Warm Up

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

$m = 9.53\,g$

$\Delta H_{fus} = ?$

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

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

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

$9.53\,g\,H_2O \times \frac{1\,mol\,H_2O}{18.02\,g\,H_2O} =$

$H_2O \rightarrow (2 \times 1.01) + (1 \times 16.00) = 18.02\,g/mol$

$$q = mC\Delta T$$

Homework - Worksheet

(3) $\Delta H_{solid} = ?$

$m = 1000\ kg$
$(1.00\ t)$

$\Delta H_{solid} = n(-H_{fus})$

$\Delta H_{solid} = \left(\frac{1000000\ g}{18.02\ g/mol}\right)\left(-6.03\ \frac{kJ}{mol}\right)$

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

s → l

H_{fus} H_{vap}

l → s

H_{solid}

Heat (q)

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

Enthalpy (H)

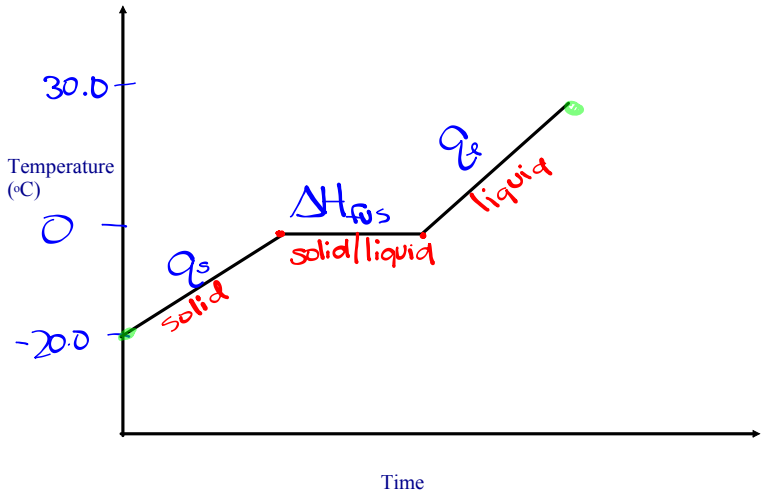
- measures potential energy
- change in energy transfer when system is at constant pressure and same initial and final temperatures

What we've looked at so far...

- Energy changes when the temperature changes (heating water from 20 °C to 50°C) 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



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

$\Delta E_T = (402\,J) + (3346.3\,J) + (1257\,J)$

$\Delta E_T = 5005.3\,J = \boxed{5.0\,kJ}$

$q_s = mC\Delta T$

$q_s = (10.g)\left(2.01\frac{J}{g\cdot°C}\right)(20.0°C)$

$q_s = 402\,J$

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

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

$\Delta H_{fus} = 3.3463\,kJ$

$q_\ell = mC\Delta T$

$q_\ell = (10.g)\left(4.19\frac{J}{g\cdot°C}\right)(30.0°C)$

$q_\ell = 1257\,J$