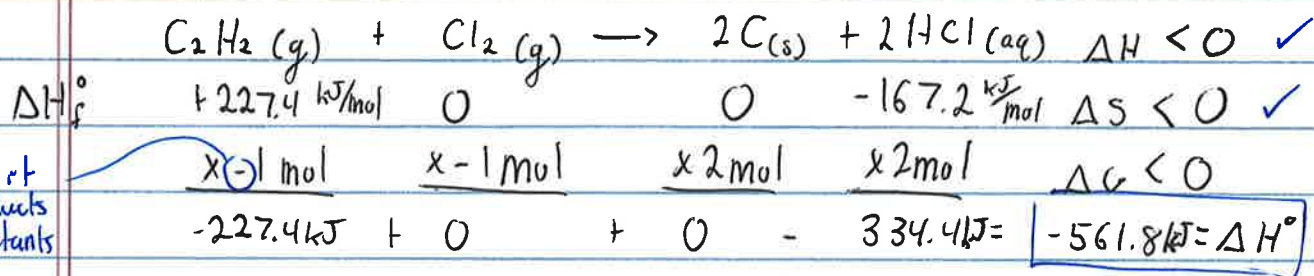


Today 3/25: Sections 17.1, 2, 4, 5

Tuesday: Expt 9

Wednesday: Sections 17.7, 8, 9



$\Delta H < 0$ exothermic $\Delta H > 0$ endothermic

• "Is heat given off?" "Does the process take heat?"

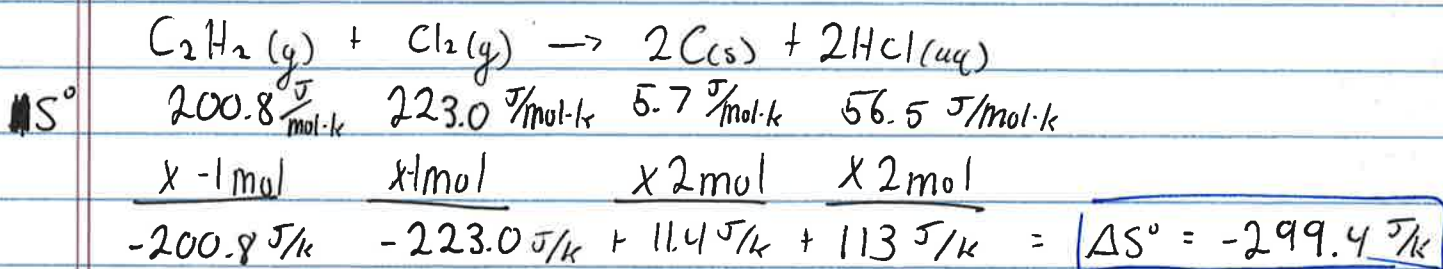
$\Delta S < 0$ entropy not favored $\Delta S > 0$ entropy favored

• $S_{\text{gas}} \gg S_{\text{liquid}} > S_{\text{solid}}$

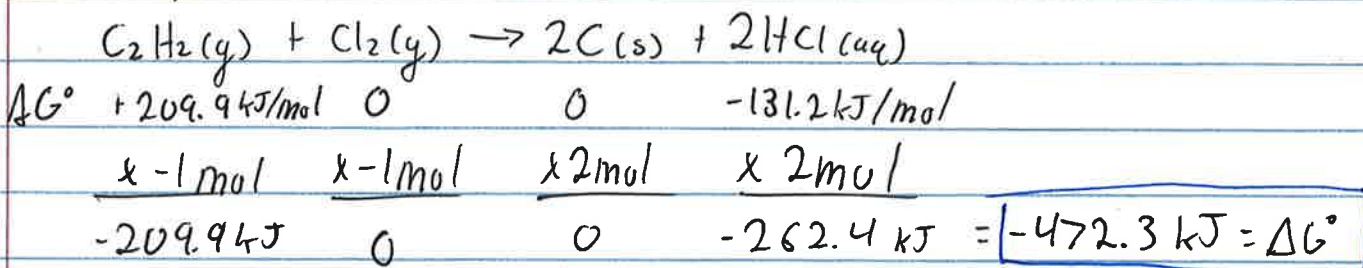
• "Does this produce gas?" \rightarrow yes, entropy favored

$\Delta G < 0$ favored/spontaneous $\Delta G > 0$ not favored/non-spontaneous

• "Does this happen? / Can this happen under these conditions?"



ΔH° , ΔS° $^\circ =$ standard conditions, 298K, 1.0 atm 1.0 M



or you can use:

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

$$\Delta G^\circ = -561.8 \text{ kJ} - (298 \text{ K})(-0.2994 \text{ kJ/K})$$

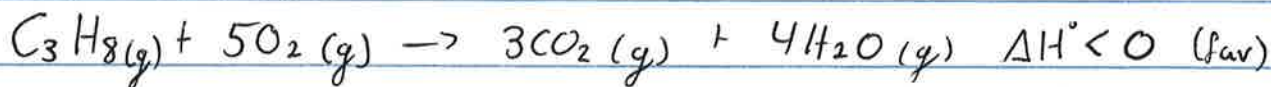
$$\Delta G^\circ = -472.6 \text{ kJ}$$

calc ΔG at 310K

$$\Delta G \approx \Delta H^\circ - T\Delta S^\circ$$

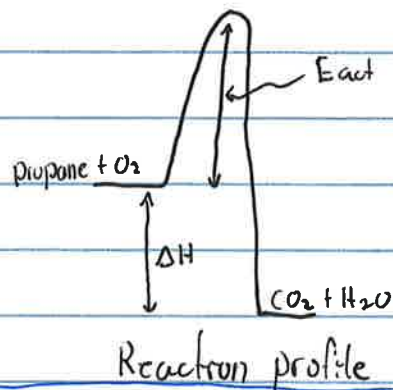
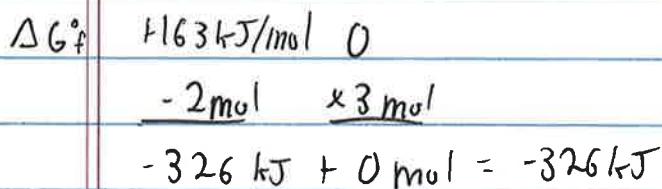
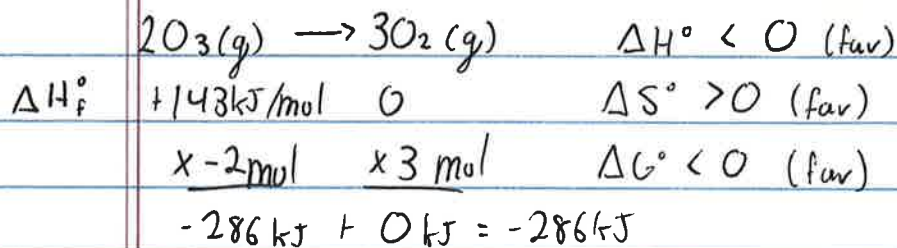
$$\Delta G = -561.8 \text{ kJ} - (310 \text{ K})(-0.2994 \text{ kJ/K})$$

$$\Delta G = -469.0 \text{ kJ}$$

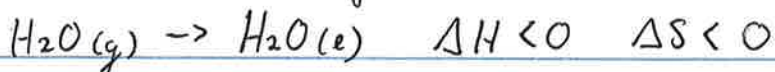
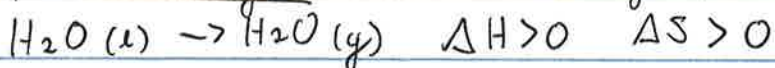


$$\Delta S^\circ > 0 \text{ (fav)}$$

$$\Delta G^\circ < 0 \text{ (fav)}$$



phase changes: ΔH and ΔS always have the same sign (+/-)



↑ takes energy to break bonds