Chap 19 Thermodynamics ← LAWS

heat (energy)

↳ work + active

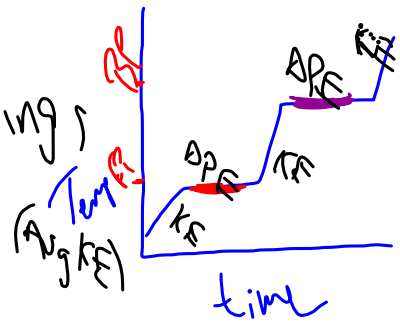
Dynamic Duo

Batman + Robin

Law #1 - Law of Conservation.

System ⇄ Surrounding;

PE ⇄ KE



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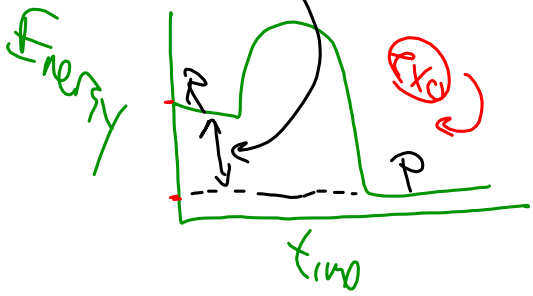
ΔH (Hess's Law Stuff)

↳ ... change in energy

Enthalpy ΔH

$\Delta H_{rxn} = \sum(\Delta H_1 + \Delta H_2 + \ldots + \Delta H_n)$

$\Delta H = \Delta H_{prod} - \Delta H_{react}$



Spontaneous → Exothermic

ΔH (−)

tends ↑

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Entropy (ΔS) 2nd Law of Thermodynamics

↳ Measure of Disorder / Randomness

Mar 29-8:08 AM

3rd Law of Thermodynamics

Rocks (Big Boulders) don't move on their own.

↳ "Molecule" Not changing position

ex: SOLID → Vibrates in place without changing position.

Pure SOLID = $\Delta H = 0$

Energy → enthalpy

Crystalline Solid

Lattice energy

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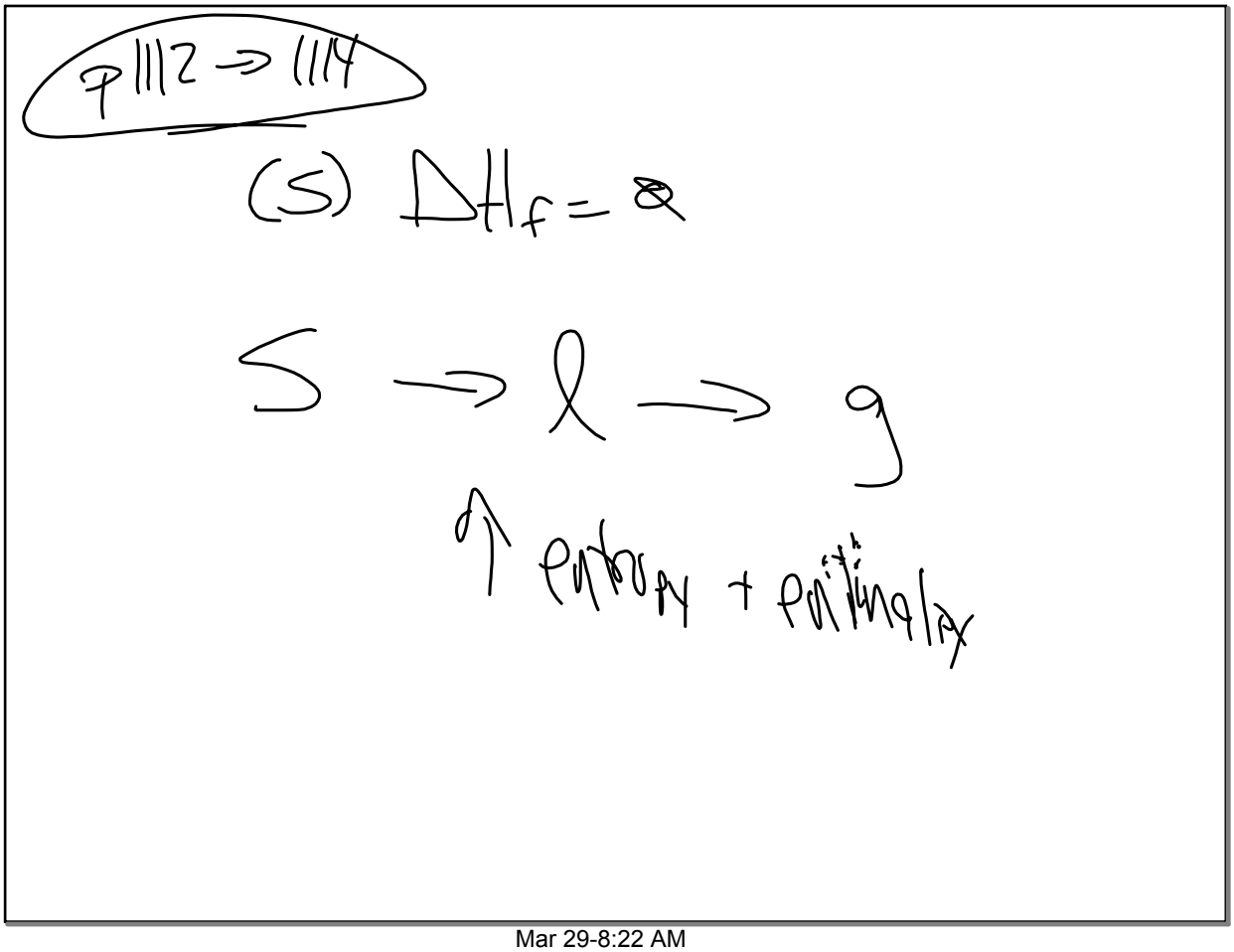

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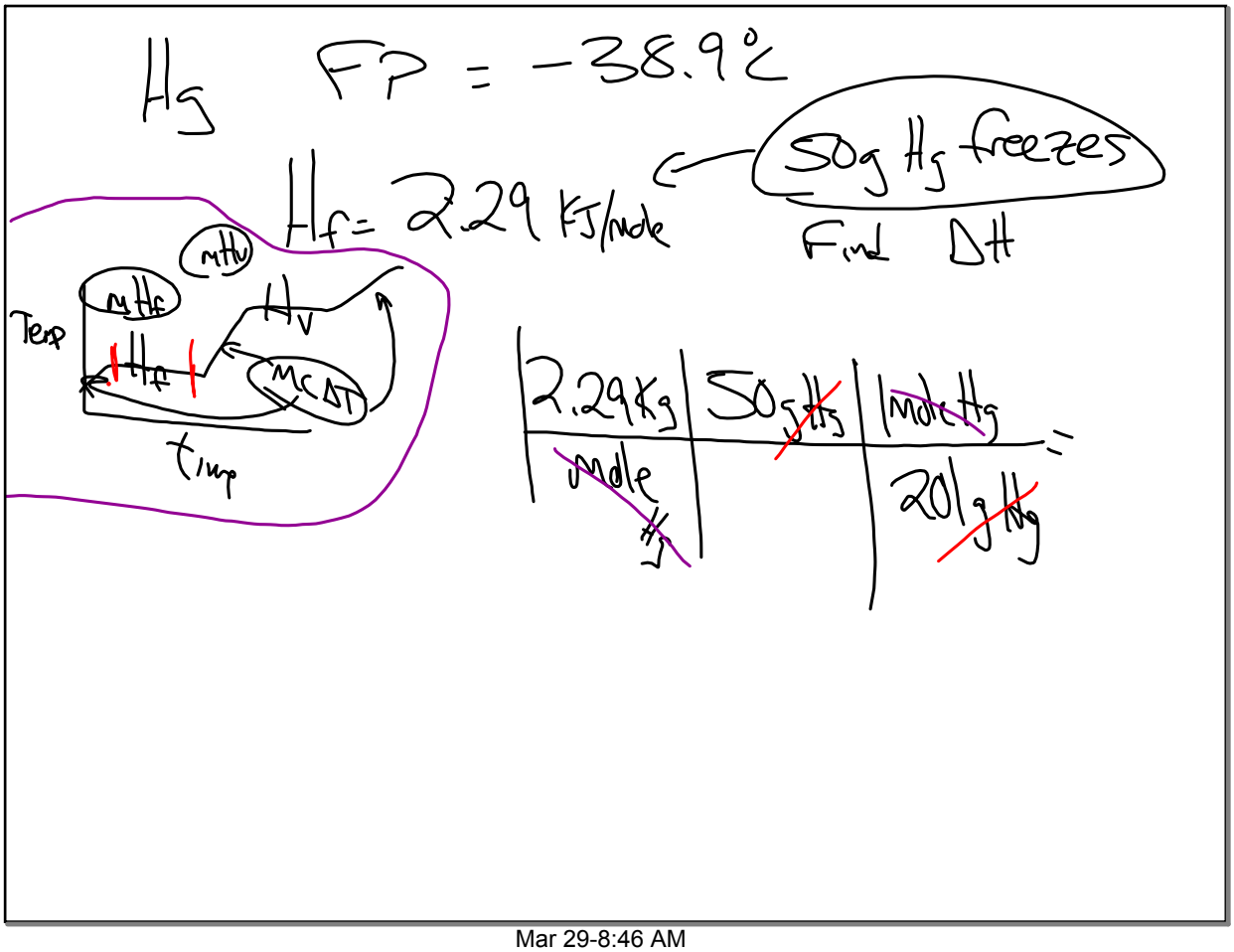

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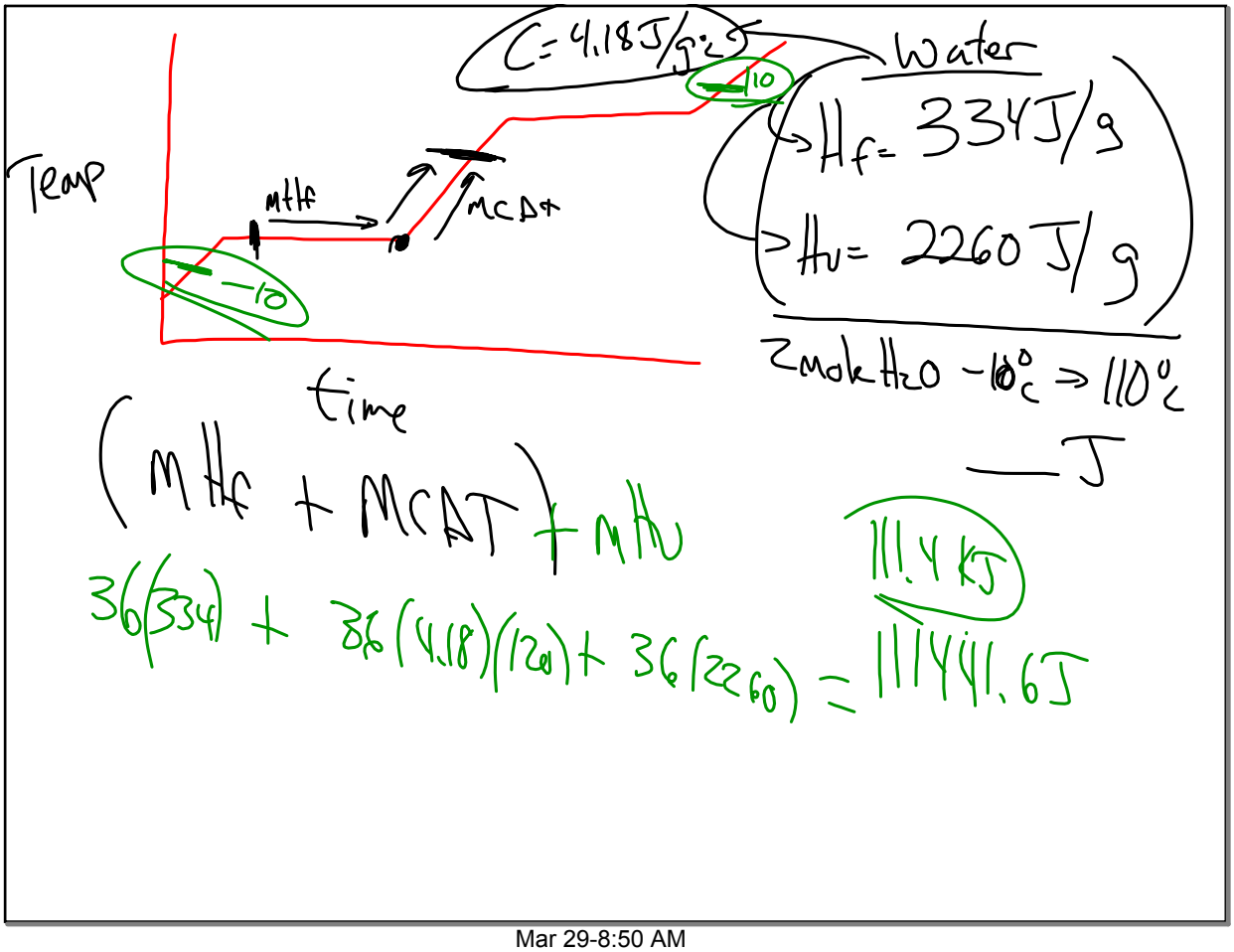

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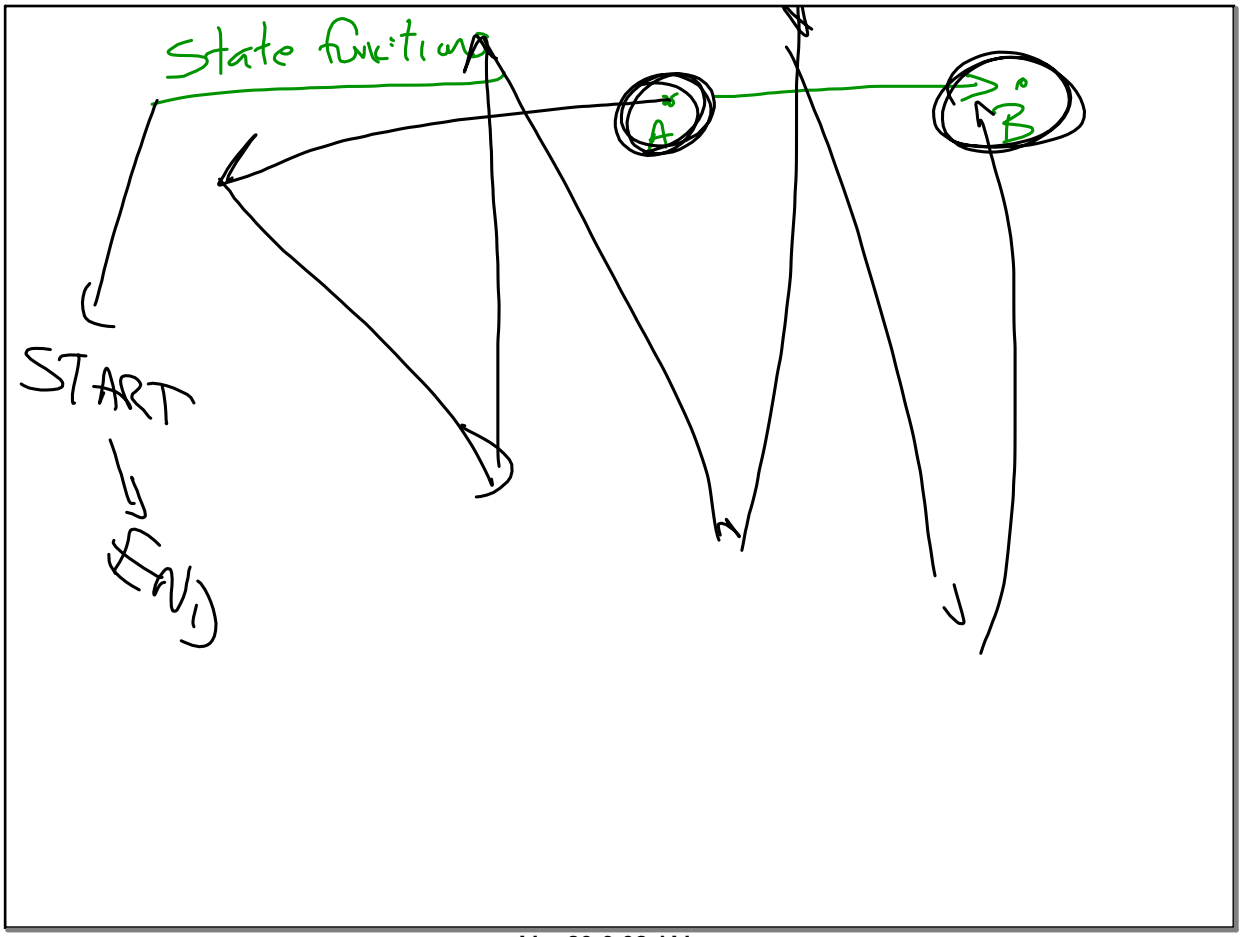

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$\Delta S_{rxn} = n\Sigma \Delta S_{prod} - n\Sigma \Delta S_{react}$

$\Delta H_{rxn} = n\Sigma \Delta H_{prod} - n\Sigma \Delta H_{react}$

Find ΔS for $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

$\Delta S = [2\Delta S(NH_3)] - [\Delta S(N_2) + 3(\Delta S(H_2))]$

$= 2(+192.5) - [191.5 + 3(130.58)]$

$= -198.24\ J$

Mar 29-9:03 AM

Spont Rxn ⊖ΔH exothermic, ⊕ΔS messier more randomness

TEMP ⇐ ΔH

⊖ΔS

Deciding Factor for Spontaneity

$\Delta G = \Delta H - T\Delta S$

ΔG Gibbs Free Energy

T Kelvin

ΔH ΔS one unit "KJ"

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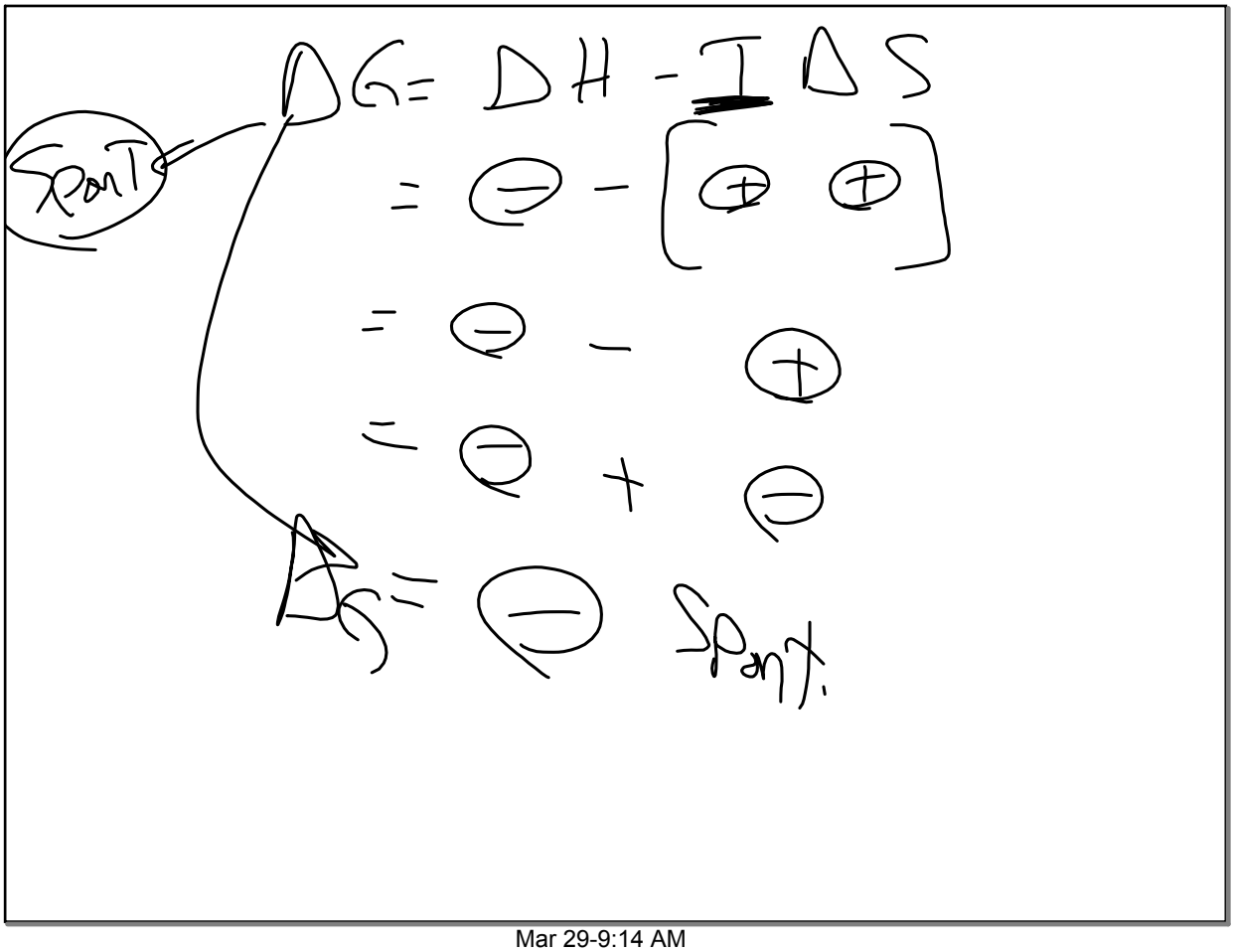

Mar 29-9:14 AM

19/ 41, 50, 58 a+b

Mar 29-9:17 AM