Name
Delta S

- Entropy (second law of thermodynamics)
  - Students will be able to recognize if entropy is increasing or decreasing as a matter of movement.
  - Students will understand how entropy relates to energy.
  - Students will calculated the actual value of entropy of a chemical process using thermodynamic tables.
  - Students will be able to relate the sign of ΔS and spontaneity.

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1. (Brady804) Predict the algebraic sign of ΔS for the reactions:
   a) $2NO_{2(g)} \rightarrow N_2O_{4(g)}$ −
   b) $C_3H_{8(g)} + 5O_{2(g)} \rightarrow 3CO_{2(g)} + 4H_2O_{(g)}$ +
   c) $H_2O_{(s)} \rightarrow H_2O_{(l)}$ +
   d) $H_2O(l) \rightarrow H_2O(g)$ +
   e) $Ag^+_{(aq)} + Cl^-_{(aq)} \rightarrow AgCl_{(s)}$ −
   f) $4Fe_{(s)} + O_{2(g)} \rightarrow 2Fe_2O_{3(s)}$ −

2. There are multiple ways to calculate ΔS. Using the absolute entropy calculate the net entropy?

C_3H_8 = 269J/molK
O_2 = 205J/molK
CO_2 = 213J/molK
H_2O = 188J/molK

$C_3H_{8(g)} + 5O_{2(g)} \rightarrow 3CO_{2(g)} + 4H_2O_{(g)}$

269 205(5) 213(3) 188(4)

P − R = Δ

269 + 1025 = 1294 639 752 = 1391

1391 − 1294 = +97

3. Alternate method, for solving for entropy.

$A_{(s)} + B_{(g)} \rightarrow C_{(g)}$ ΔH = -50kJ ΔG = -55KJ$_{rxn}$

   a. Using the equation, estimate the sign of entropy change.

all gases +

   b. Calculate Entropy using the values above. @25°C

ΔG = ΔH − TΔS

−55 = −50 − 298(x) x = +.016 KJ/mol K

   c. How does temperature have to change to make this reaction non-spontaneous?

ΔG = ΔH − TΔS

− − (+)

−

−ΔG at all temps