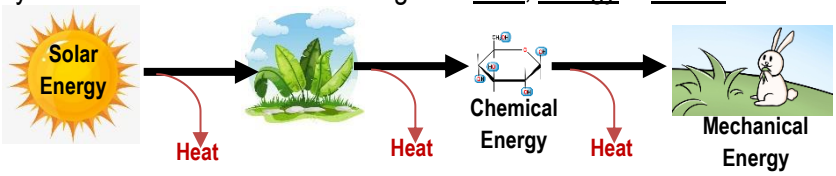
CONCEPT: ENTROPY

●Entropy: a measure of randomness & a property of _____.

□ Laws of thermodynamics: describes flows & changes of *heat*, *energy* & *matter* in reactions.

EXAMPLE:

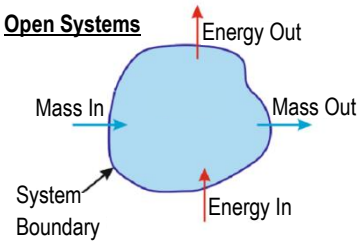


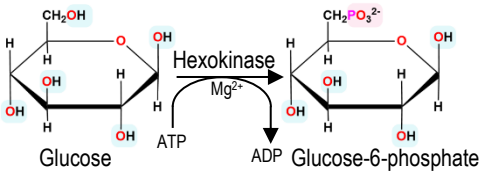
System & Surroundings

●_____: local portion of the universe that we are focusing on; (*surroundings:* rest of the universe).

●Biological systems: *open systems* that exchange both _____ & _____ with the surroundings.

EXAMPLE:





Understanding Entropy

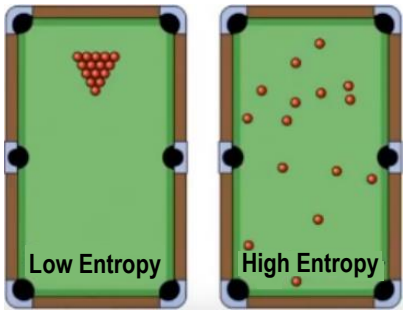
●Entropy: a measure of _____, or randomness; the greater the disorder, the _____ the entropy.

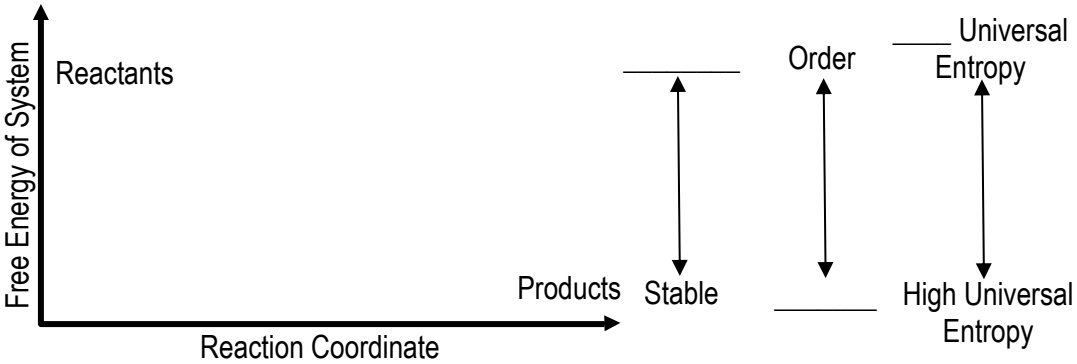
●Reactions move the Universe toward a state of maximum entropy.

□ Local entropy can decrease if *accompanied* by an _____ in universal entropy.

□ High universal entropy is associated with more _____ & lower _____ within a system.

EXAMPLE:

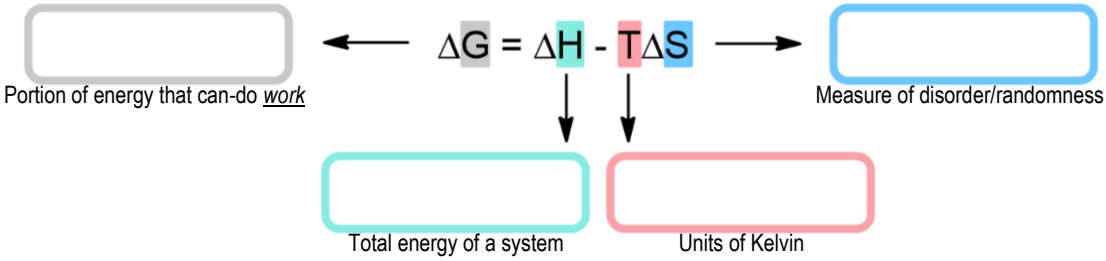




Gibbs Free Energy Equation

●Gibbs Free Energy Equation expresses the link between *changes* in entropy (**ΔS**), enthalpy (**ΔH**) & free energy (**ΔG**).

EXAMPLE: Appropriately label each term:

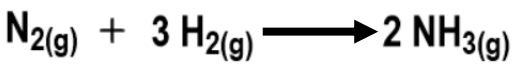


CONCEPT: ENTROPY

PRACTICE: When solid ice water melts to liquid water, how does that affect its entropy?

a) Entropy decreases.
b) Entropy increases.
c) Entropy stays the same.
d) Impossible to tell. Needs more information.

PRACTICE: How does the entropy change with the following reaction?



$$N_{2(g)} + 3\,H_{2(g)} \longrightarrow 2\,NH_{3(g)}$$

a) Entropy decreases.
b) Entropy increases.
c) Entropy stays the same.
d) Impossible to tell. Needs more information.

PRACTICE: Consider a reaction at 100˚C with ΔG = 15 kJ and ΔH = 40 kJ. Calculate the system's change in entropy.

a) 139.13 kJ/K
b) -13.3 kJ/K
c) 0.15 kJ/K
d) 0.07 kJ/K