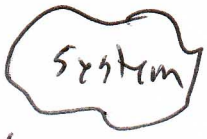
10/24/11 system, internal energy, enthalpy, entropy, free energy, state functions, Hess's law

system – an arbitrary frame of reference – in chemistry, it is usually a sol'n (excluding the glassware containing the sol'n)



internal energy – (U) – the total of all the vibrational, rotational, and translational motion of all matter within the system.

– Internal energy cannot be directly measured, but Δ changes in internal energy can be measured.

1st law of thermodynamics – Within a closed system (a system that does not allow energy or matter to flow across the system boundaries)

$\Delta U = 0$

$\Delta U = q + w$ The change in internal energy is due to heat (q) and work (w).

Enthalpy – (ΔH) – A measure of internal energy adjusted for any pressure-volume work,

$\Delta H = \Delta U + pV$ ⟶ raw energy of reactants or products.

$\Delta H > 0$ – endothermic – energy is added to the system.

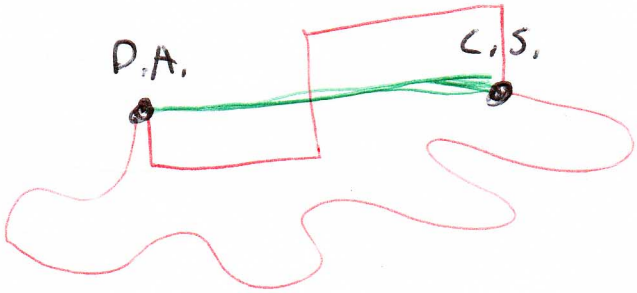
$\Delta H < 0$ – exothermic – energy is released from the system.

Enthalpy is a state function

State [redacted] – the set of all physical descriptions of a system. Ex: P, V, T

state function – a function the value of which only depends on the initial and final states, not on how the process occurred.

path function – a function the value of which entirely depends on how a process occurs and not on its initial or final states.



— displacement (shortest distance)

— total distance