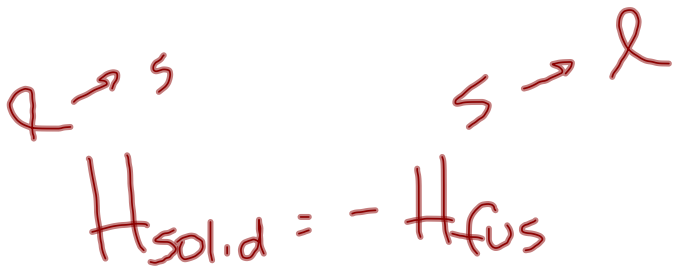
$m = 250.\ g$

$H_{solid} = -6.01\ \frac{kJ}{mol}$

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

$\Delta H_{solid} = \left(\frac{250.\ g}{18.02\ g/mol}\right)\left(-6.01\ \frac{kJ}{mol}\right)$

$\Delta H_{solid} = -83.4\ kJ$


l → s
s → l
Hsolid = - Hfus

Homework - Worksheet

$\Delta H_{solid} = ?$

$m = 1000000\,g$

$H_{solid} = -6.01\,\frac{kJ}{mol}$

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

$\Delta H_{solid} = \left(\frac{1000000\,g}{18.02\,g/mol}\right)\left(-6.01\,\frac{kJ}{mol}\right)$

$\Delta H_{solid} = -334000\,kJ$

Heat (q)

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

Enthalpy (H)

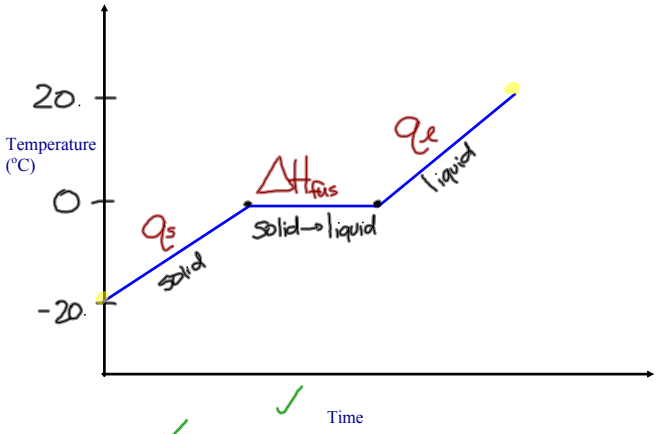
- measures potential energy
- change in energy transfer when system is at constant pressure and same initial and final temperatures

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



$\Delta E_T = q_s + \Delta H_{fus} + q_e$

$q_s = mC\Delta T$

$q_s = (10.g)\left(2.0\frac{J}{g\cdot°C}\right)(20.°C)$

$q_s = 402\ J$

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

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

$\Delta H_{fus} = 3.335\ kJ$

$q_e = mC\Delta T$

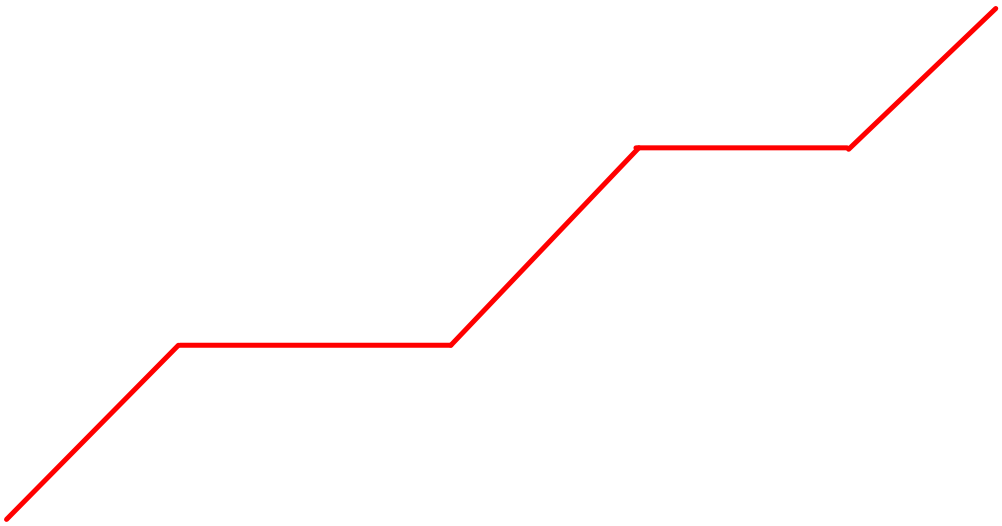
$q_e = (10.g)\left(4.19\frac{J}{g\cdot°C}\right)(20.°C)$

$q_e = 838\ J$

$\Delta E_T = q_s + \Delta H_{fus} + q_e$

$\Delta E_T = (402\ J) + (3\,335\ J) + (838\ J)$

$\Delta E_T = 4600\ J$



Total Energy Changes

Ex. Calculate the total energy change if 2.50 g of water at 12.0°C is completely converted to steam at 100.°C.

ΔE_{total} =