(19) $CH_4 + 2O_2 \Rightarrow CO_2 + 2H_2O + 890.4\ KJ$

$22°c$ 100°c

System

Exo $\Delta H_{rxn} - 890$ KJ

EXO

System's Point of View

Exo
metal loses heat System

Surroundings

Water gains heat.
Endo.

WOO! This feels COLD

← Chris Core ←EXO

← ICE PACK

ENDO

System.

P19 $\dfrac{8g\,CH_4}{} \cdot \dfrac{1\,mole\,CH_4}{16g\,CH_4} \cdot \dfrac{890.4\,KJ}{1\,mole\,CH_4} = 445.2$

P26
② $\Delta G = \Delta H - T\Delta S$

$= (+300\,KJ) - \Big[(298)(0.454) \Big]_{KJ}$

$\Delta G \oplus = 164.708\,KJ$

p26 (4)

$$\Delta G = \boxed{\Delta H} - \boxed{T \Delta S}$$

Spont!

$-160 \text{ kJ} = (-200 \text{ kJ}) - (298 \Delta S)$ SPONT

$+200 \qquad +200$

$\dfrac{+40}{-298} = \dfrac{-298 \Delta S}{-298}$

More ordered

ΔS

-134 J

Not Spont

$-0.134 \text{ kJ} = \Delta S$

$\Delta S \ominus$
Non-Spont

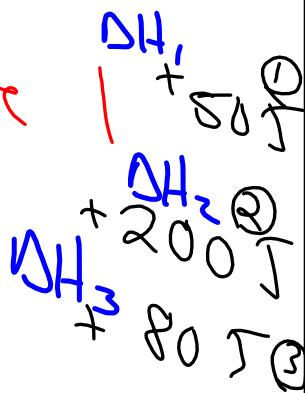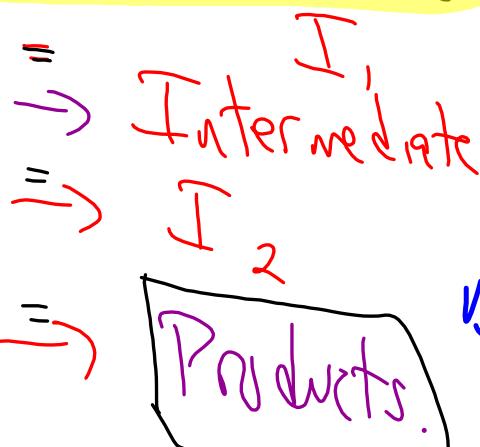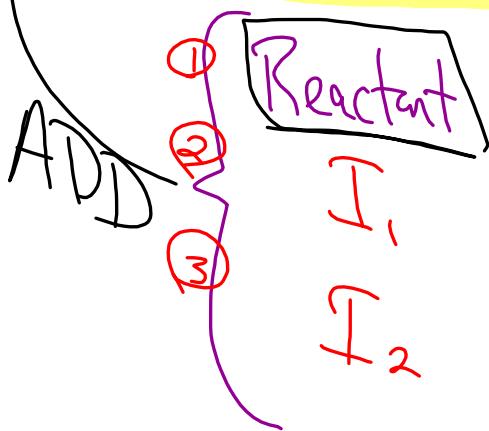|	Spont	Non-Spont
ΔH Enthalpy	⊖ EXO	⊕ ENDO
ΔS Entropy (Disorder)	⊕ Messier ↑Disorder	⊖ Cleaner
✳ ΔG Gibbs free energy ✳	⊖ Def. Spont.!	⊕ Def. Non-Spont.
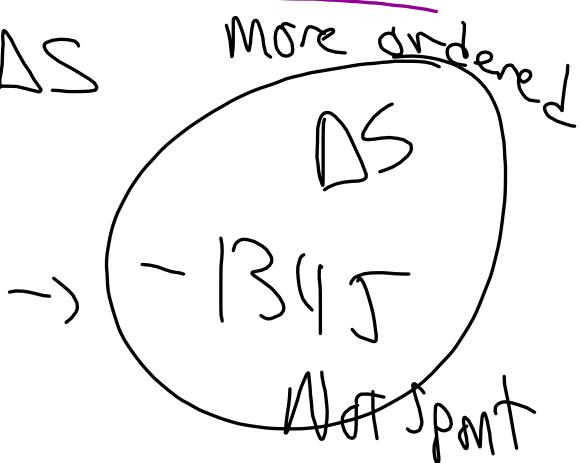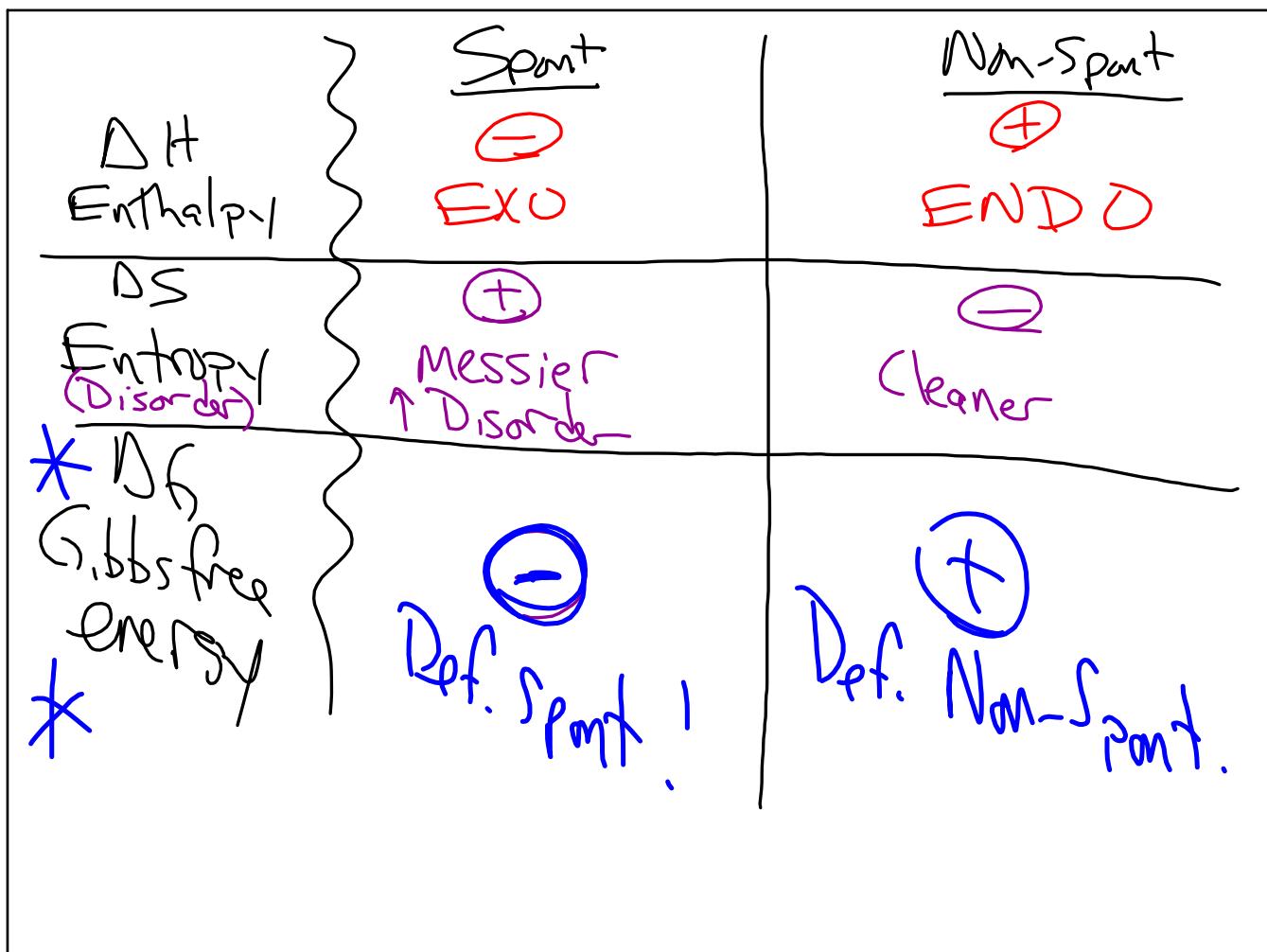
Hess's Law

→ A reaction occurs in a series of steps.

[React] → [Products]   (ΔHrxn's 330 J)

① [Reactant] = → Intermediate   I₁   ΔH₁ +50 J ①
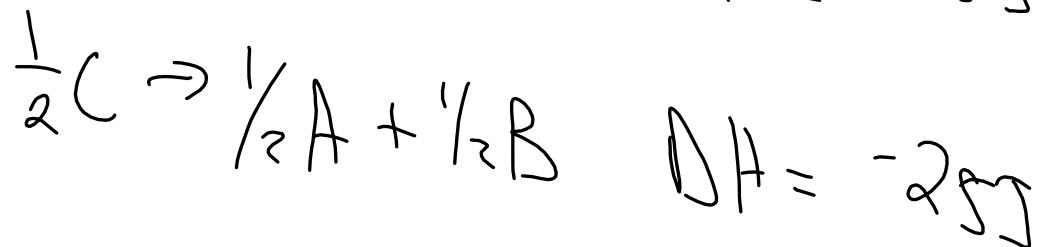
② I₁ = → I₂   ΔH₂ +200 J ②

③ I₂ = → [Products]   ΔH₃ +80 J ③

ADD
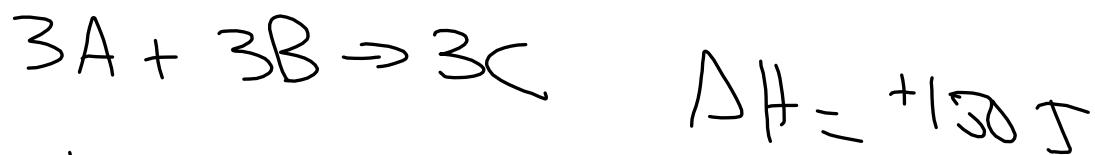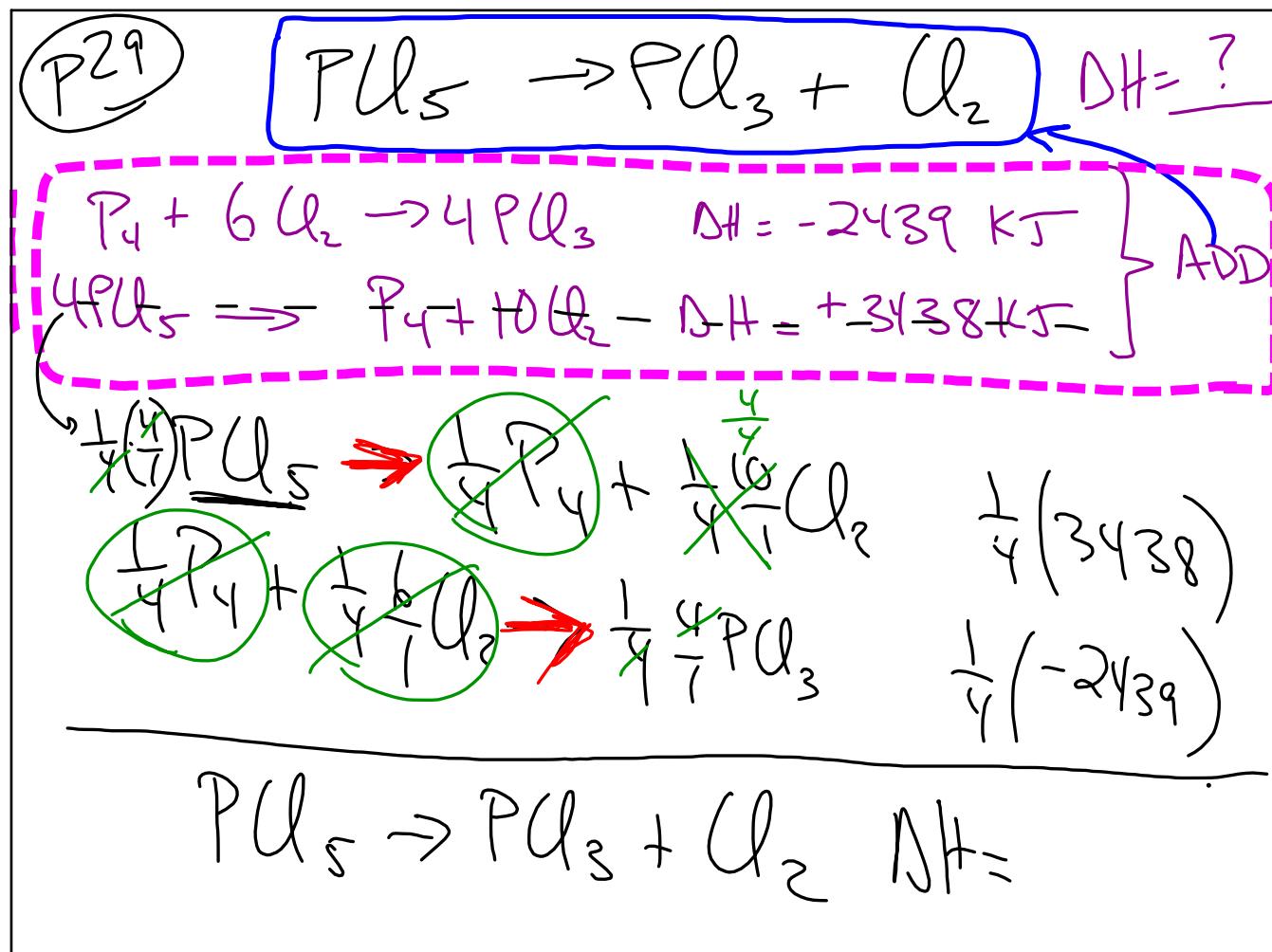
ADD up the parts (steps) to get the whole (final rxn)

$$\Delta H_{rxn} = \Delta H_1 + \Delta H_2 + \Delta H_3 + \ldots$$

$$A + B \rightarrow C \qquad \Delta H = 50 J$$

$$C \rightarrow A + B \qquad \Delta H = \underline{-50 J}$$

$$3A + 3B \rightarrow 3C \qquad \Delta H = +150 J$$

$$\frac{1}{2}C \rightarrow \frac{1}{2}A + \frac{1}{2}B \qquad \Delta H = -25 J$$

Feb 9-11:04 AM

(P29) $\boxed{PCl_5 \rightarrow PCl_3 + Cl_2}$ $\Delta H = \underline{?}$

$P_4 + 6Cl_2 \rightarrow 4PCl_3$ $\Delta H = -2439 \ KJ$ $\Big\}$ ADD

$4PCl_5 \Rightarrow P_4 + 10Cl_2$ $-\Delta H = +3438 KJ$

$\frac{1}{4}\left(\frac{4}{1}\right)PCl_5 \rightarrow \frac{1}{4}P_4 + \frac{1}{4}\frac{10}{1}Cl_2$ $\frac{1}{4}(3438)$

$\frac{1}{4}P_4 + \frac{1}{4}\frac{6}{1}Cl_2 \rightarrow \frac{1}{4}\frac{4}{1}PCl_3$ $\frac{1}{4}(-2439)$

$PCl_5 \rightarrow PCl_3 + Cl_2$ $\Delta H =$

P29 / 2 + 3