SCH4U	
Energy Changes & Rates of Reaction	

Enthalpy & Phase Change

- As heat (Q) is added, temperature generally increases
- We have shown this by using **$Q = mc\Delta T$**
- The enthalpy change of a system is related to the change in heat so we can use **$\Delta H = mc\Delta T$**

- At **critical points**, heat is added but the temperature does not change because the heat is being used to cause the phase change

These changes have special symbols and values:

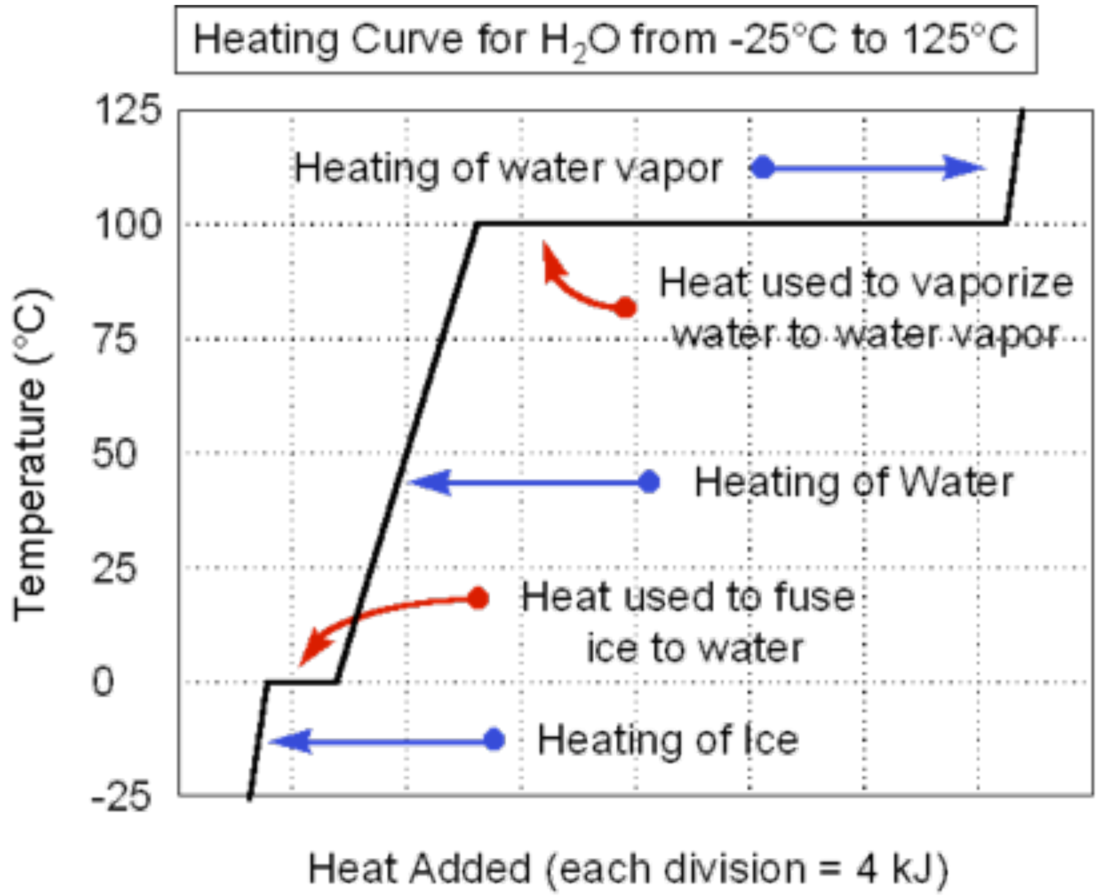
Enthalpy of melting: ΔH_{melt}
Enthalpy of vaporization: ΔH_{vap}
Enthalpy of dissolving: ΔH_{sol}

So any time a problem involves a phase change, you must take into account this additional energy change.

For example, H_2O has the following values:
ΔH_{melt} = 6.02 kJ/mol
ΔH_{vap}= 40.0 kJ/mol

Notice they are in kJ/mol, meaning you must convert your masses into moles!

You have 50 g of ice at -25C and heat it until you have 50 g of steam at 125C. Determine the enthalpy change of the reaction.



1) ice going from -25 to 0C [$\Delta H = mc\Delta T$]
2) ice melting to water [ΔH_{melt}]
3) water going from 0 to 100 [$\Delta H = mc\Delta T$]
4) water vaporizing to steam [ΔH_{vap}]
5) steam going from 100 to 125 C [$\Delta H = mc\Delta T$]

$$\Delta H = mc\Delta T + \Delta H_{melt} + mc\Delta T + \Delta H_{vap} + mc\Delta T$$

SCH4U	# Enthalpy & Phase Change
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1. How much energy must be lost for 50.0 g of liquid wax at 85.0˚C to cool to room temperature at 25.0˚C?
($C_{solid\ wax}$= 2.18 J/g˚C, m.p. of wax = 62.0˚C, $C_{liquid\ wax}$=2.31 J/g˚C; M=352.7 g/mol, ΔH_{fusion}=70,500 J/mol)

2. The melting point of $O_{2(s)}$ is −219˚C. Determine the amount of thermal energy that must be removed to completely freeze 15.0 mol of $O_{2(l)}$ at this temperature.
(**ΔH_{melt} = 0.44 kJ/mol, ΔH_{vap} = 6.82 kJ/mol)**