# Entropy:

Most chemical reactions (occurring in nature) are exothermic. Most natural reactions are spontaneous. Some spontaneous reactions are endothermic. WHY??

Not only enthalpy helps determine wether a reaction will be spontaneous, we also use entropy.

# Entropy is disorder.

If the arrangement of the atoms of the products of a chemical reaction is more disordered than the order of the reactants the reaction will tend to happen spontaneously.

Entropy is symbolized by S.

A disordered state has more entropy than an ordered one.

At absolute zero the entropy of a substance is zero.

Chemical reactions are driven by two processes;
1) Towards and increase in entropy
2) Towards the lowest enthalpy

The combination of these to processes is called the free-energy of the system. (Sometimes called the Gibb's Free Energy.)
Symbolized by $\Delta G$.

$\Delta G = \Delta H - T\Delta S$ (Units are usually kJ/mol)

Does the reaction below proceed in the forward or reverse direction and calculate the free energy.

$NH_4Cl \rightleftharpoons NH_3 + HCl$ @ 298 K.

$\Delta H = 176$ kJ/mol and $\Delta S = .285$ kJ/mol K

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$\Delta G = \Delta H - T\Delta S = 176 - 298(.285) = 91$kJ/mol it does not occur spontaneously at 298 in the forward reaction.