Aim B2: ~~Entropy~~ (Day 3) 4/24/17

Entropy - Measure of degree of <u>disorder</u> in a system

- When things are warmer there is more entropy
  liquid vs. Solid Hot vs. Cold
  (More KE)

- When we mix, there is more entropy
  Mixture vs. 2 gases separate

Closed system - For entropy you go from low entropy to higher entropy as time advances
(As time ~~increases~~ advances, Entropy increases) $\Delta S > 0$

"Reversible Process" $\Delta S = 0$

<u>The 2ND Law of Thermodynamics</u>

- $\Delta S_{closed} \geq 0$ (Entropy of a closed system always increases)

Ex. A lake Freezes, as a result the entropy of the water decreases. Does this violate 2ND Law of Thermo

Need to consider the whole system

~~ICE to Water~~
Water to ice
(low Entropy)

$\Delta S_{syst} > 0$

Heat Energy released
(High Entropy)

Low Entropy

Surrounding Envir. Gets warmer

$|\Delta S_{Envir}| > |\Delta S_{ICE}|$
(+) (−)

During Freezing process heat energy must be released

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Calculating Entropy changes

$\Delta S = \frac{\Delta Q}{T}$ ΔQ - Heat Added

T - Temp (K) Can Fanded High T - less order

- At low T big increase in entropy

22:26 Ex. 300g of water is heated from 20°C to 30°C. How much has the entropy of the water increased?

$c_{H_2O} = 4200$

Goal $\Delta S = \frac{Q}{T}$ ① Need Q $Q = mc\Delta T$

$= .3kg (4200\ J/kg°C)(10°C)$

$= 12{,}600\ J$

② Temp is changing : Use T_{Avg}

$T = 25°C \rightarrow 25 + 273 = 298K$

③ $\Delta S = \frac{12{,}600\ J}{298K} = 42.3\ J/K$

Summary

- Entropy is a measure of disorder

→ less entropy - Colder

- Separated / Organized

2^{ND} Law $\Delta S > 0$

If $\Delta S = 0$ It is reversible

Calc. Change $\Delta S = \frac{Q}{T}$