Warm Up

What quantity of energy is required to change 9.53 g of ice at 0.00ºC to water on an automobile windshield?

$\Delta H_{fus} = ?$

$m = 9.53\,g$

$H_{fus} = 6.03\,kJ/mol$

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

$\Delta H_{fus} = \left(\dfrac{9.53\,g}{18.02\,g/mol}\right)\left(6.03\,\dfrac{kJ}{mol}\right)$

$\boxed{\Delta H_{fus} = 3.19\,kJ}$

Homework - Worksheet

③ $\Delta H_{solid} = ?$

$m = 1\,000\,000\,g$

$H_{solid} = -6.03\,kJ/mol$

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

$\Delta H_{solid} = \left(\dfrac{1\,000\,000\,g}{18.02\,g/mol} \right)\left(\dfrac{-6.03\,kJ}{mol} \right)$

$\boxed{\Delta H_{solid} = -335\,000\,kJ}$

Heat (q)

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

Enthalpy (ΔH)

- 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)　q
- Energy changes when the temperature remains the same.
    (melting of ice at 0°C)　ΔH

What if you heat 10. g of ice at -20. °C until it is water at 30.°C?

Heating Curve of Water
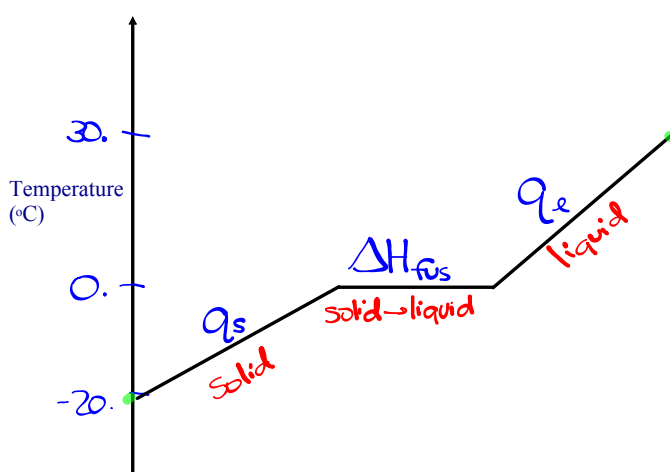
$$\Delta E_T = q_s + \Delta H_{fus} + q_\ell$$

$q_s = mC\Delta T$

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

$q_s = 402 J$

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

$\Delta H_{fus} = \left(\frac{10.g}{18.02g/mol}\right)\left(\frac{6.03kJ}{mol}\right)$

$\Delta H_{fus} = 3.346 \ kJ$

$q_\ell = mC\Delta T$

$q_\ell = (10.g)(4.19\frac{J}{g°C})(30.°C)$

$q_\ell = 1257 J$
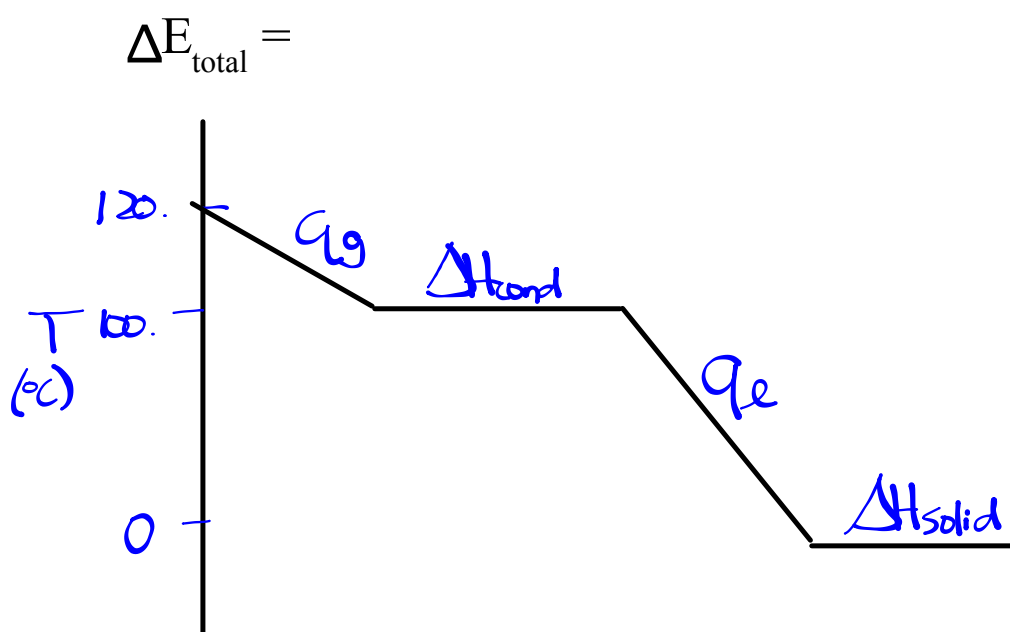
$\Delta E_T = q_s + \Delta H_{fus} + q_\ell$

$\Delta E_T = (0.402kJ) + (3.346kJ) + (1.257kJ)$

$\boxed{\Delta E_T = 5.0 \ kJ}$

Total Energy Changes

Ex.   Calculate the total energy change if 2.50 g of steam at 120.0 °C
is completely converted to ice at 0.0°C.

$\Delta E_{total} =$

Worksheet