

Standard Enthalpy of Formation ($\Delta_f H^\circ$)

The fundamental building block for chemical energy calculations.

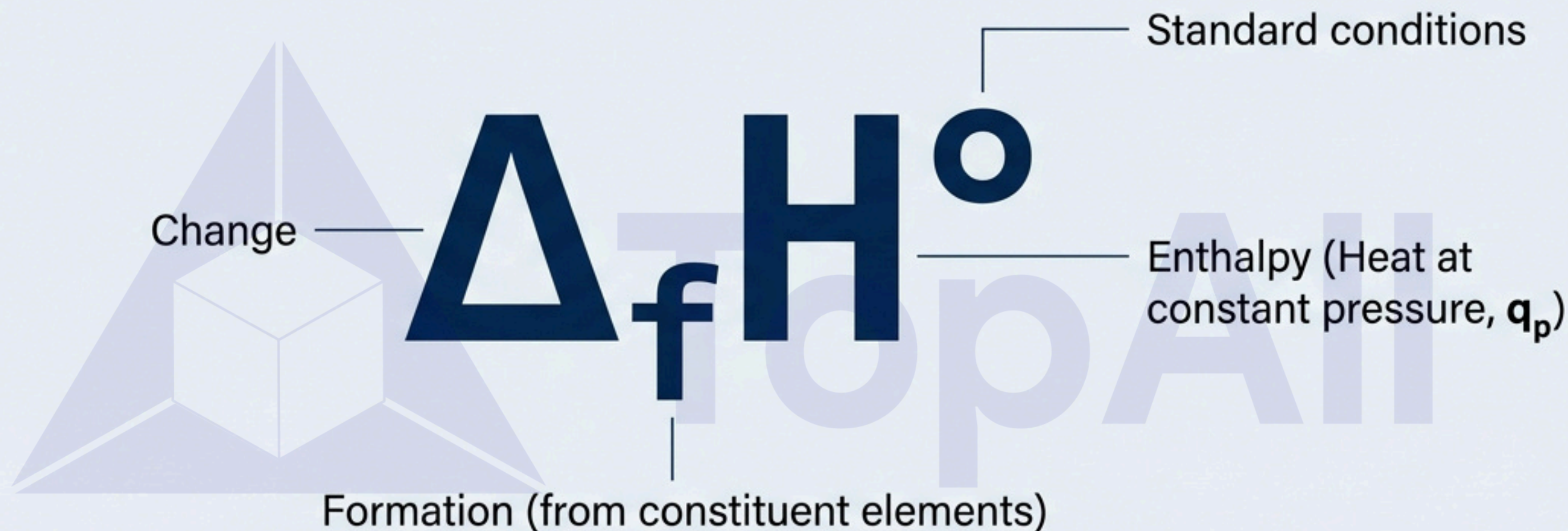


1 Bar Pressure

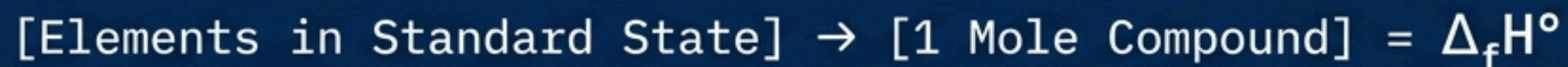
298 K (25°C)

Most Stable State

What is Formation Enthalpy?



The standard enthalpy change when exactly **one mole** of a compound is formed from its **constituent elements** in their **reference states**.



The 'Ground Zero' of Enthalpy

By convention, $\Delta_f H^\circ$ of an element in its reference state = **0 kJ mol⁻¹**

H₂ (g)

Diatomic gas

0 kJ/mol

O₂ (g)

Diatomic gas

0 kJ/mol

C (graphite)

Solid graphite (not diamond!)

0 kJ/mol

S (rhombic)

Solid rhombic crystal

0 kJ/mol



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

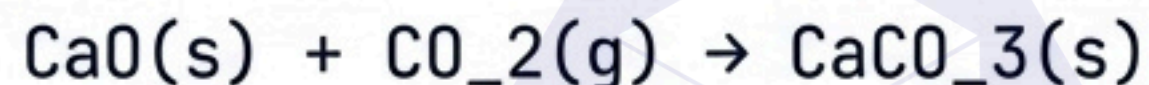
Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter

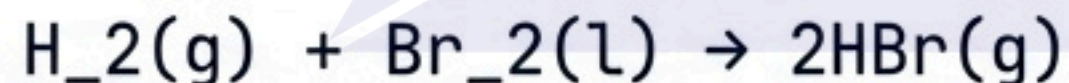


The 'One Mole' Constraint

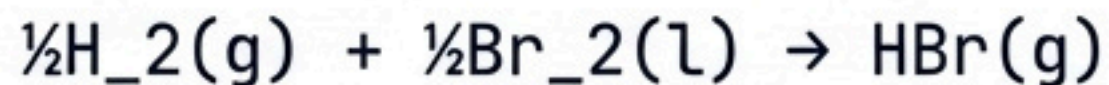
$\Delta_f H^\circ$ is a special case of reaction enthalpy ($\Delta_r H^\circ$). It must produce exactly 1 mole of product, directly from elements.

**INVALID**

Formed from other compounds, not constituent elements.

**INVALID**

Produces 2 moles. ($\Delta_r H^\circ = 2\Delta_f H^\circ$).

**VALID**

Fractional coefficients are allowed to ensure exactly 1 mole of product is formed.

APPLICATION

Calculating Reaction Enthalpy ($\Delta_r H^\circ$)

Because enthalpy is a state function (Hess's Law), we can calculate the heat of any reaction by subtracting the formation enthalpy of the reactants from the products.

$$\Delta_r H^\circ = \sum a_i \Delta_f H^\circ(\text{products}) - \sum b_i \Delta_f H^\circ(\text{reactants})$$

Table 5.2 Extract

CH ₄ (g)	-74.81 kJ mol ⁻¹
CO ₂ (g)	-393.5 kJ mol ⁻¹
H ₂ O(l)	-285.83 kJ mol ⁻¹

Tabulated reference data replaces the need for infinite lab experiments.

The Thermodynamic Engine

Enthalpy (ΔH°)

Uses $\Delta_f H^\circ$ tables to find the heat of reaction. Are bonds releasing or absorbing energy?



Entropy (ΔS°)

Measures the degree of randomness or structural disorder.



Gibbs Energy (ΔG°)

Determines if a chemical universe acts spontaneously.

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

Standard Enthalpy of Formation is the primary numerical baseline required to ultimately determine the **spontaneity** and **equilibrium** of any chemical reaction.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis