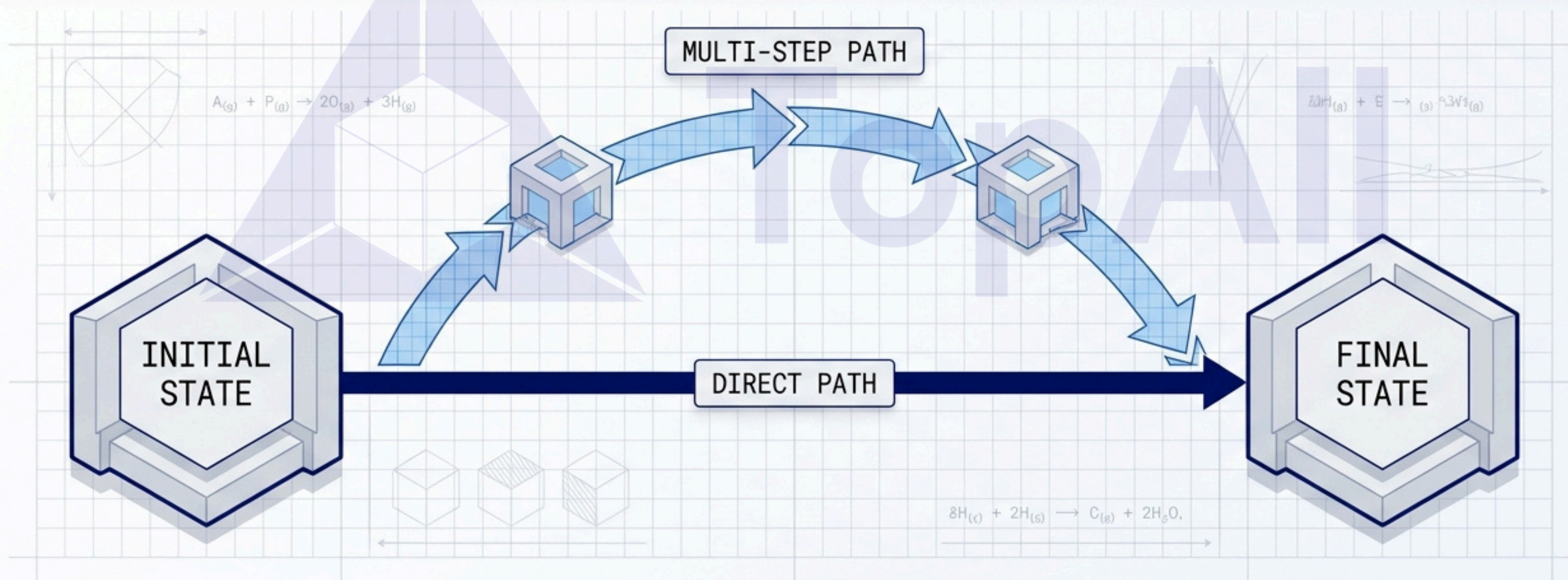


5.5 Hess's Law of Constant Heat Summation

Determining unknown reaction enthalpies through indirect thermodynamic pathways.



Why Hess's Law Works

Core Principle

Enthalpy (H) is a **state function**. Its value depends only on the initial and final states of the system, not the specific route or sequence of steps taken to get there.

The Consequence

Because H is a state function, the overall change in enthalpy (ΔH) is completely path-independent. A one-step reaction and a five-step reaction between the same states yield the exact same energy change.

$$\Delta H = H_{\text{final}} - H_{\text{initial}}$$



**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.**

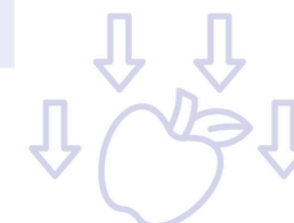
Practice Now



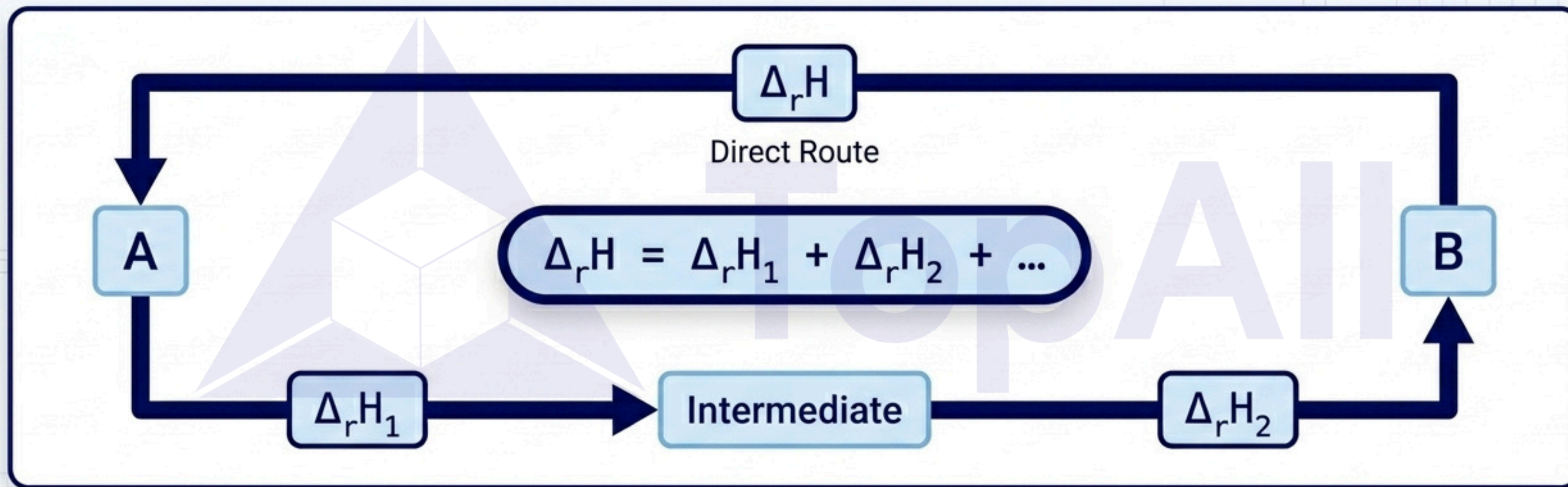
At prep.topall.app

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



Same States, Same Total ΔH

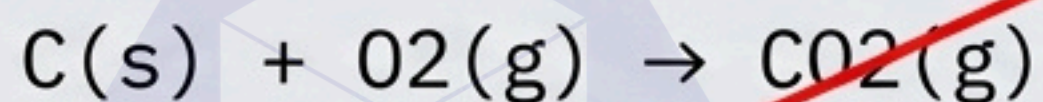


If a reaction takes place in several steps, its standard reaction enthalpy is the **sum of the standard enthalpies** of the intermediate reactions into which the overall reaction may be divided.

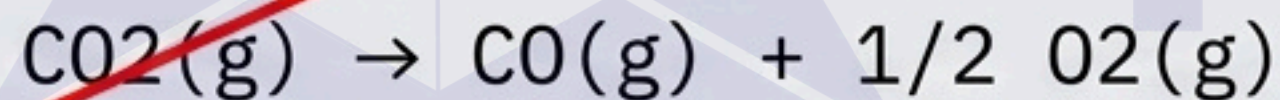
Adding Thermochemical Equations

We cannot directly measure the formation of CO(g) without producing some CO₂(g). We must use related intermediate reactions.

Math Block



$$\Delta_{\text{r}}H = -393.5 \text{ kJ mol}^{-1}$$



$$\Delta_{\text{r}}H = +283.0 \text{ kJ mol}^{-1}$$

Sign reversed!

Adding equations (cross out CO₂ on both sides):



Result Strip

The Power of the Indirect Route

Finding the Unknown

The ultimate utility of Hess's Law is **finding the enthalpy of a chemical reaction that cannot** be measured directly in a laboratory setting.

State Function: ΔH depends only on initial and final states.

Equation Algebra: Chemical equations can be sequentially added, multiplied, or reversed.

Sign Flipping: If you reverse an equation's direction, you **MUST** reverse the sign of ΔH .

Exam-Smart Rule: Treat thermochemical equations exactly like algebraic equations. What you do to the reactants and products, you must do to the ΔH value.



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