Homework - Worksheet #1,2

② $\Delta H_{vap} = ?$

$m = 500.\ g$

$C_2H_4(OH)_2$

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

$\Delta H_{vap} = \left(\frac{500.\ g}{62.08\ g/mol}\right)\left(58.8\ \frac{kJ}{mol}\right)$

$\boxed{\Delta H_{vap} = 474\ kJ}$

$C_2H_4(OH)_2 \rightarrow (2\times12.01)+(6\times1.01)+(2\times16.00)$

$= 62.08\ g/mol$

Worksheet #3-6

H_{fus}
molar enthalpy of fusion
$(s \rightarrow \ell)$

H_{vap}
molar enthalpy of vaporization
$(\ell \rightarrow g)$

+

$H_{solid} = -H_{fus}$ $H_{cond} = -H_{vap}$

Ice → water
+6.03 kJ/mol

$\Delta H = nH$

water → ice
−6.03 kJ/mol

Heat (q)

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

Enthalpy (H)

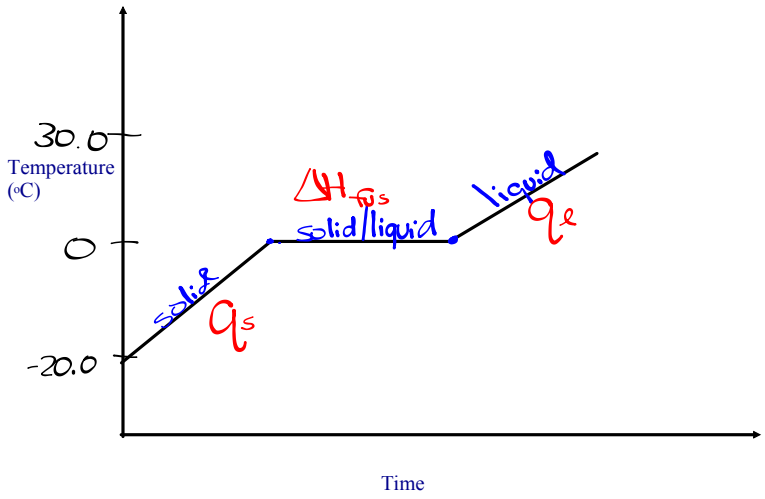
- measures potential energy
- change in energy transfer when system is at constant pressure and same initial and final temperatures

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



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

$q_s = mC\Delta T$

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

$q_s = 402\,J$

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

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

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

$q_\ell = mC\Delta T$

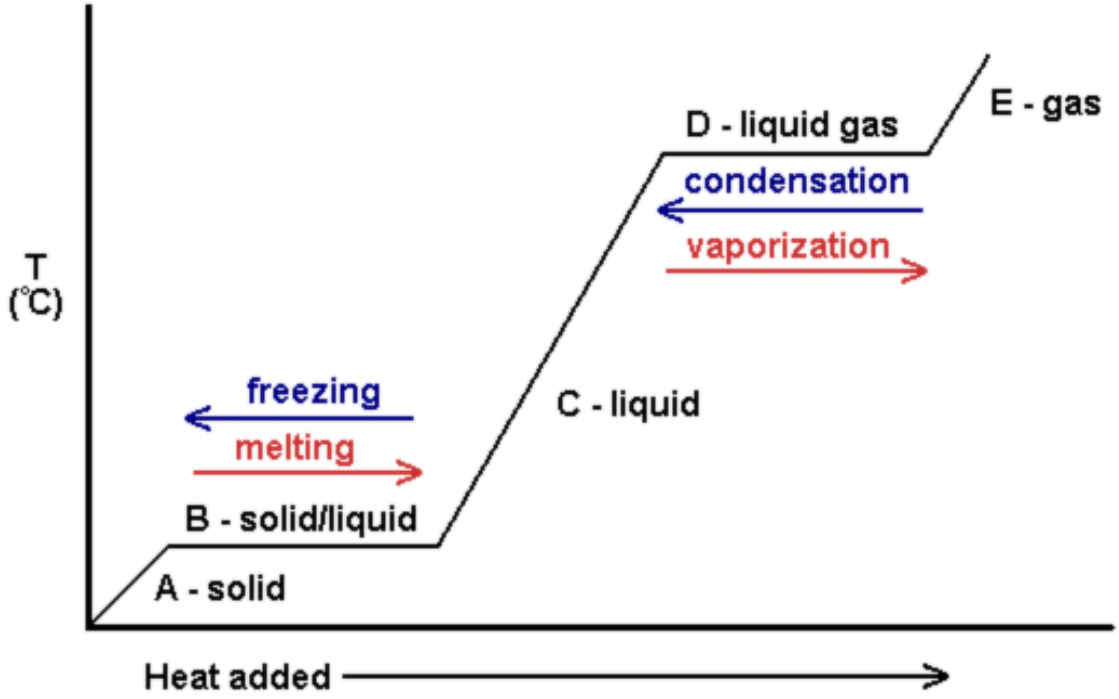
$q_\ell = (10.g)(4.19\frac{J}{g°C})(30.°C)$

$q_\ell = 1257\,J$

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

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

$\boxed{\Delta E_T = 4.7\,kJ}$


T
(°C)
E - gas
D - liquid gas
condensation
vaporization
freezing
melting
C - liquid
B - solid/liquid
A - solid
Heat added