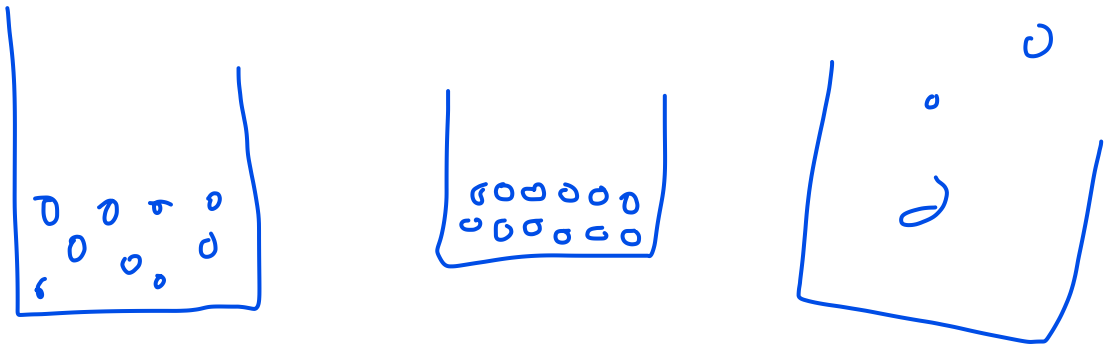
$$2H_2 + \frac{1}{2}O_2 \longrightarrow 2H_2O$$

(g) (g) (l)

$\equiv$

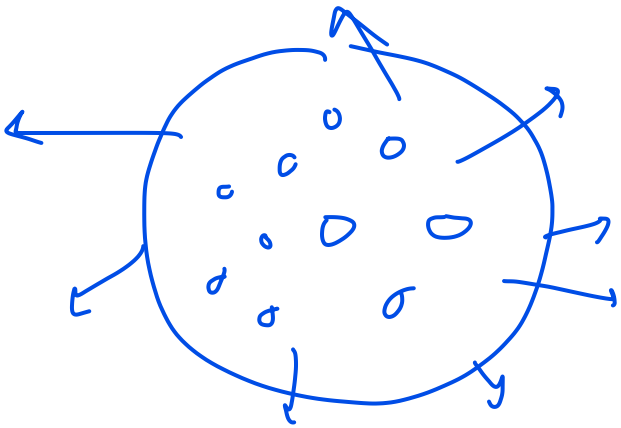
$$\Delta n = 0 - (3)$$

$$= -3$$



Liquid Solid Gas

Entropy ↓ Entropy ↑



$$\Delta S_r^\circ = \sum S^\circ_{pdts} - \sum S^\circ_{react.}$$

$$= 2S^\circ(NO_2) - [2S^\circ(NO) + S^\circ(O_2)]$$

$$= (2 \times 240.5) - [(2 \times 210.6) + 205]$$

$$\Delta S_r^\circ = -145.2 \text{ kJ/mol}$$

$NO_2 = 240.5 \text{ kJ/mol}$

$O_2 = 205 \text{ kJ/mol}$

$NO = 210.6 \text{ kJ/mol}$

NO

2 mol ⟶ −145.2 kJ/mol

$\frac{40}{14+16}$ mol ⟶ ?? ⟶ −76.8 kJ

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

(+) (−)

$\Delta H(+)$, $\Delta S(+)$

$$\Delta G = \overset{+ve}{\Delta H} \overset{-ve}{- T\Delta S}$$

$$= 27.68 \text{ kJ/mol} - \left((25 + 273 - 15) \times 86.39 \times 10^{-3} \right) \text{ KJ}$$

$$= +1.9 \text{ KJ/mol}$$

$$\Delta S = \frac{\Delta H}{T}$$

$$\Delta G^{\circ}_{r} = \sum \Delta G^{\circ}_{Pdts} - \sum \Delta G^{\circ}_{react}$$

$T = \cancel{298.15}\ K$

$\Delta S = 331\ J/K\ mol$

$\Delta H = 155\ KJ/mol$

T ??

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

$$\Delta G = 155 - (T \times 331 \times 10^{-3})$$

$$\text{Zero} = 155 - (T \times 331 \times 10^{-3})$$

$$155 = T \times 331 \times 10^{-3}$$

$$T = 468.27\ K$$

Spont. at $T > 468.27$