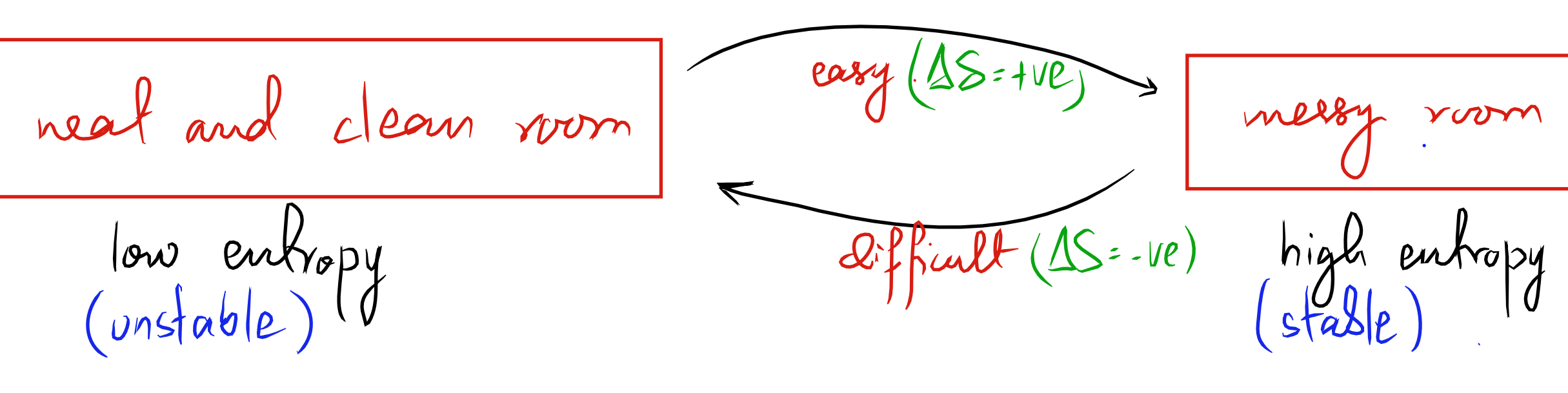


Entropy S° $J K^{-1} mol^{-1}$

measure of a disorder of a system.



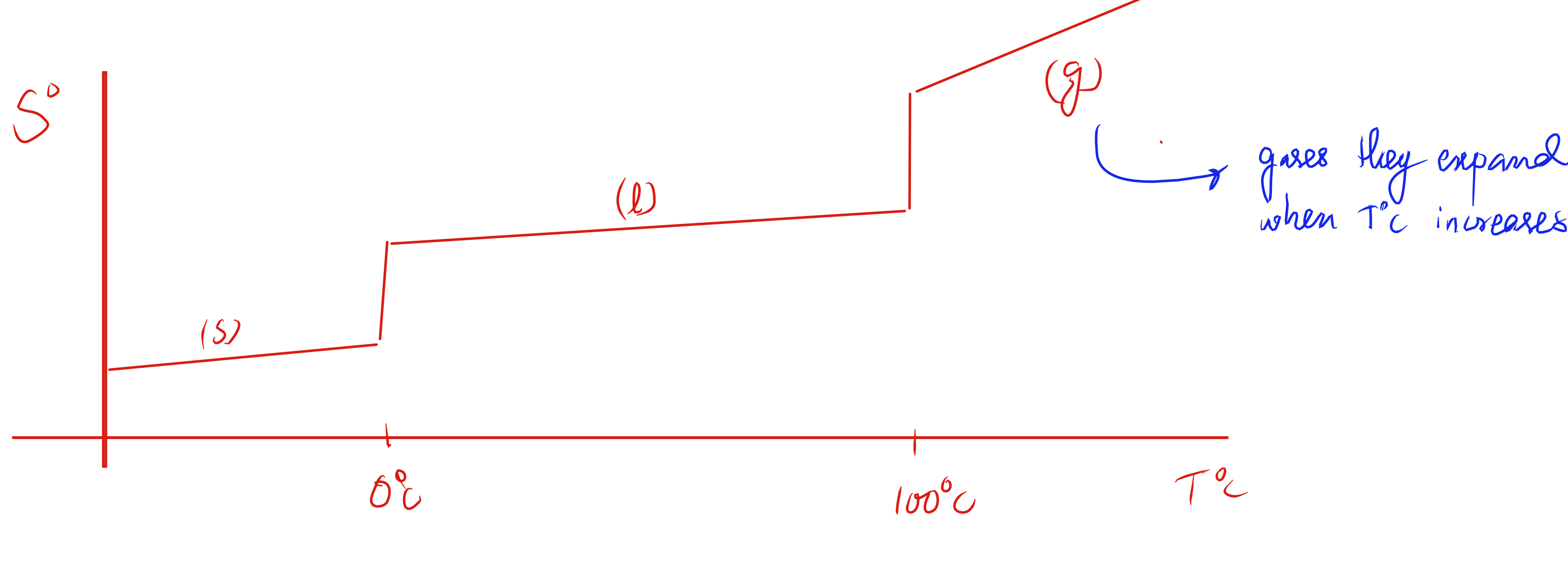
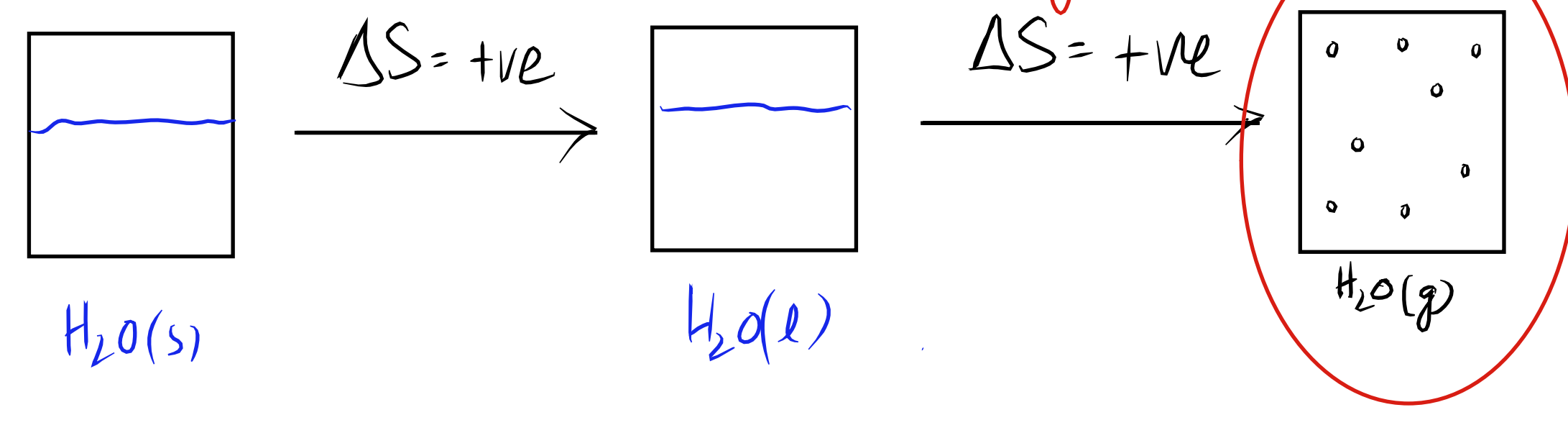
disordered states have higher probability.
ordered states have very low probability.

ΔS° = Standard Entropy Change

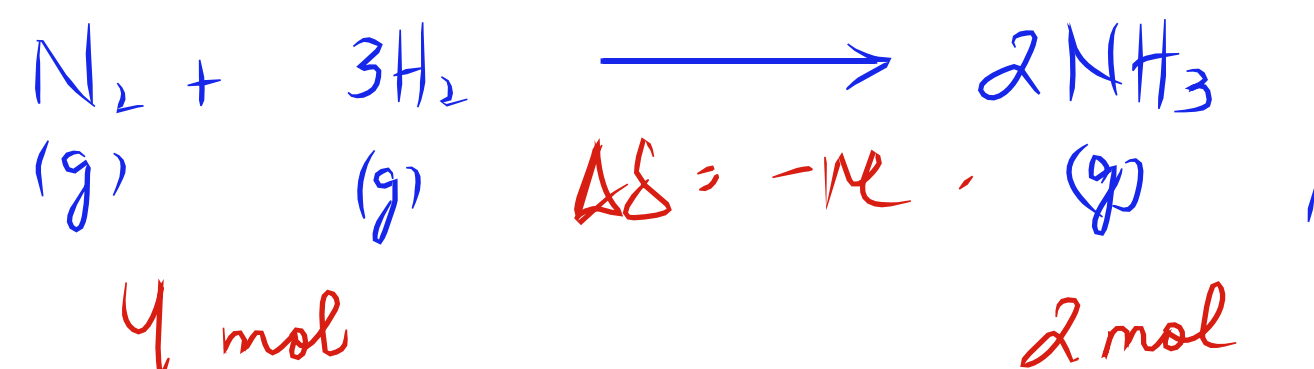
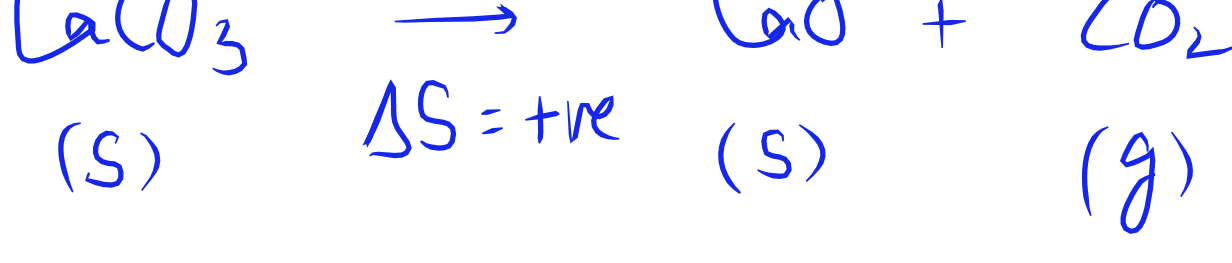
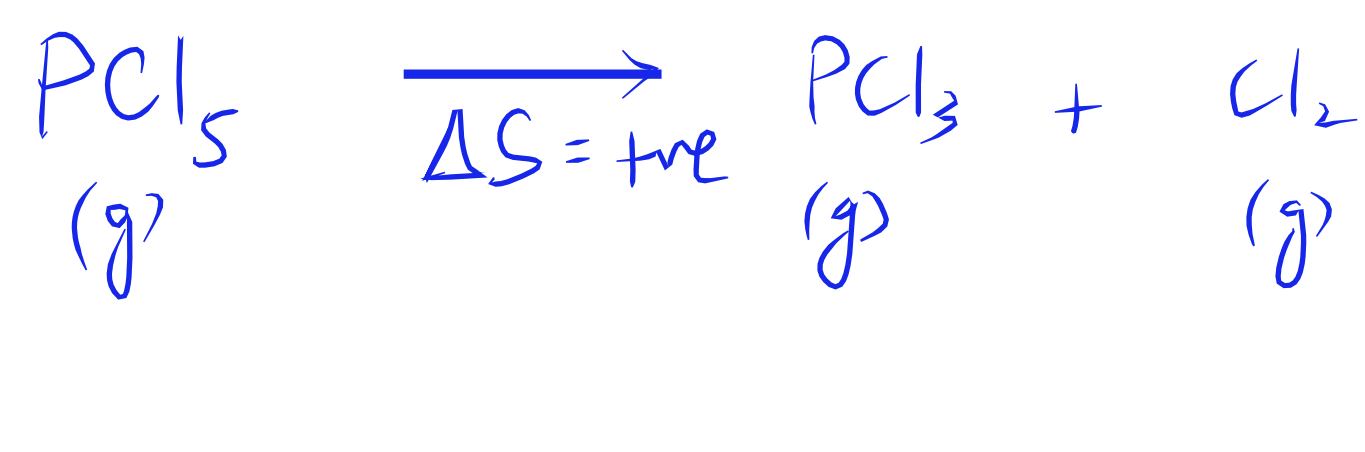
$\Delta S^\circ = +ve$ / gain of disorder
 $\Delta S^\circ = -ve$ / loss of disorder

Predicting sign of ΔS

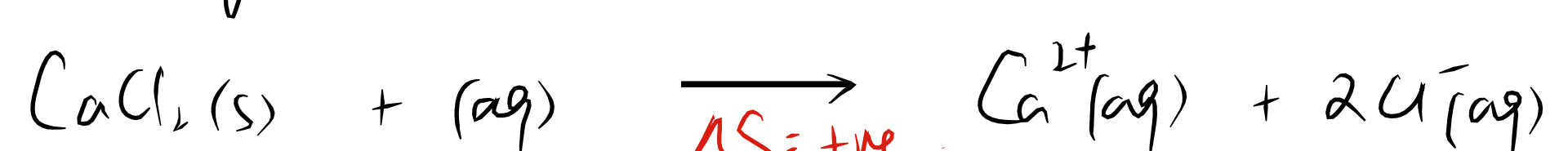
1. Changes of state



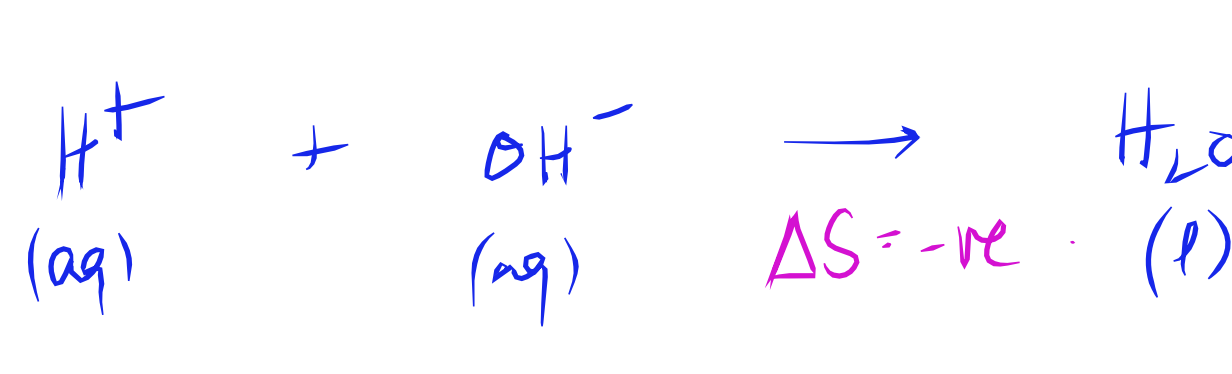
2. Whenever moles of gas increase $\Delta S = +ve$



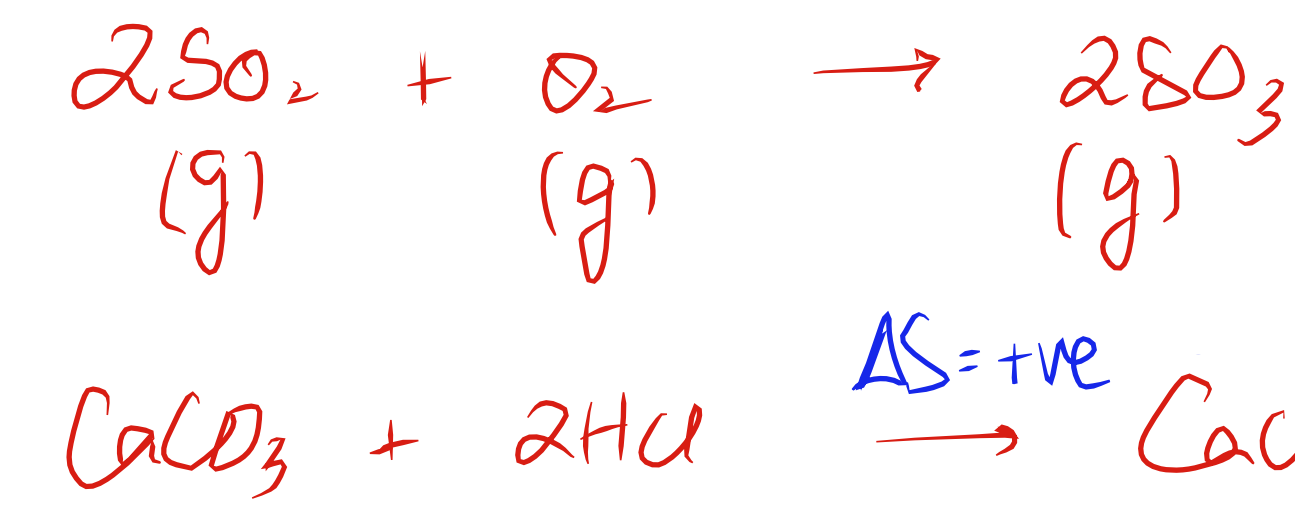
3. Dissolving



4. if same states / number of particles increase $\Delta S = +ve$

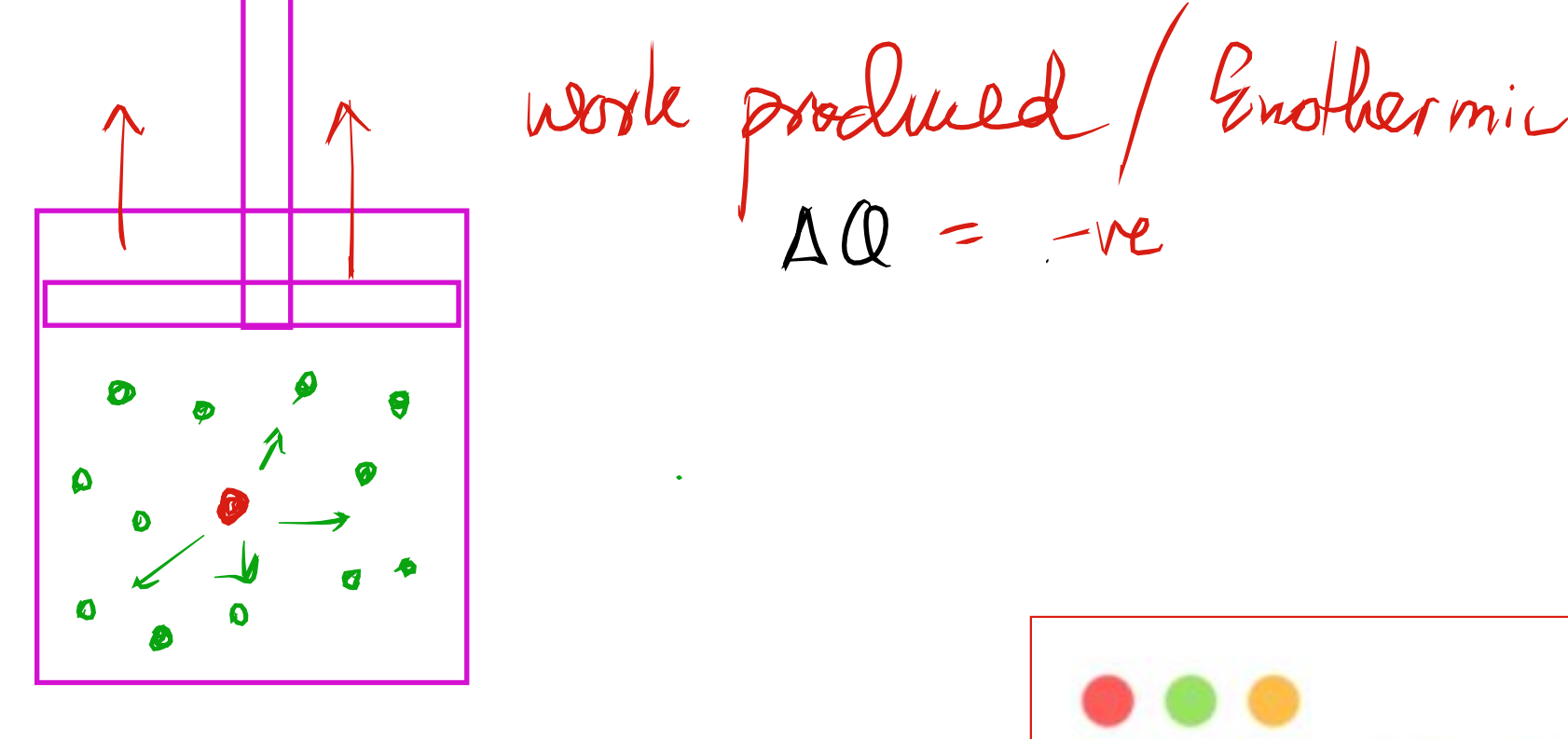
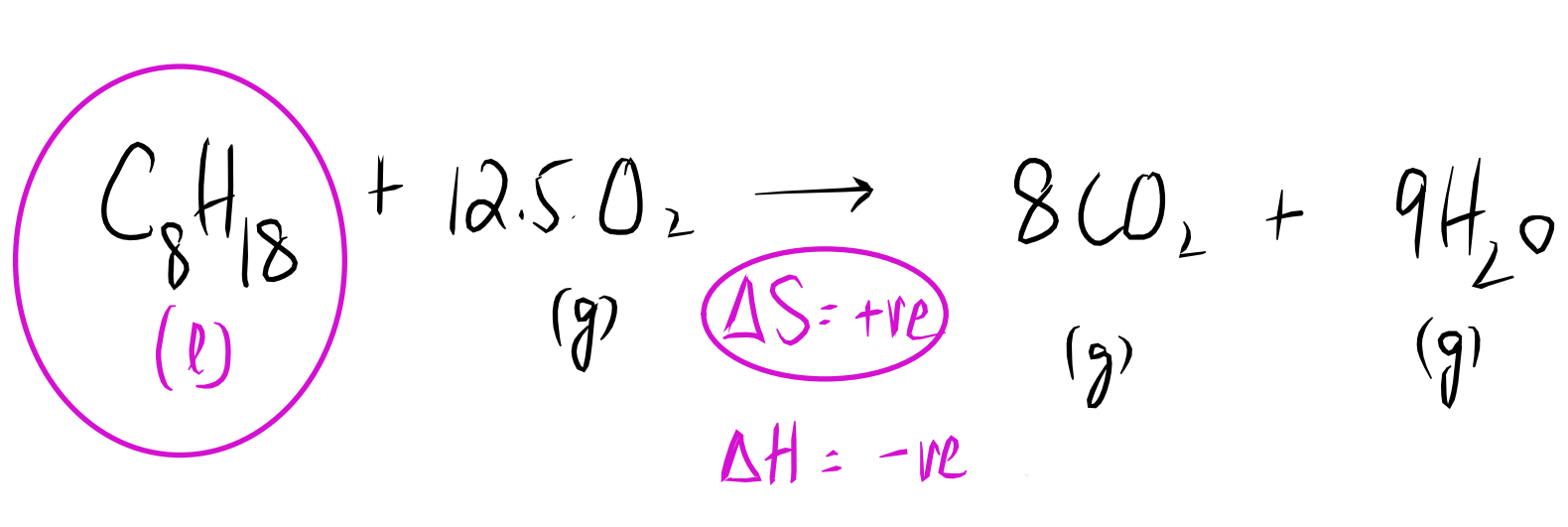


Example



$\Delta S ?$

most system they run on ΔS



$$\Delta S = -\frac{\Delta Q}{T} \quad T \text{ mol}^{-1} K^{-1}$$

$$\Delta Q = -T\Delta S$$

work produced due to ΔS



$$\Delta S = S^\circ(P) - S^\circ(R)$$

Standard Entropies S° are already provided in questions

(b) Magnesium carbonate can be decomposed.

$$MgCO_3(s) \rightarrow MgO(s) + CO_2(g) \quad \Delta H^\circ = +117 \text{ kJ mol}^{-1}$$

Standard entropies are shown in the table.

substance	$MgCO_3(s)$	$MgO(s)$	$CO_2(g)$
$S^\circ / J \text{ mol}^{-1} K^{-1}$	+65.7	+26.9	+214

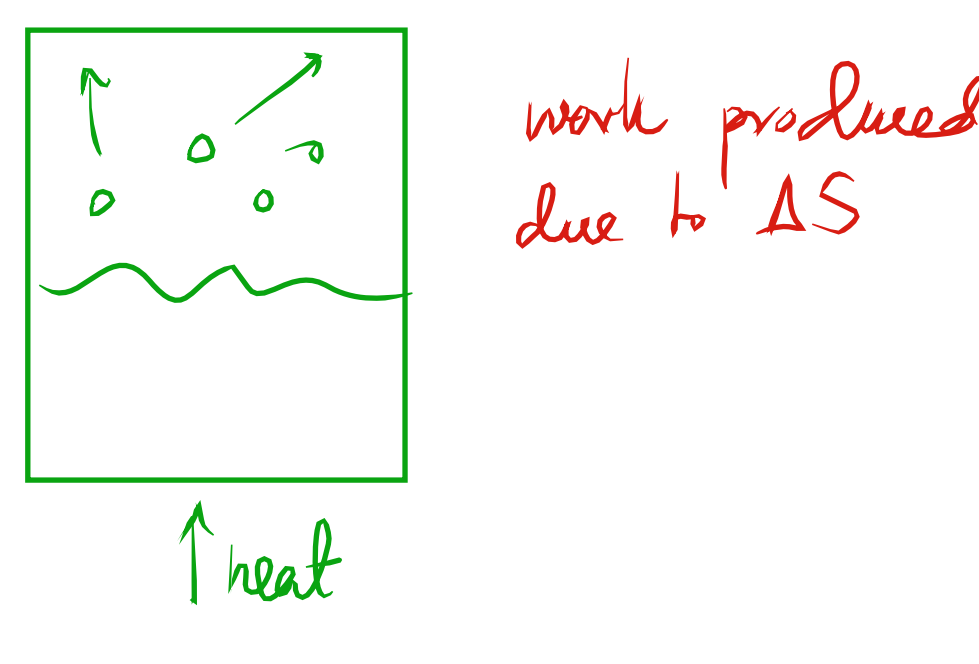
(i) Calculate ΔG° for this reaction at 298 K. Include a relevant sign and give your answer to three significant figures.

$$\Delta S = S^\circ(P) - S^\circ(R) = (26.9 + 214) - (65.7)$$

Gibbs Free Energy

Boiling water

$\Delta H = +ve$ takes in energy +ve
 $\Delta S = +ve$ produces work -ve



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

feasibility $\Delta G < 0$ feasible/spontaneous
 $\Delta G > 0$ not feasible/ not spontaneous

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

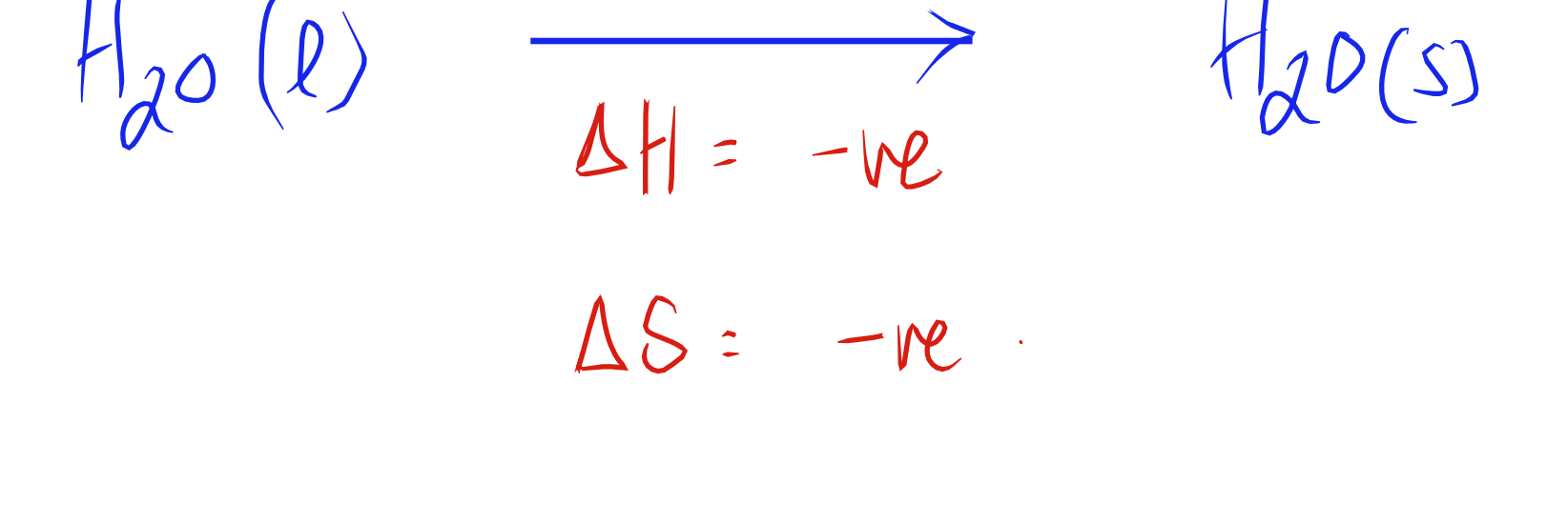
$$\Delta G = (+ve) - T(+ve)$$

for feasible, $\Delta G = -ve$, -ve term is bigger / T should be large

boiling at higher T°

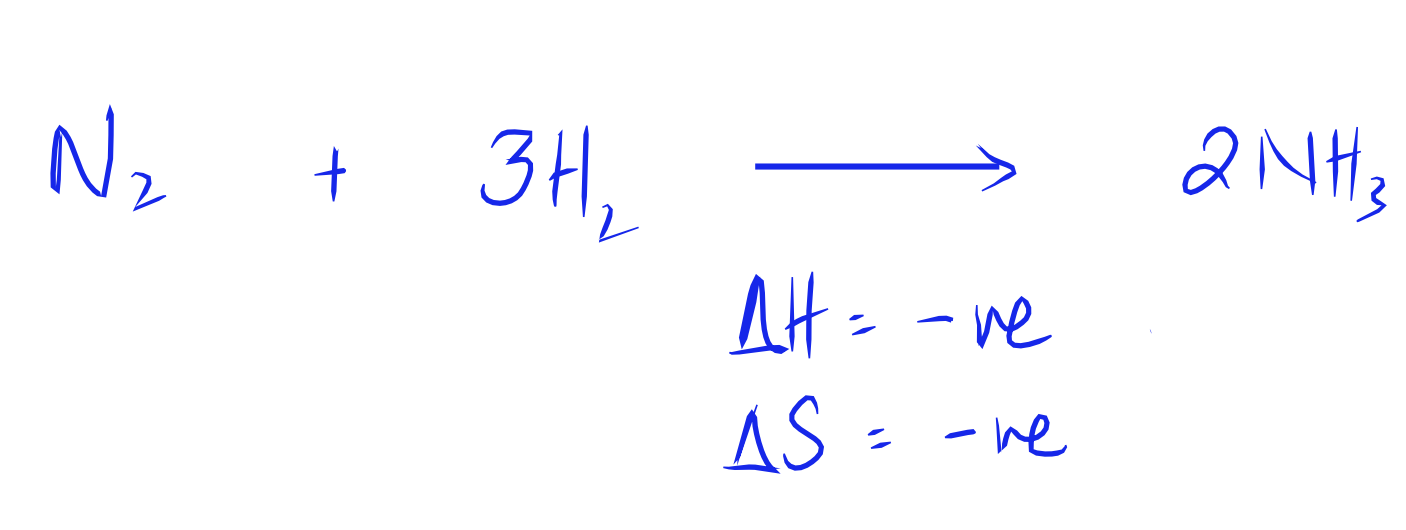
0°	50°	90°	150°	$1000^\circ C$
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spontaneous



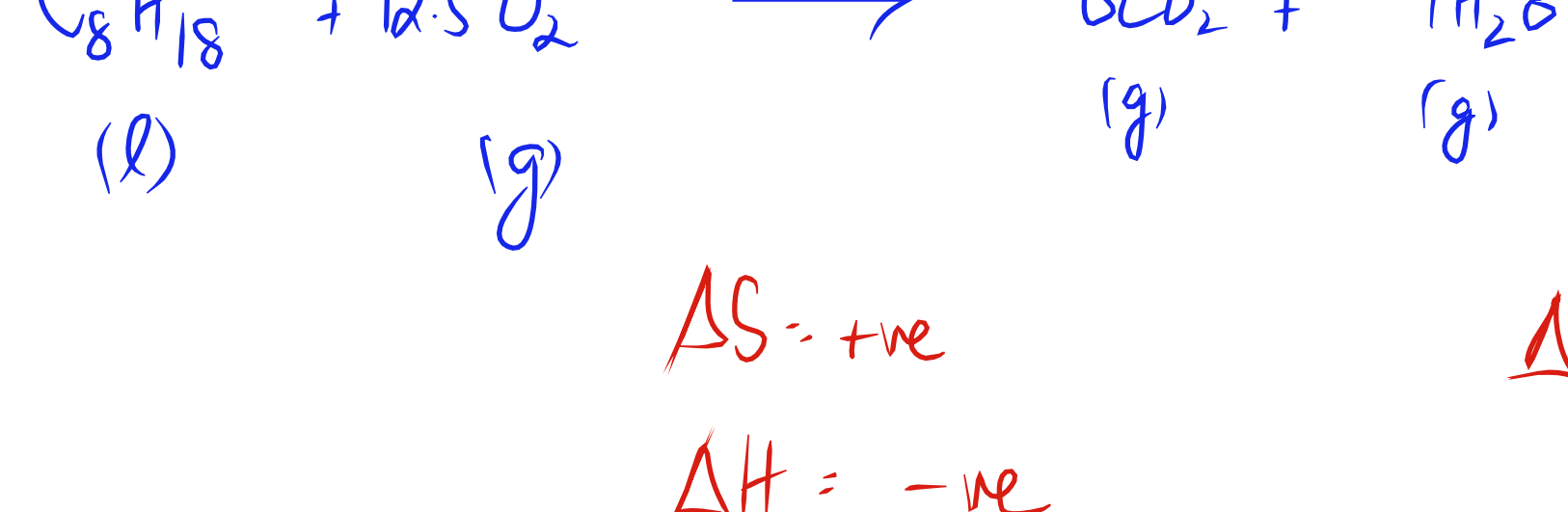
$$\Delta G = \Delta H - T\Delta S = (-ve) - T(-ve)$$

"-ve" feasible -ve +ve small lower T°



$$\Delta G = \Delta H - T\Delta S = (-ve) - T(-ve)$$

-ve = -ve +ve lower T°



$$\Delta G = \Delta H - T\Delta S = -ve - T(+ve)$$

-ve -ve always feasible / more feasible as T° rises

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