

THERMOCHEMISTRY



$$\Delta H = 20$$



$$-\Delta H_1 = \Delta H_f + \frac{3}{2} \frac{\Delta H_3}{2} - \frac{\Delta H_2}{2}$$

S-I

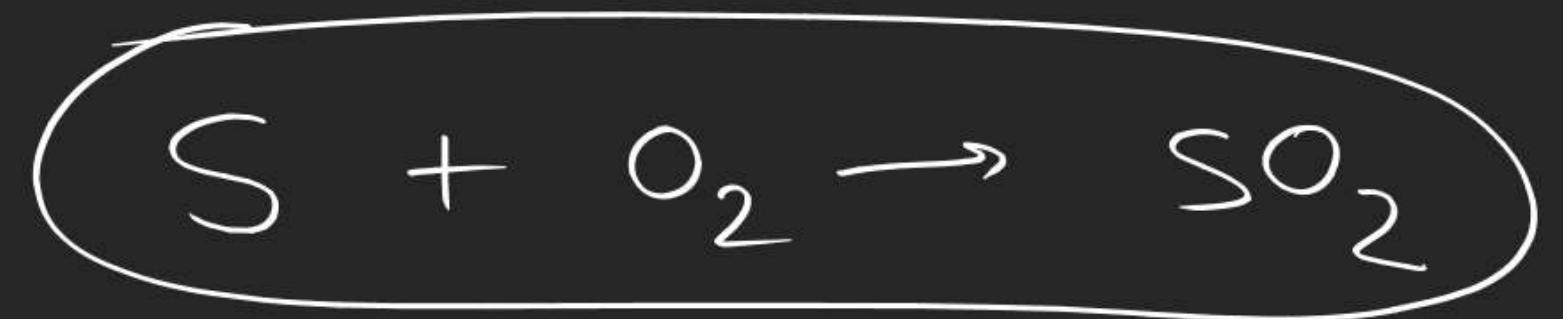
$$\Delta H_f [CO_2(g)] = -393$$

$$\xrightarrow{Rxn \text{ D}} -282 = \Delta H_r = -393 - \Delta H_f [CO(g)]$$

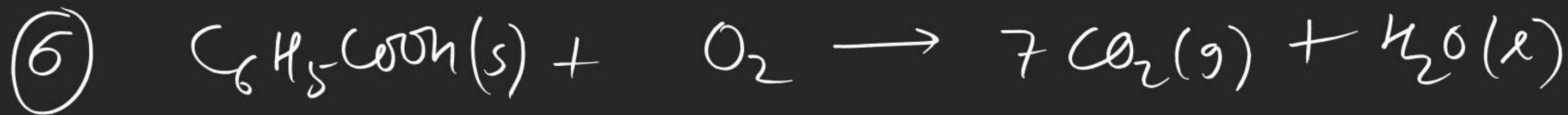
(A) $492 = 3 \times \Delta H_f [CO] - \Delta H_f [Fe_2O_3]$



$$\begin{aligned} \Delta H_r &= \cancel{-1108} - \cancel{(-393)} - 2 \cancel{(-293)} \\ &= -393 + 2(-293) - (-1108) \end{aligned}$$



1 mol Sulphur \equiv 1 mole Sulphur atom



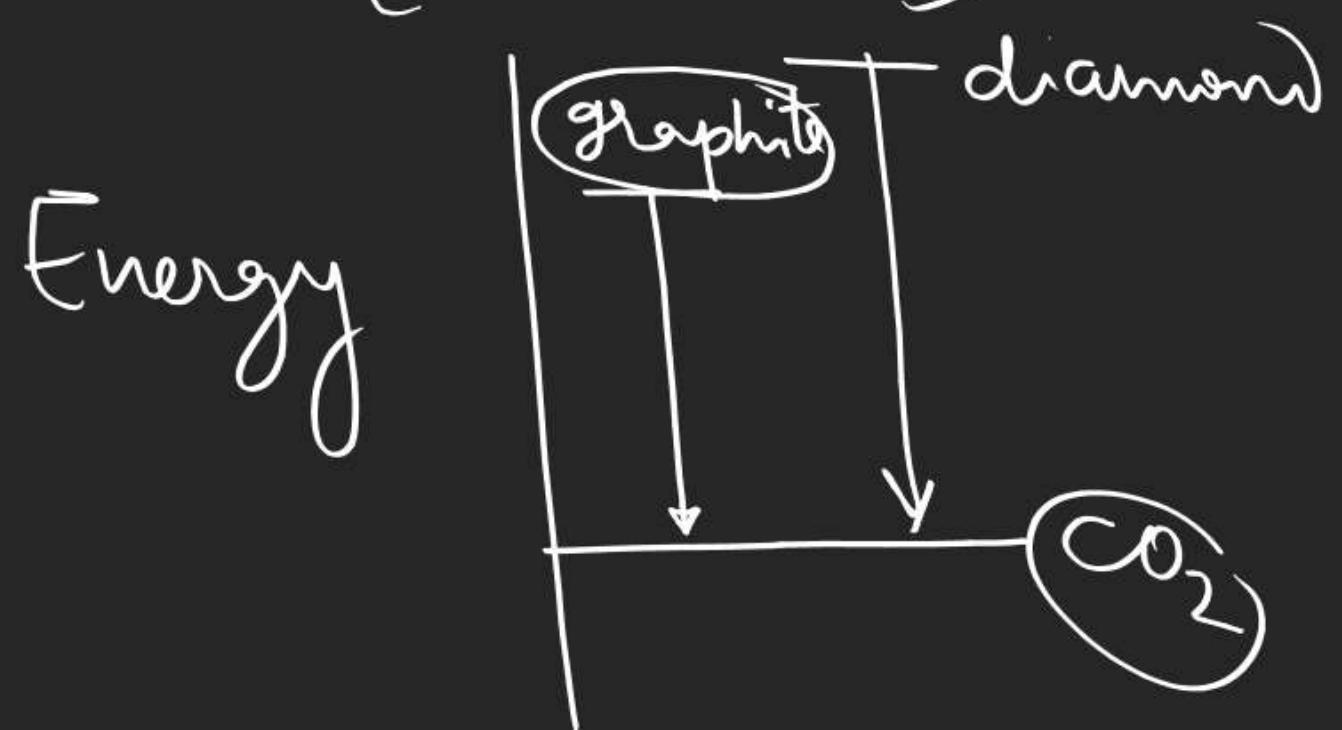
$$\Delta H = \Delta H_f(P) - \Delta H_f(I)$$

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⑪ To compare energy of isomers and allotropes :-

$$\Delta H_{\text{comb}}[C(\text{graphite})] = \underline{-393} \text{ kJ/mol}$$

$$\Delta H_{\text{comb}}[C(\text{diamond})] = -395 \text{ kJ/mol}$$



Substance with less magnitude of ΔH_{comb} will be more stable.

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(III)

To compare calorific value

It is equal to the heat evolved by the combustion of 1 gm substance.

$$\underline{\underline{C.V. = - \frac{\Delta H_{\text{comb}}}{M}}}$$

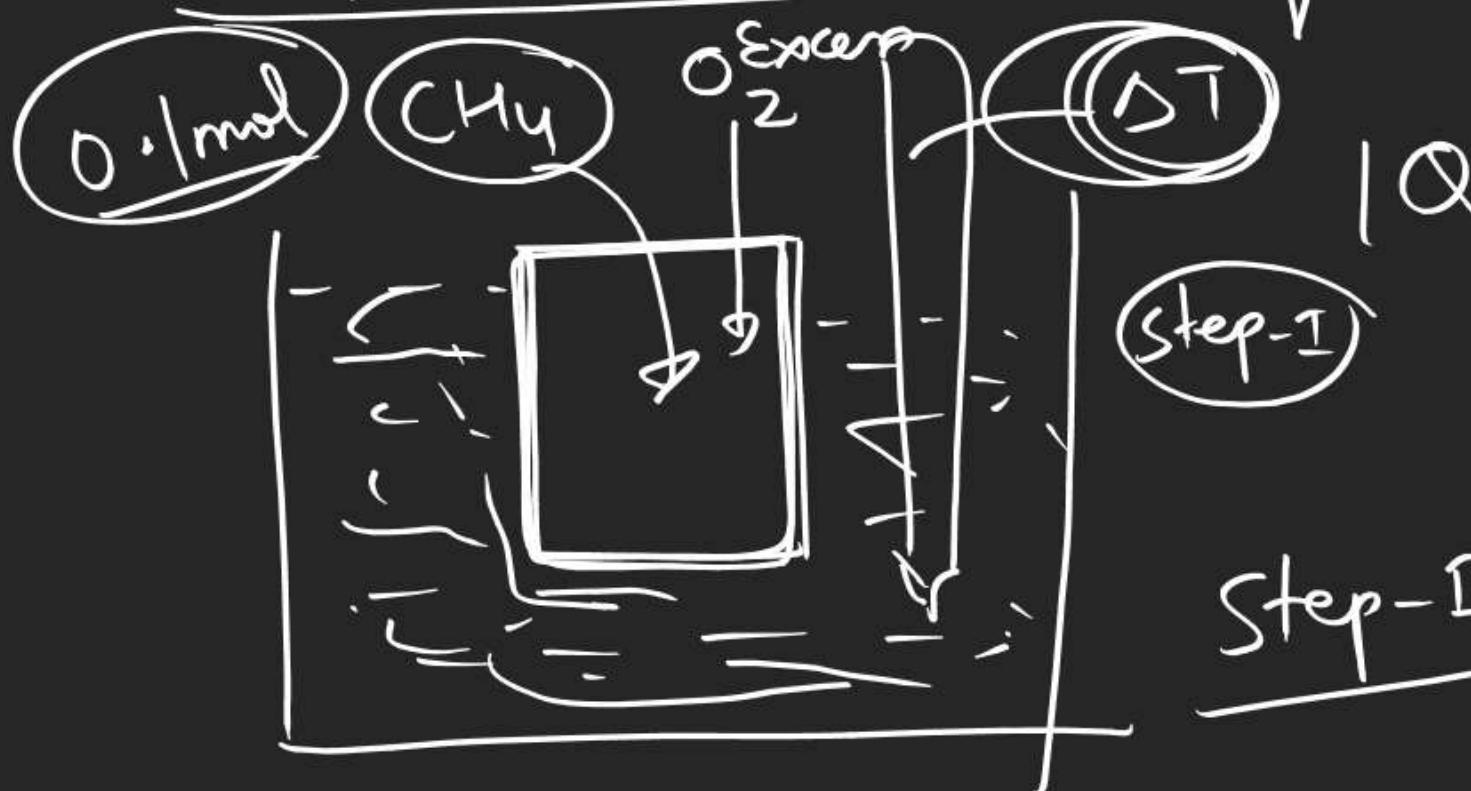
C.V of hydrogen is highest among all the conventional fuels.

Among H. C.



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Exp determination of ΔH_{comb} by (Bomb calorimeter)



$$|Q| = [(mS)_{H_2O} + (mS)_{\text{cont}}] \Delta T$$

heat capacity of syst

$$|Q_m| = \frac{|Q|}{n}$$

$$\underline{\text{Step-II}} \quad \Delta U = - |Q_m|$$

$$\underline{\Delta H = \Delta U + n g RT}$$

MSDT

NC DT

Enthalpy of Sublimation

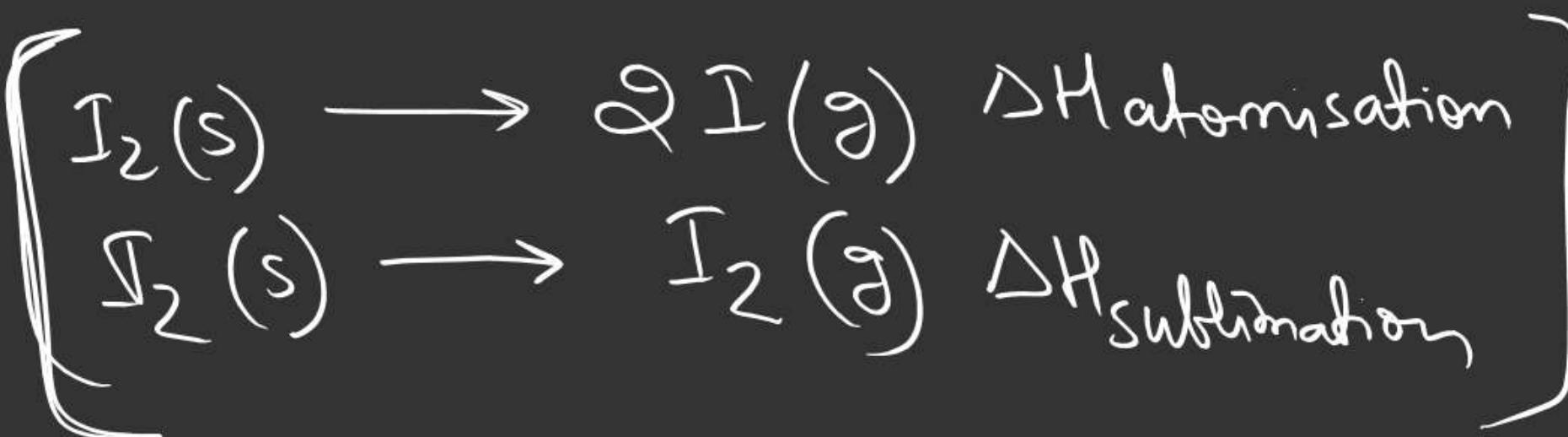
It is the enthalpy change when 1mol substance is

converted from solid to gas.



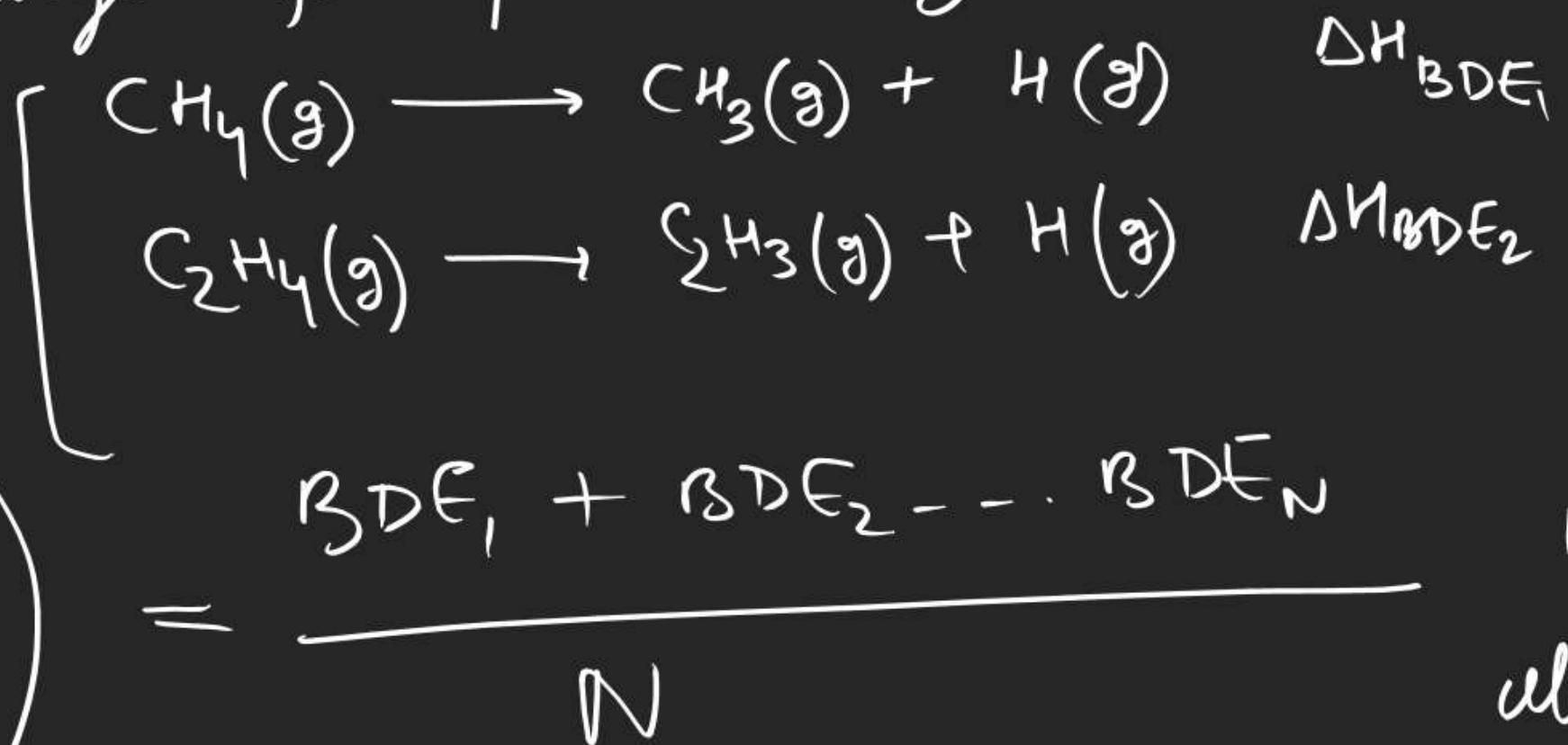
$$\Delta H_{\text{sub}} = \Delta H_{\text{fusion}} + \Delta H_{\text{vap}}$$

Enthalpy of atomisation : → It is the enthalpy change when 1 mol substance is converted into its constituent gaseous atoms.



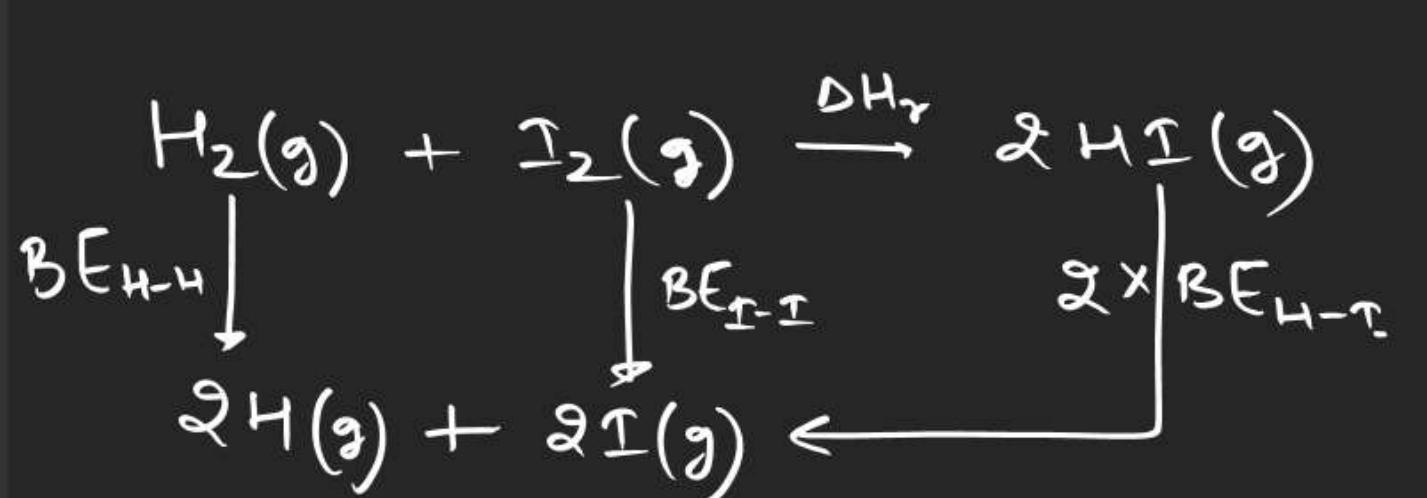
Bond dissociation enthalpy & Bond enthalpy:

It is the enthalpy change when 1 mol of a particular bond present in gaseous compound undergoes homolytic cleavage to form products in gaseous state.

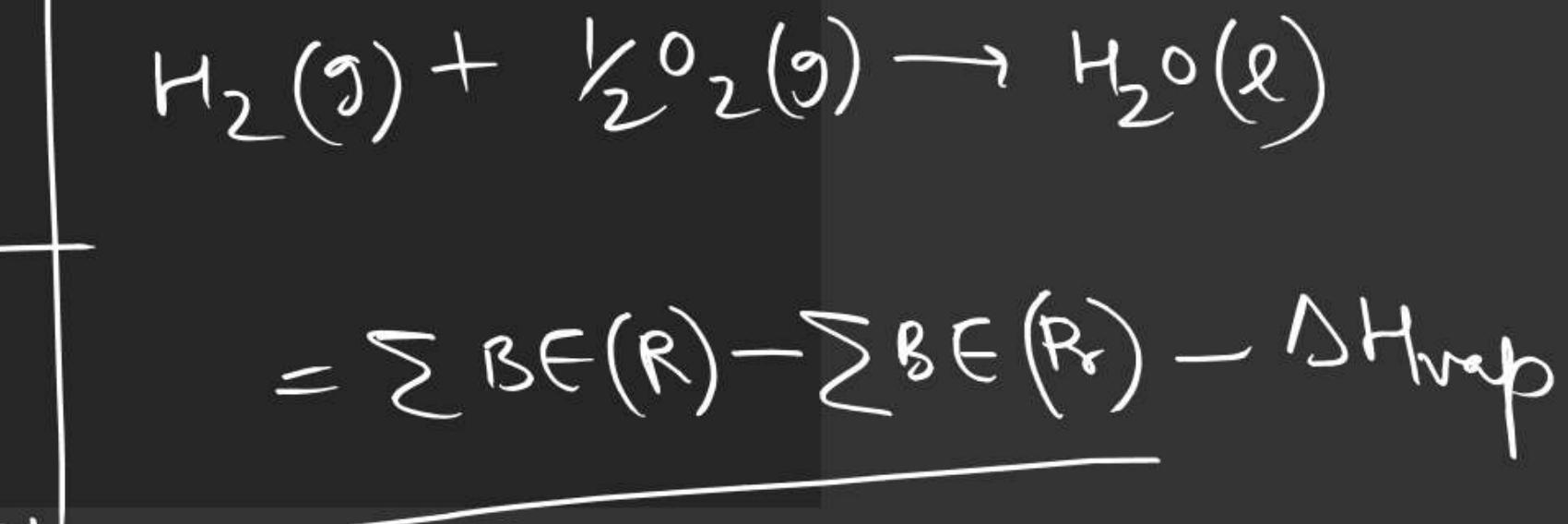
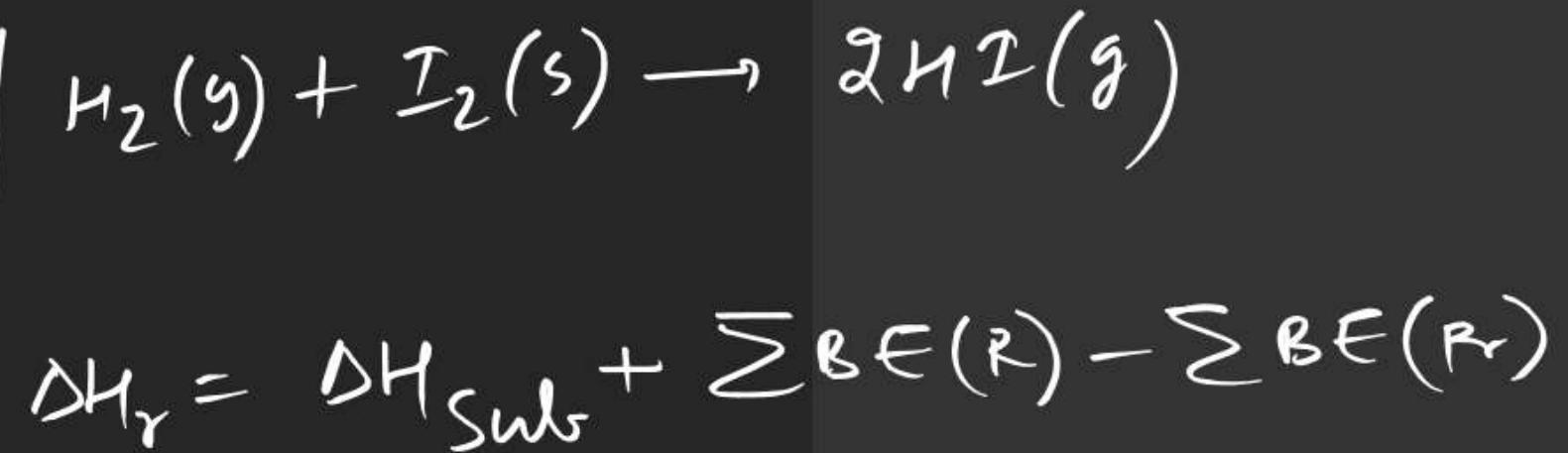
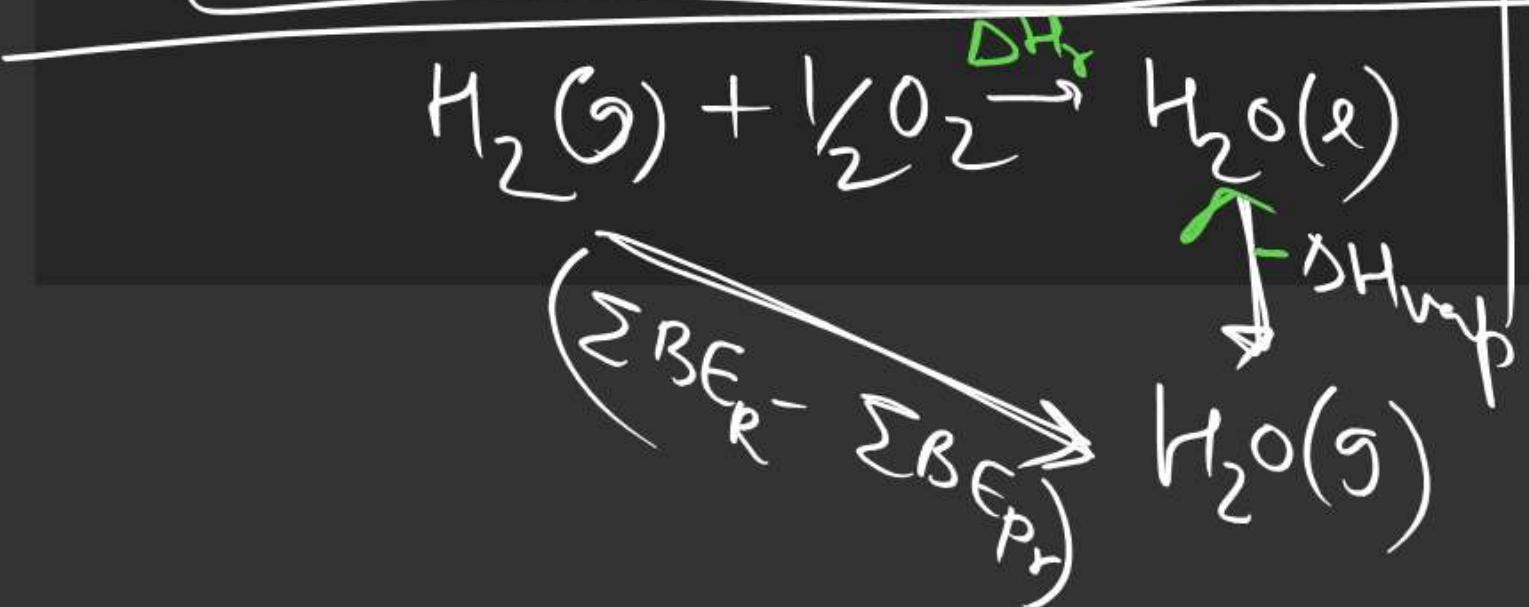


Bond Enthalpy
is average of
all BDE of a
particular bond

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$$\begin{aligned}\Delta H_r &= \text{BE}_{\text{H-H}} + \text{BE}_{\text{I-I}} - 2 \text{BE}_{\text{HI}} \\ &= \sum \text{BE(R)} - \sum \text{BE(P}_r)\end{aligned}$$



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(2)

$$\Delta S = \underbrace{n C_v \ln \frac{T_2}{T_1}} + \underbrace{n R \ln \frac{V_2}{V_1}}$$

+ive

O

-ive



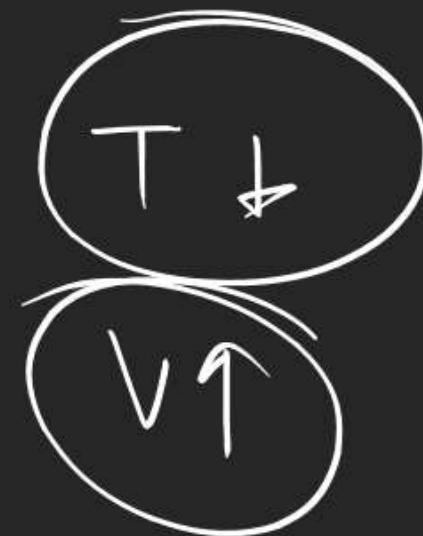
$$\Delta G^\circ = -RT \ln K_p$$

$$K_p = \text{vap pr of Hg(l)} = P_{\text{ext}}$$

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7

Adiabatic



14

$$\Delta G_{sys} = 0 \quad T, P$$

C ΔG°