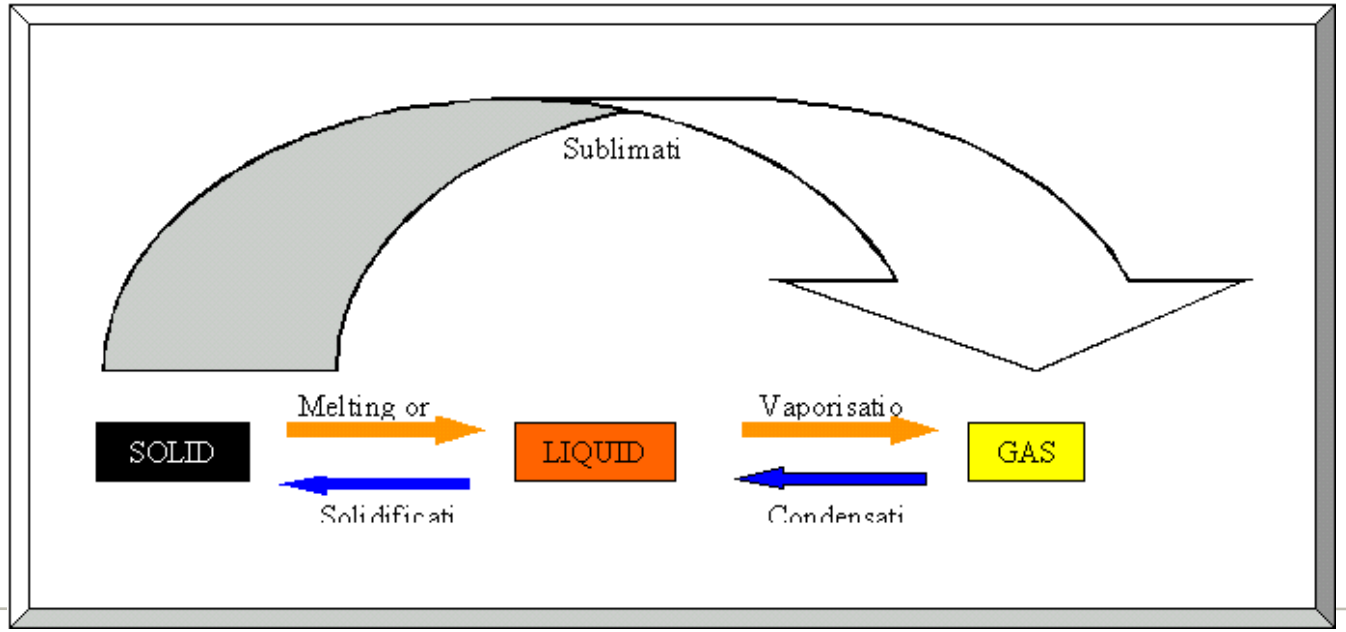
Reaction Enthalpy



- the enthalpy change of any reaction is the difference between the sum of the formation enthalpies of the products and the reactants

$$\Delta_r H = \Sigma(n_f \Delta H_m) - \Sigma(n_f \Delta H_m)$$

PRODUCTS **REACTANTS**

- *It's a good habit to put the molar enthalpies directly below each reactant from your data booklet*

Example 1:

- What is the enthalpy change for the combustion of propane that produces gaseous products?

Example 2:

- What is the enthalpy change when 3.6g of ammonium nitrate decomposes to produce water vapor, dinitogen monoxide (which immediately decomposes into nitrogen gas and oxygen gas)?

IMPORTANT TO REMEMBER

- In an OPEN SYSTEM, something like an engine or a fireplace, water is GASEOUS – think about it a fire doesn't make you get soaked!
- In a CLOSED SYSTEM, something like a plant, body or a calorimeter, water is LIQUID – obviously we don't drink gaseous water!

Steps to Enthalpy Questions

1. **Figure out balanced equation**
2. **Find formation enthalpies and determine ΔHrxn**
3. **Put ΔHrxn into equation (exothermic energy is a product, endotherminc is a reactant)**
4. **Use ΔHrxn as Hm by dividing by coefficients**
5. **Determine the enthalpy by multiplying by given moles ΔH = nHm**

Example 3: challenge

- When heptane burns, 4816.7kJ of energy is released from the overall reaction. What is the molar enthalpy of FORMATION of heptane, given gaseous products?