

CHAPTER 9: BIOMOLECULES

One Starting Molecule, Many End Products

Decoding the hidden logic and adaptability of metabolic pathways.

What is a Metabolic Pathway?

In biology, chemical conversions rarely happen in a single leap. A metabolic pathway is a multistep chemical reaction where each sequential step is catalyzed by specific enzymes.



Substrate A → Product B



The Rule of Progression: Substrate → Enzyme Complex 1 → Intermediate → Enzyme Complex 2 → Product.

The Core Example: Breaking Down Glucose

The most famous metabolic pathway transforms glucose into pyruvic acid. This overarching process is how cells unlock and harvest energy.





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



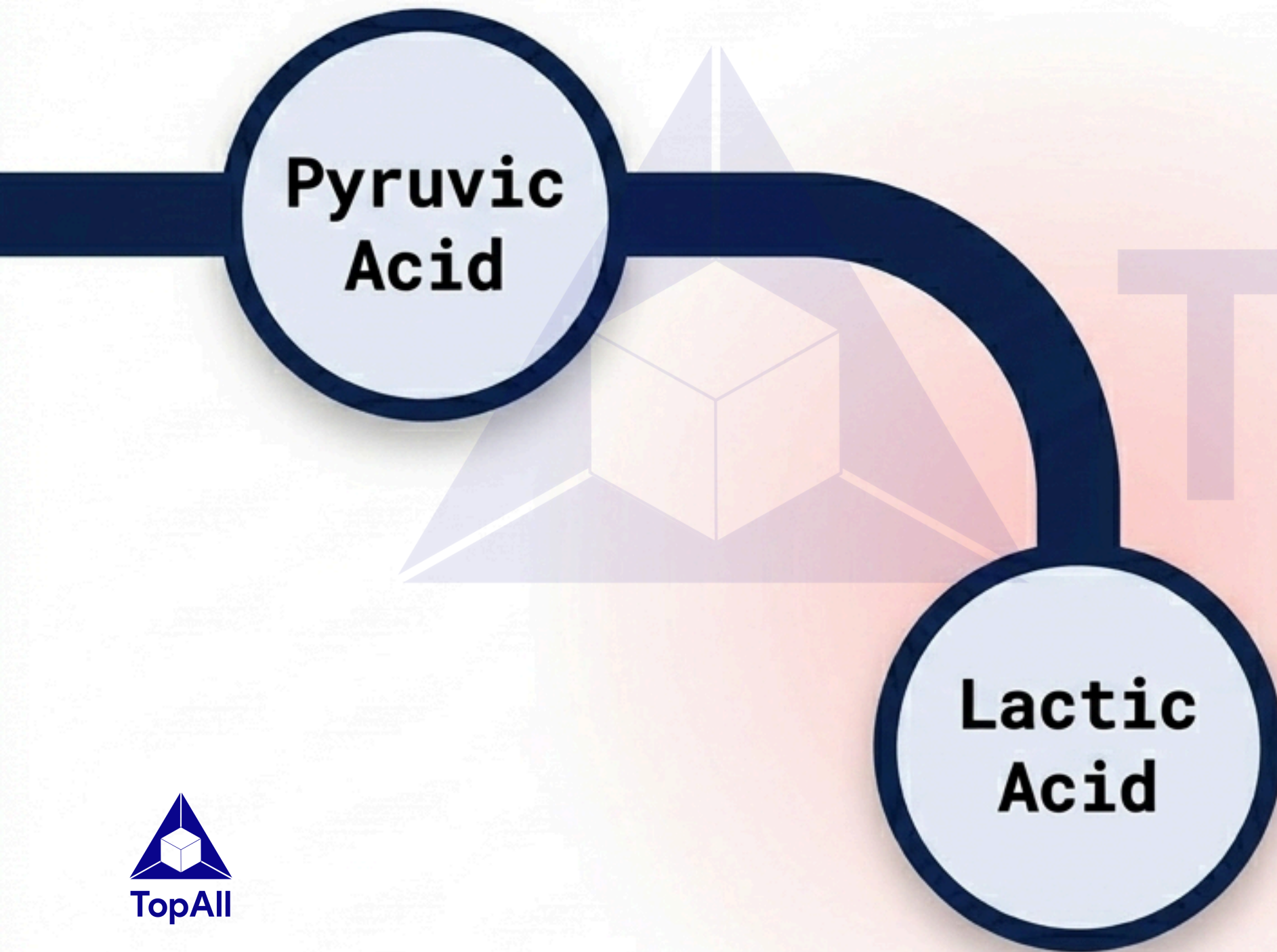
It's Never Just One Step

The simple formula on the previous slide is an illusion. Glucose does not magically become pyruvic acid in a single bound.



It takes ten different enzyme-catalysed metabolic reactions to complete this specific pathway from Glucose to Pyruvic Acid.

The Muscle Fork: Lactic Acid

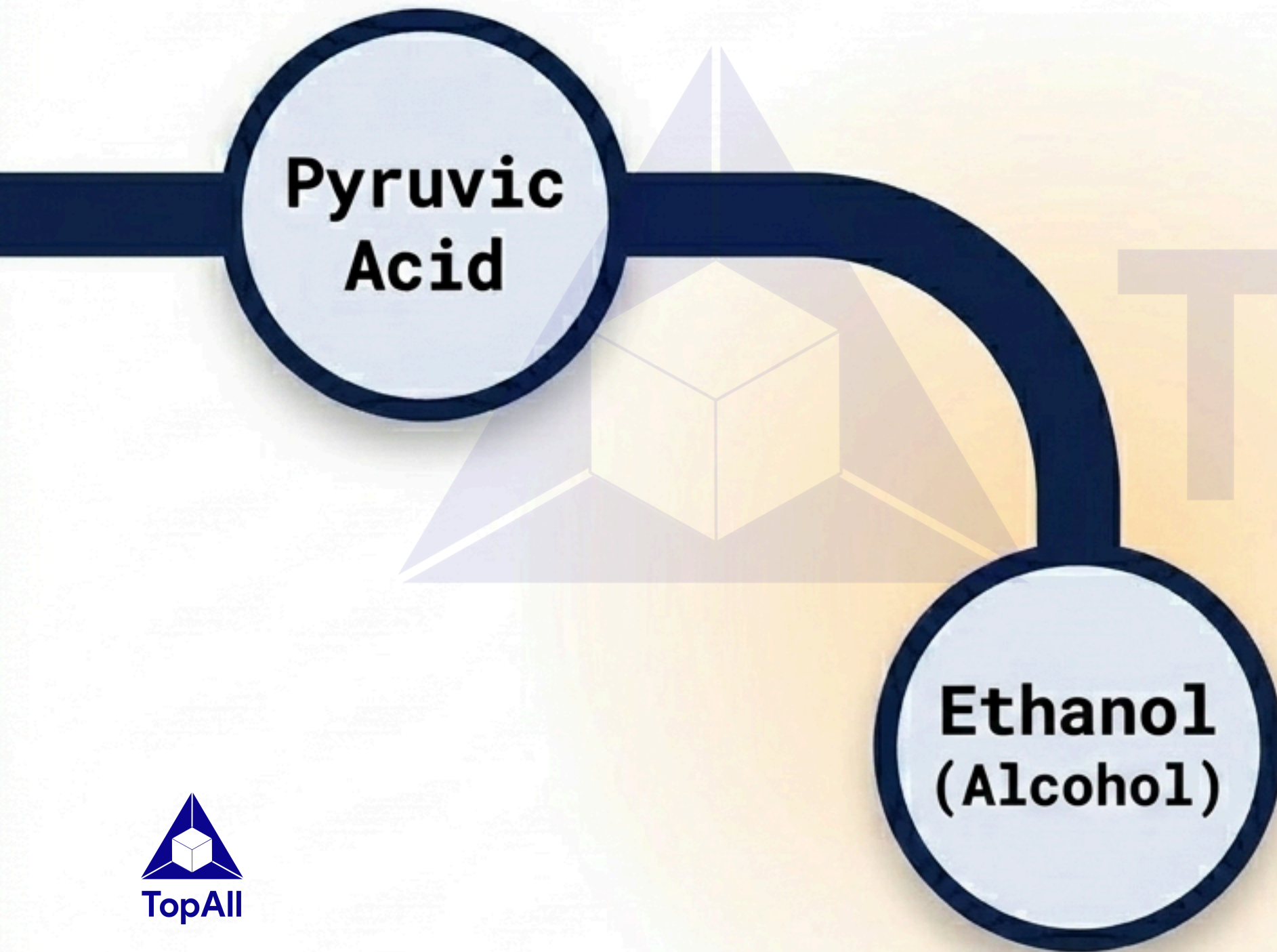


Condition: Anaerobic
(Lack of Oxygen)

When you exercise intensely, skeletal muscles run out of oxygen. The normal aerobic pathway halts, and the metabolic pathway redirects. Pyruvic acid is converted into lactic acid to keep energy production moving.

DO NOT CONFUSE: Lactic acid is the endpoint for animal skeletal muscle under stress. It is not the same byproduct produced by plants or fungi under similar conditions.

The Yeast Fork: Ethanol



Condition: Anaerobic Fermentation

If we trace the exact same starting pathway but place it inside a different organism—yeast—under anaerobic conditions, the outcome changes entirely. Instead of lactic acid, the pathway produces ethanol.

Pyruvic Acid → Ethanol

The Power of Metabolic Flexibility



The fundamental chemistry of life is remarkably modular. A single starting molecule (like glucose) passing through a shared metabolic pathway can yield vastly different end products (lactic acid, ethanol, or more pyruvic acid) simply based on the organism and its environmental conditions.

BIOLOGY USES A SHARED TOOLKIT TO SOLVE
ENTIRELY DIFFERENT PROBLEMS.



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