

CHANGE THE EQUATION CHANGE ΔH

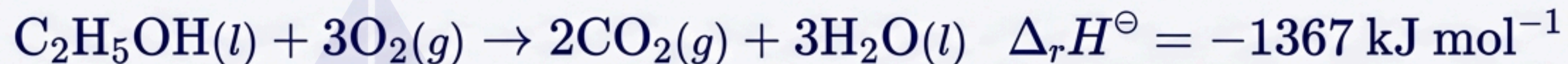
Enthalpy is an extensive property.

It strictly depends on the amount of substance reacting and the direction of the process.

Rule #1 of Thermodynamics Algebra:

What you do to the reaction, you must do to the Enthalpy.

DEFINING THE THERMOCHEMICAL EQUATION



1. Balanced Reaction

Coefficients refer to exact moles (not molecules) reacting.

2. Physical States

Standard states (s, l, g, aq) must be specified. Phase changes (e.g., liquid to gas) cost energy and alter ΔH !

Warning/JEE Trap

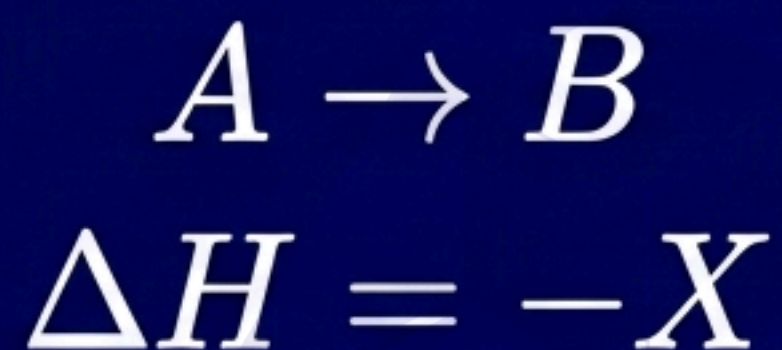
3. Associated Enthalpy

The exact heat evolved/absorbed for these specific molar quantities at standard conditions.

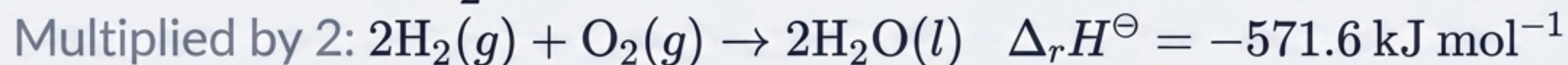
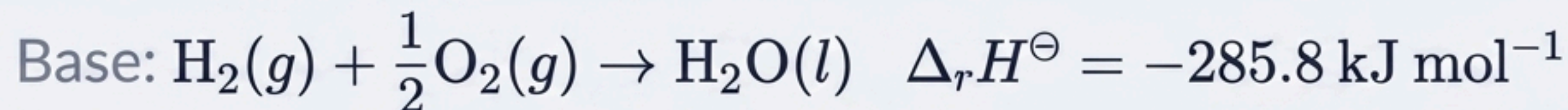
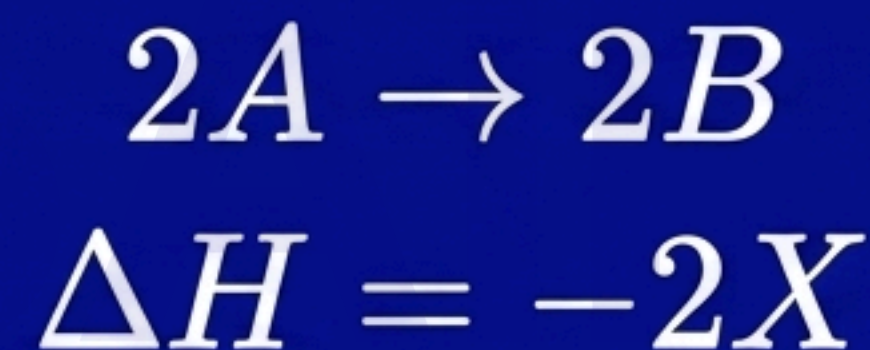
OPERATION 1: MULTIPLY THE REACTION

If you multiply a balanced equation by a factor n , you must multiply ΔH by n .

Base Reaction



Scaled Reaction





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$$E=mc^2$$



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Key Highlights

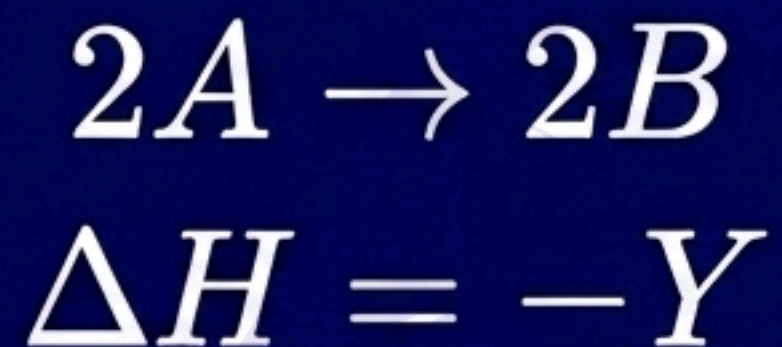
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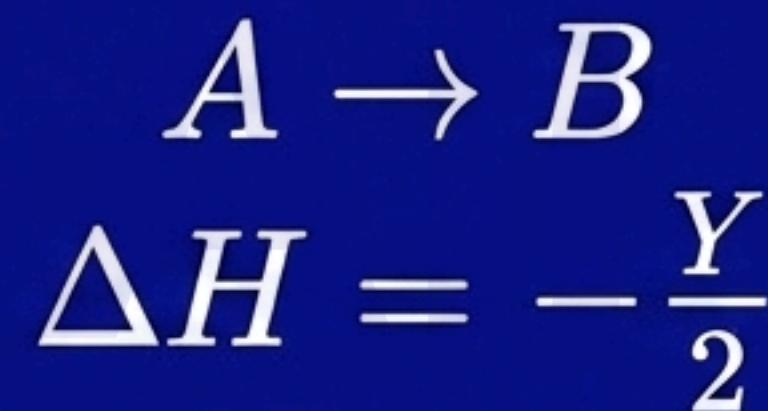
OPERATION 2: DIVIDE THE REACTION

Dividing an equation is common to find standard enthalpy of formation ($\Delta_f H^\ominus$) for exactly 1 mole of product.

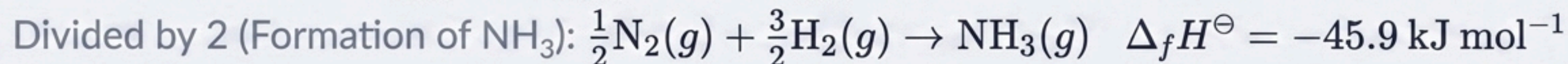
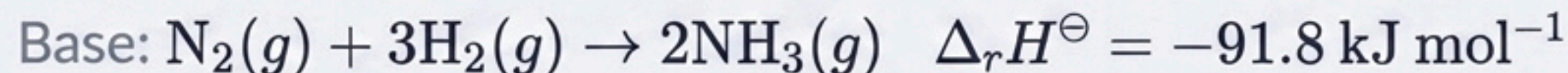
Base Reaction



Scaled Reaction

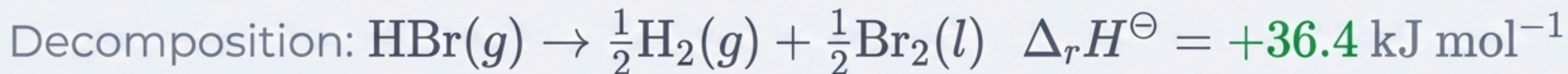


Real-world Example:



OPERATION 3: REVERSE THE REACTION

If you reverse a chemical equation, the magnitude of ΔH remains the same, but h , but the sign flips. Exothermic becomes Endothermic, and vice versa.



Thermochemical Algebra | Summary & Traps



Reaction Transformation	Impact on ΔH
Multiply by n	$\Delta H \rightarrow n \times \Delta H$
Divide by n	$\Delta H \rightarrow \frac{\Delta H}{n}$
Reverse Equation	$\Delta H \rightarrow -\Delta H$

TRAP:

Hess's Law questions give you multiple equations to add.

Avoid:

Don't just add the raw ΔH values! You must apply multipliers/reversals to the intermediate ΔH values before summing them.

Enthalpy is Extensive:

It strictly scales with the stoichiometric coefficients.

States Matter:

$\text{H}_2\text{O}(l)$ and $\text{H}_2\text{O}(g)$ have different formation enthalpies. Always write the states!