

Aim B2: Entropy (Day 3)

4/24/17

Entropy - Measure of degree of disorder 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 high entropy as time advances
(As time increases, advances, Entropy increases) $\Delta S > 0$

"Reversible Process" $\Delta S = 0$

The 2nd Law of Thermodynamics

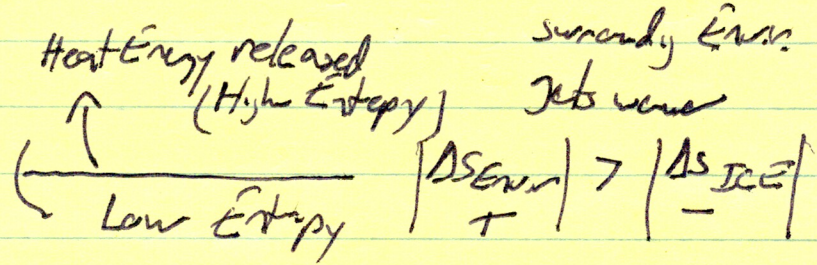
- $\Delta S_{\text{closed}} \geq 0$ (Entropy of a closed system always increases)

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)

$\Delta S_{\text{system}} \geq 0$



During freezing process heat energy must be released

Calculating Entropy changes

$$\Delta S = \frac{\Delta Q}{T}$$

ΔQ - Heat Added

T - Temp (K) (use Farred H₂O ^{less} and
- At low T by 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?

Goal

$$\Delta S = \frac{Q}{T}$$

① Need Q $Q = mc\Delta T$

$$c_{H_2O} = 4200$$

$$= .3 \text{ kg} (4200 \text{ J/kg}^\circ\text{C}) (10^\circ\text{C})$$

$$= 12,600 \text{ J}$$

② Temp is changing: use T_{avg}

$$T = 25^\circ\text{C} \rightarrow 25 + 273 = 298 \text{ K}$$

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

Summary

- Entropy is a measure of disorder
- less entropy - Colder
- Separated / Organized

2nd Law $\Delta S \geq 0$

If $\Delta S = 0$ It is reversible

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