

Peptides

Prelims: Current events of national and international importance | Science & Technology

Why in News?

A study published in the *Proceedings of the National Academy of Sciences (PNAS)* reports that specific peptides remain stable in 98% concentrated sulphuric acid.

- **Peptides** - It is a short chain of amino acids linked together by chemical bonds called peptide bonds.
- **Characteristics**
 - Building blocks - Made up of amino acids, the basic units of peptides.
 - Size - Generally contain 2-50 amino acids; longer chains are usually classified as polypeptides/proteins.
 - Formation - The carboxyl group of one amino acid joins the amino group of another.
 - Chemical process - Formation releases a water molecule, called condensation/dehydration synthesis.
- **Functions & Uses**
- **In the Human Body**
 - **Hormonal signalling** - It regulates various biological processes.
 - **Immune defence** - It supports protection against pathogens.
 - **Muscle repair** - It involved in tissue maintenance and repair.
 - **Digestion** - Certain peptides participate in digestive processes.
 - **For example, insulin** is a peptide hormone that regulates blood glucose levels.
- **Skincare & Wellness**
 - **In skincare, peptides are incorporated into** creams and serums to promote **skin firmness and facilitate repair**.
 - **Supplements** - Some peptide-based products are marketed for **muscle recovery and wellness**, though their effects depend on the specific peptide and product.

PEPTIDES

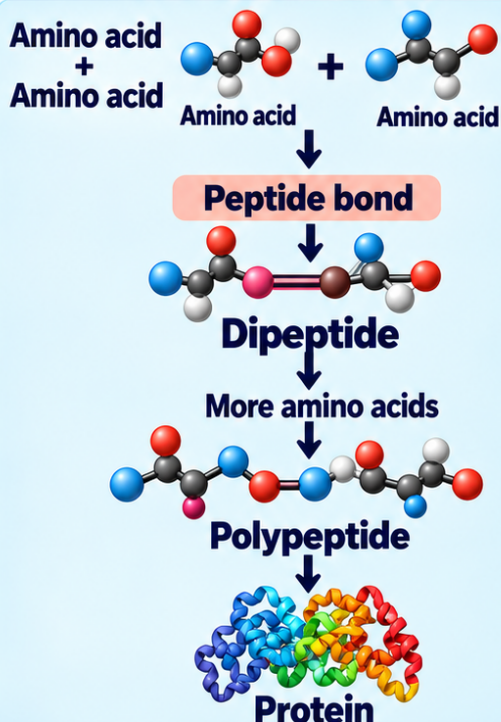
Small Chains. Big Roles in Life.

From
Amino Acids
to Action

Peptides are short chains of amino acids linked together by **peptide bonds**.

Think: Amino acids → Peptide → Protein

Formation



Peptide vs Protein

Peptide

Shorter chain of amino acids

Can have biological functions

Basic building block of proteins

Protein

Generally longer chain

Perform many complex biological functions

Major functional molecules of cells



The distinction between peptide and protein is primarily based on **chain length and structural/functional complexity**, rather than one universally fixed amino-acid number.

Building the Molecules of Life

- **Previous Scientific Assumptions** - Concentrated sulphuric acid is considered extremely harsh, as it destroys biological molecules and is therefore unlikely to support complex chemical processes.
- **Recent Research Findings** - In 98% concentrated H_2SO_4 , certain peptides remain stable for several weeks.
- Peptide bonds are not readily hydrolyzed under these conditions.
- Peptides are able to fold into **specific three-dimensional structures**, may **potentially facilitate biological functions**.
- **Key finding**
- Peptides were observed to form an **omega-loop structure** in concentrated sulphuric acid.
- Sulphuric acid molecules functioned as a scaffold, stabilizing the peptide structure.
- This mechanism differs from protein folding in aqueous environments, where structures such as **α -helices and β -sheets** are typically observed.
- Peptide stability in concentrated sulphuric acid challenges prior assumptions, suggesting Venus' acid clouds may support complex chemistry and potential life.

Reference

[The Hindu | Peptides](#)

