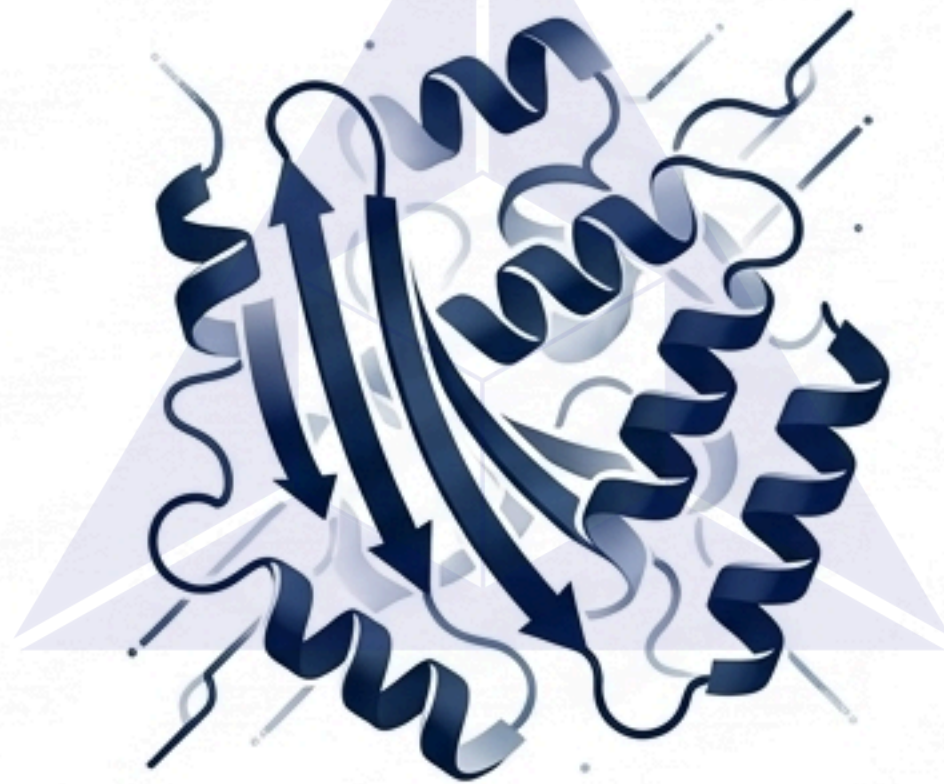


Denaturation of Proteins



The Baseline: What is a Native Protein?

Unique 3D Structure



Active Biological Function



Together, these define a biological system's Native Protein.



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$$E=mc^2$$



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Key Highlights

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The Unraveling: Denaturation of a Native Protein

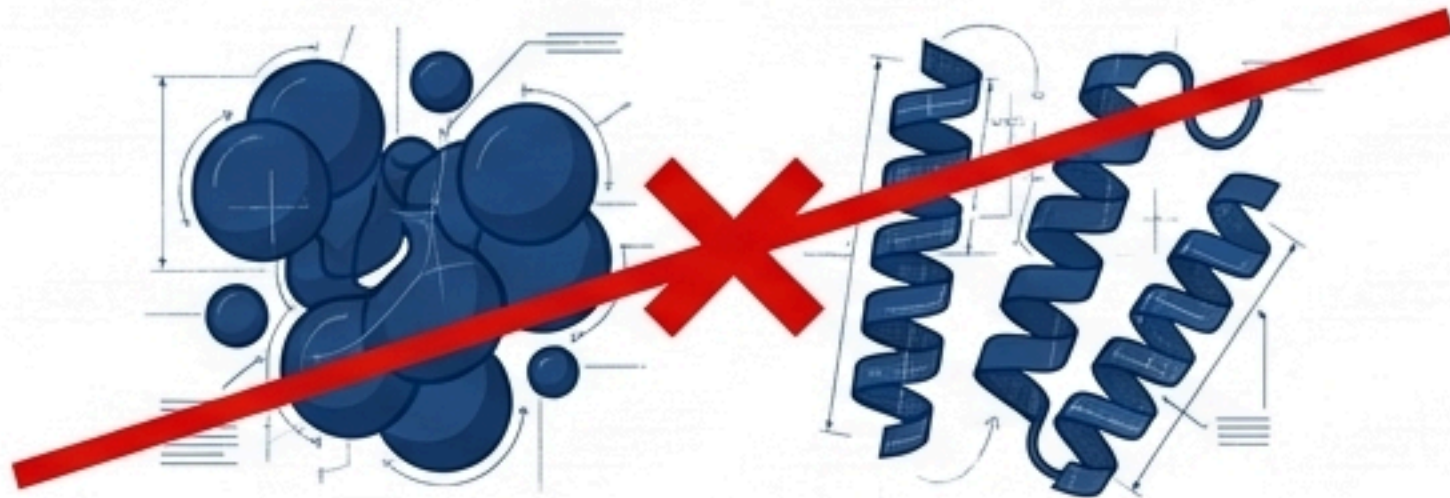
Physical Change ($\uparrow$ Temperature)

Chemical Change (Δ pH)

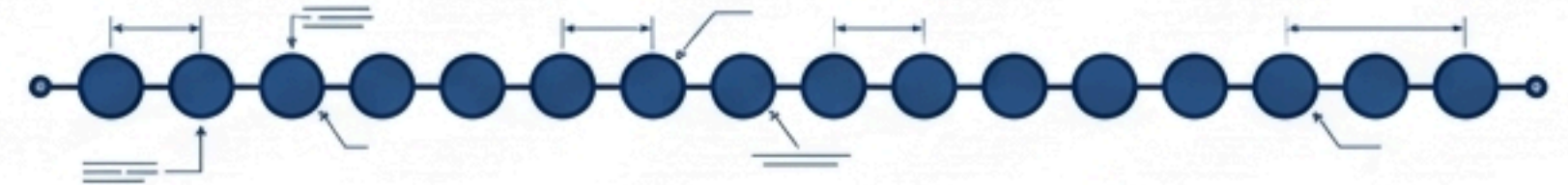
[HYDROGEN BONDS DISTURBED]

Globules unfold. Helices uncoil.
Biological activity is lost.

Tertiary (3°) & Secondary (2°)



Primary (1°)



✓ **INTACT**

Real-World Denaturation

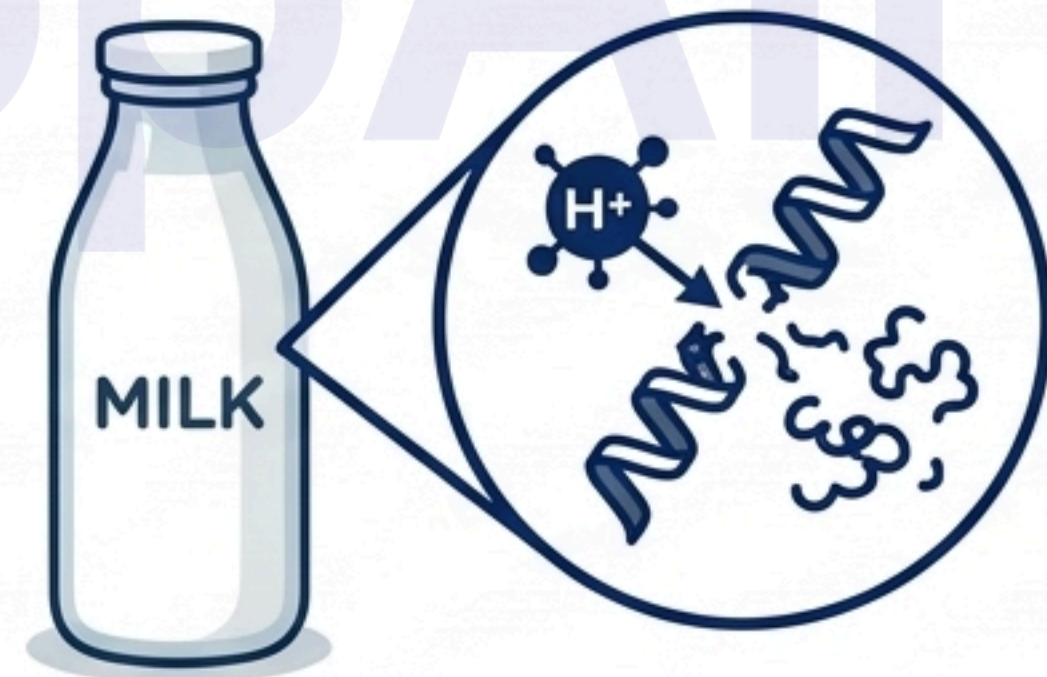
Physical Trigger

- Mechanism: Boiling
- Result: Coagulation of egg white



Chemical Trigger

- Mechanism: Lactic acid from bacteria drops the pH
- Result: Curdling of milk

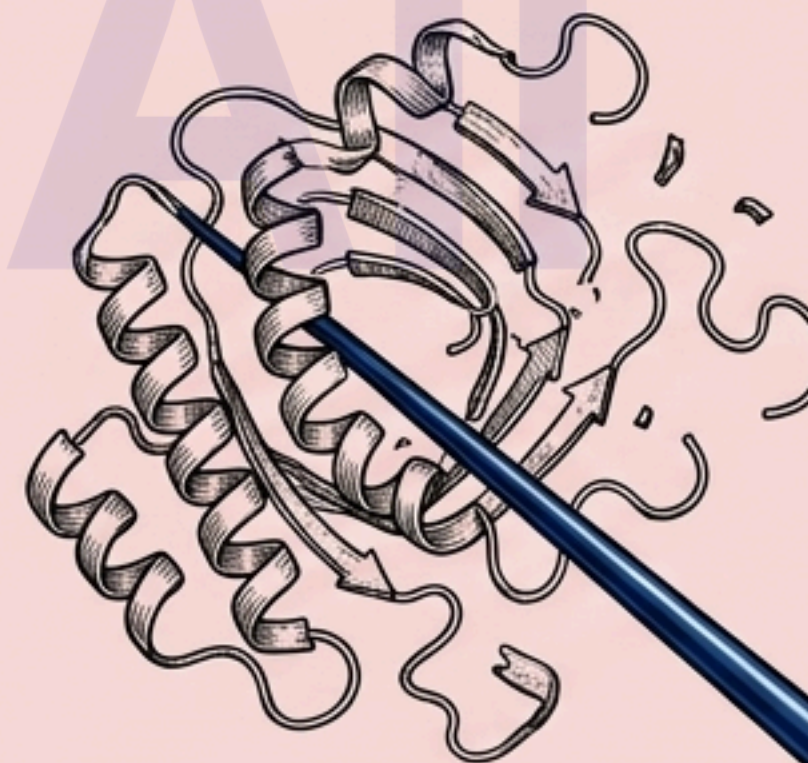


! JEE/NEET TRAP ALERT

Watch for this: The sequence never breaks.

It is easy to assume denaturation destroys the entire protein. However, denaturation only breaks the hydrogen bonds that maintain the protein's 3D shape.

The primary structure—the exact sequence of amino acids held together by strong peptide bonds—remains 100% intact.



Key Takeaways

1. **Denaturation** is the **loss of a native protein's biological activity** and **3D shape** due to physical (heat) or chemical (pH) changes that **break hydrogen bonds**.
2. Exam Focus: Only **secondary** and **tertiary structures** are **destroyed** during this process; the **primary amino acid sequence** remains **perfectly intact**.



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