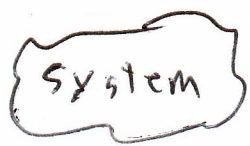


10/25/11 system, internal energy, enthalpy, entropy,  
 free energy, state functions, Hess's Law  
 system - an arbitrary frame of reference -  
 in chemistry, it's usually the reaction mixture  
 (excluding the glass ware containing it)



surroundings

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

- Internal energy cannot be directly measured,  
 but 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/or work (w).

$\Delta U + pV = \Delta H \rightarrow$  Enthalpy - A measure of  
 internal energy adjusted for pressure volume  
 work.  $\rightarrow$  raw energy of reactants or  
 products.

Sign convention

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

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

# Enthalpy is a state function

#2

State - the set of all physical descriptions of a system. Ex:  $P, V, T, x$

state function - a function the value of which only depends on the initial and final states, not on how the process occurs,

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

