

Who introduced the 'Vitamin'?

BIOMOLECULES

Continued from 18th December..

(i) **α -helix** : This structure is formed when the chain of α -amino acids coils as a right handed screw (called α -helix) because of the formation of hydrogen bonds between amide groups of the same peptide chain, i.e., NH group in one unit is linked to carbonyl oxygen of the third unit by hydrogen bonding.

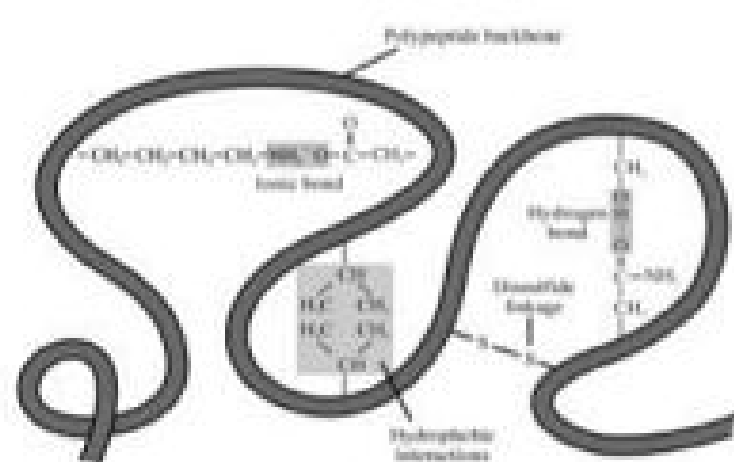
- This hydrogen bonding between different units is responsible for holding helix in a position.
- The side chains of these units project outward from the coiled backbone. Such proteins are elastic, i.e., they can be stretched.
- On stretching weak hydrogen bonds break up and the peptide chain acts like a spring. The hydrogen bonds are reformed on releasing the tension. Wool and hair have α -helix structure.
- In each turn of helix, 3.6 amino acid residues are present on an average. A 13 membered chelate ring is formed due to intermolecular hydrogen bonding.

(ii) **β -pleated sheet** :

- A different type of secondary structure is possible when polypeptide chains are arranged side by side.
- The chains are held together by a very large number of hydrogen bonds between C=O and NH of different chains. Thus, the chains are bonded together forming a sheet.
- These sheets can slide over each other to form a three dimensional structure called a beta pleated sheet. Silk has a beta pleated structure.
- Globular proteins possess tertiary structure. In general globular proteins are very tightly folded into a compact spherical form.

Tertiary structure: It indicates the three dimensional arrangement of all the atoms in the protein.

- The tertiary structure is understood from its primary structure and further folding of secondary structure in fibrous and globular shapes.
- The forces that stabilise secondary and tertiary structures are H-bonds, disulphide linkages, vander Waals forces and electrostatic forces of attraction.



Quarternary structure: Proteins that have more than one peptide chain are known as oligomers. The individual chains are called subunits.

The subunits are held together by hydrogen bonding, electrostatic attractions, hydrophobic interactions etc. Quarternary structure explains the way the sub units are arranged in space.

i.e. **Proteins have four levels of structure**

Denaturation of proteins: The process which changes the physical and biological properties of a protein is called denaturation.

The denaturation is caused by changes in P^H , temperature, presence of some salts or certain chemical agents.

- Denaturation is carried out by
 - a) Change in pH , which breaks down hydrogen bonds and electrostatic attractions.
 - b) Adding reagents like urea that form stronger hydrogen bonds with protein groups.
 - c) Adding detergents like sodium dodecyl sulphate (or) organic solvents which associate with non polar groups of protein and interface with hydrophobic interactions.
 - d) Heating or agitation which causes disruption of attractive forces.
- Denaturation can be carried out without effecting the primary structure of protein. Denaturation may be reversible or irreversible.

Ex:1 The coagulation of egg white on boiling is an irreversible denaturation.

Renaturation is the reverse of denaturation.

Ex:2 Curdling of milk which is caused due to the formation of lactic acid by bacteria present



JEE MAIN Special

- Reverse process of denaturation is called renaturation which is possible in DNA.

Enzymes: Enzymes are biological catalyst produced by living cells which catalyze the biochemical reactions.

- Life is possible due to the co-ordination of various chemical reactions in living organisms
- Digestion of food, absorption of appropriate molecules and ultimately production of energy etc sequence of reactions occur slowly in the body under very mild conditions. These occurs with the help of certain biocatalysts are called enzymes
- The mechanism of an enzymes as catalyst will be. $E + S \rightarrow ES \rightarrow EI \rightarrow EP \rightarrow E + P$ Here E = enzyme, S = substrate, ES = complex, EI = intermediate, P = product.
- These are simple or globular conjugated proteins. These are highly specific.
- If once they are utilised in the reaction, they get deactivated such that in the further reaction they must be replaced by synthesis in the body.

- Enzymes are needed only in small quantities. Enzymes reduce the magnitude of activation energy. For Example, activation energy for acid hydrolysis of sucrose is 6.22 KJ/mol , while the activation energy is only 2.15 KJ/mol when hydrolysed by the enzyme sucrase.

- An enzyme contain a non-protein part called **prosthetic group**.

- The prosthetic group covalently bonded with enzyme component is called **co-factor**.

- The prosthetic group attached to the enzyme at the time of reactions are called **co-enzymes**.

Ex: 5-Deoxy adenosil group is the coenzyme to the vitamin B_{12} .

- Almost all the enzymes are globular proteins.
- Enzymes are very specific for a particular reaction and for a particular substrate.

They are generally named after the compound
Ex: The enzyme that catalyse hydrolysis of maltose into glucose is named as maltase.



- Sometimes enzymes are also named after the reactions in which they are used.
Ex: the enzymes which catalyse the oxidation of one substrate with simultaneous reduction of another substrate are names as oxidoreductase enzymes.

The important enzymes are:

Enzymes Reaction catalysed

1. Urease Urea \rightarrow $CO_2 + NH_3$
2. Invertase Sucrose \rightarrow Glucose + Fructose
3. Maltase Maltose \rightarrow 2 Glucose
4. Amylase Starch \rightarrow n Glucose
5. Pepsin Proteins \rightarrow Polypeptides \rightarrow α -Amino acids
6. Trypsin Polypeptides \rightarrow α -Amino acids
7. Carbonic anhydrase $H_2CO_3 \rightarrow H_2O + CO_2$
8. Nuclease DNA, RNA \rightarrow Nucleotides
9. Lactase Lactose \rightarrow Glucose + Glucose
10. Emulsin Cellulose \rightarrow n Glucose
11. RNA Polymerase Ribo nucleotide triphosphates \rightarrow RNA

12. DNA Deoxy nucleotide
Polymerase triphosphate \rightarrow DNA

Some other points in proteins and aminoacids: The lack of the essential aminoacids in the diet causes diseases like Kwashiorkor

- The rotation about C-N bonds is hindered and because of this hindered rotation, the peptide bond can show geometrical isomerism.
- Biological Membranes mainly consists of phospholipids and proteins
- The phospholipids are arranged in a double layer with their polar heads pointing outside and non-polar tails into the interior of the membrane
- The protein components of the membranes are either embeded in the bilayer or are attached to either side of the membrane.

Vitamins

- **Introduction**: Vitamins are naturally occurring low molecular weight carbon compounds, which are essential dietary factors.

These are required in minute quantities for the maintenance of normal health of organisms.

The term "Vitamin": for such substances was introduced by Dr. Funk.

Their absence in the human body causes deficiency diseases or disorders.

They participate in the production of co-enzymes and also in the regulation of biochemical processes.

Plants can synthesise all vitamins. Animals can synthesise few but not all vitamins.

Human body can synthesise vitamin 'A' from carotene.

Some members of vitamin - B - complex and vitamin K are synthesized by microorganisms present in intestinal tract of human beings.

Vitamins are widely distributed in nature in plants and animals. All cells in the body can store vitamins to some extent.

Vitamins have varied chemical structures.

Vitamins are designated by English alphabets A, B, C, D, E, K.

Excess or low levels of vitamins cause different diseases.

Fat Soluble Vitamins Table

Vitamin	Structure and formula	Sources	Functions	Deficiency Diseases
A (Retinol)	(an alcohol contains ionone ring and hydro carbon chain) $C_{20}H_{30}O$	Milk, butter, kidney, egg, yolk, liver, fish oil, rice polishing papaya, carrot	Essential for synthesis of visual pigments, growth and division of epithelial cells, strength of bones, healthy skin	Night blindness, xerophthalmia, degeneration of lacrymal
D (Calciferol or Ergocalciferol)	(a sterol) (Four rings and a side chain) three rings are 6-carbon rings and one ring is cyclopentane $C_{28}H_{44}O$	Synthesised in skin cells in sun light butter, liver, egg, fish oil and milk (Sunshine vitamin)	Regulates absorption of calcium and phosphorus in intestine, mineral deposition in bones and teeth	Rickets in children and osteomalacea in adults, brittle ness of bones
E (Tocopherol derivative) Anti sterility Vitamin	α, β, γ - Trimethyl tocopherol (an unsaturated alcohol, chromone ring with 3-methyl rings) $C_{29}H_{50}O_2$	Green leafy vegetables, oils, wheat, animal tissue	Normal muscle functioning, essential for proper spermatogenesis, pregnancy, sythesis of coenzyme-Q, stores glycogen in muscle	Muscular dystrophy sterility, necrosis of heart muscle
K (Anti Haemorrhagic vitamin or Phyloquinone)	(a naphthaquinone derivative) $C_{11}H_{16}O_2$	Green leafy vegetables, synthesized by colon bacteria, cow milk, cabbage, liver and intestinal flora	Essential for blood clotting (co-agulation of blood)	Excessive bleeding in injury, poor coagulation of blood



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Classification: Vitamins are classified into two broad groups. These are
(a) Fat soluble vitamins

(b). Water - soluble vitamins

Fat soluble vitamins: Vitamins A, D, E and K are fat soluble. Liver cells are rich in fat soluble vitamins (Vitamins A & D)

Water soluble vitamins: Vitamins C and B-complex are water soluble. These are present in much smaller amounts in cells.

Functions in bio systems: Vitamins in low concentrations catalyse biological reactions.

- The daily dose of vitamins for an individual depends on his or her age, size and rate of metabolism.
- Youngsters need higher quantities than elders.
- The need of vitamins for younger, growing children and pregnant women is higher.
- A lack of one or more vitamins leads to characteristic deficiency symptoms.
- Multiple deficiencies caused by deficiency of multiple vitamins are also common.
- The condition of vitamin deficiency is known as avitaminosis.
- The sources, structures, physiological functions and deficiency diseases of vitamins are presented in the table.
- Some other points in vitamins: Vitamin D is also called sunshine vitamin. Since it is obtained by sunlight irradiation of ergosterol present in oils and fats
- Vitamin B_1 is a derivative of pyrimidine as well as such it contains both N and S
- Vitamin B_{12} contains both N and P
- Provitamins are the biologically inactive compounds which can be easily converted into biologically active vitamins
- β -carotene is provitamin A

126th amendment bill is related to?

CURRENT AFFAIRS

- Which of the following important amendments were made to Constitution of India in 2019?
 - Reservations to EBC
 - Abrogation of Article 370
 - Abolition of Uniform Civil Code
 - Citizenship Amendment Bill
 Which of the above are true
A) 2,4 B) 1,3,4 C) 1,2,4 D) 1,2,3,4
- Observe the following, about Citizenship Amendment Bill (CAB)?
 - CAB to grant Indian Citizenship to persons belonging to Hindu, Sikh, Buddhist, Jain, Parsi and Christian communities who have migrated to India after facing persecution on grounds of religion in Pakistan, Afghanistan and Bangladesh
 - The provisions on citizenship for illegal migrants will not apply to two categories - states protected by the 'Inner Line', and areas covered under the Sixth Schedule of the Constitution
 - The provisions on citizenship for illegal migrants will apply entire India
 - The bill allows to grant citizenship, any where in the world, who are minorities in respective countries
 Which of the above are true
A) 1,2,4 B) 1,3 C) 1,3,4 D) 1,2,
- According to the Climate Change Performance Index (CCPI), match the following countries and ranks?
 - India a. 6
 - Sweden b. 5
 - Denmark c. 4
 - Morocco d. 9
 A) 1-b, 2-c, 3-a, 4-d
B) 1-d, 2-c, 3-a, 4-b
C) 1-d, 2-c, 3-b, 4-a
D) 1-d, 2-b, 3-a, 4-c
- Observe the following?
 - Climate Change Performance Index (CCPI) is based on national performances on 14 indicators
 - In the Index 2019 first three places in the final ranking remain unoccupied
 - For the first time, India is in top 10, in the CCPI
 - Being in top 10 in CCPI, is second time for India
 Which of the above are correct
A) 1,2,4 B) 1,2,3 C) 1,3 D) 1,4
- Ami Bera is in news in recent times, he is....?
 - Chairman of the Subcommittee on Asia, the Pacific, and Nonproliferation of the House Foreign Affairs Committee in US
 - He is an Indo-European and has been elected to the British Parliament
 - He is the new Executive Director of European Bank
 - He is the Chief Negotiator of European Union on BREXIT issue
- In the Climate Change Performance Index, how many G-20 Countries are in top 10 category?

- A) 4 B) 3 C) 2 D) 1
- Match the following persons and ranks in the Forbes' 2019 edition of 100 World's Most Powerful Women?
 - Nirmala Sitharaman a. 65
 - Roshni Nadar b. 34
 - Kiran Mazumdar Shaw c. 54
 A) 1-b, 2-a, 3-c B) 1-b, 2-c, 3-a
C) 1-a, 2-b, 3-c D) 1-c, 2-b, 3-a

Sircilla tops MGNREGA implementation

- Rajanna-Sircilla district has been placed in the fourth position in the national ranks in implementation of MGNREGA scheme. It secured fourth rank in the category of effective implementation of MGNREGA scheme in the district. Out of 18 districts selected for the award under the category, Sircilla secured fourth place followed by Siddipet at fifth position

- Match the following persons and ranks in the Forbes' 2019 edition of 100 World's Most Powerful Women?
 - Greta Thunberg a. 1
 - Melinda Gates b. 29
 - Angela Merkel c. 2
 - Sheikh Hasina d. 100
 - Christine Lagarde e. 6
 A) 1-b, 2-c, 3-a, 4-d, 5-e
B) 1-d, 2-c, 3-a, 4-b, 5-e
C) 1-d, 2-a, 3-c, 4-b, 5-e
D) 1-d, 2-e, 3-a, 4-b, 5-c
- Observe the following?
 - First full time Finance Minister of India -Nirmala Sitharaman
 - Roshni Nadar is the Executive director and CEO of - Axis Bank
 - Roshni Nadar is the Executive director and CEO of - HCL Enterprises
 - Kiran Mazumdar Shaw is the Chairperson and Managing Director of Biocon Limited
 Which of the above are true
A) 1,4 B) 1,2,4 C) 1,3,4 D) 1,2
- Observe the following?
 - The Seventh Economic Census is being conducted nationwide through Common Service Centres
 - The Indian Economic Census was first launched in 1977
 - The Indian Economic Census was first launched in 1979
 - The Indian Economic Census is counting entrepreneurial units in the country. It involves both agricultural and non-agricultural activities
 Which of the above are true
A) 1,4 B) 1,2,4 C) 1,3,4 D) 1,2
- Dimapur is in news in recent times, the reason is?
 - The state government of Nagaland has extended Inner Line Permit (ILP) regime to Dimapur district
 - The state government of Nagaland has

- terminated the extension of Inner Line Permit (ILP) regime to Dimapur district
 - India and Myanmar have decided to construct a junction in Dimapur, allowing movement of people from both sides
 - None
- Lok Sabha passed the Central Sanskrit University Bill 2019, upgrading three sanskrit deemed universities into central universities, match the universities and places?
 - Rashtriya Sanskrit Sansthan a. Bhopal
 - Lal Bahadur Shastri Rashtriya Sanskrit Vidyapeeth b. New Delhi
 - Rashtriya Sanskrit Vidyapeeth c. Tirupati
 A) 1-b, 2-a, 3-c B) 1-b, 2-c, 3-a
C) 1-a, 2-b, 3-c D) 1-c, 2-b, 3-a

For All Competitive Exams

- Assertion: The Indian Council of Agricultural Research (ICAR) and National Board of Agriculture and Rural Development (NABARD) signed Memorandum of Understanding on December 13, 2019
Reason: ICAR and NABARD have decided to facilitate the research and technologies to develop climate resilient practices in the agriculture sector and hi-tech farming practices
A) Both A and R are true and R is the correct explanation of A
B) Both A and R are true but R is not the correct explanation of A
C) A is true but R is false
D) A is false but R is true
- The region of Bougainville, a collection of islands in the South Pacific, has voted to become independent from which of the following country?
 - New Zealand
 - Finland
 - Argentina
 - Papua New Guinea
- In Gujarat Assembly, Nanavati Commission was tabled recently, it is related to...?
 - 1984-Anti Sikh riots
 - Mumbai Terror attacks
 - 2002 Gujarat Riots
 - Present situation in Jammu and Kashmir
- Observe the following?
 - ISRO successfully launched RISAT-2BRI and 9 foreign satellites recently
 - The launch vehicle used for RISAT-2BRI and 9 foreign satellites is PSLV-C48
 - RISAT-2BRI helps in agriculture, forestry and disaster management
 - The launch vehicle used for RISAT-2BRI and 9 foreign satellites is GSLV-C48
 Which of the above are true
A) 1,3,4 B) 1,2,3 C) 1,4 D) 1,3
- Observe the following?
 - The 2019 South Asian Games were conducted from December 1st to 10th in Nepal
 - The 2019 South Asian Games were conducted from December 1st to 10th



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- in Sri Lanka
 - India got 312 medals and topped in the medals table
 - Sri Lanka got 312 medals and topped in the medals table
- Which of the above are true
A) 2,4 B) 2,3 C) 1,4 D) 1,3
- Match the following South Asian games, years and venues
 - 12th South Asian Games (2016) a. India
 - 13th South Asian Games (2019) b. Nepal
 - 14th South Asian Games (2022) c. Pakistan
 A) 1-b, 2-a, 3-c B) 1-b, 2-c, 3-a
C) 1-a, 2-b, 3-c D) 1-c, 2-b, 3-a
 - George Laurer, has passed away recently, he was associated with?
 - Invention of GPS system
 - Invention of Barcode
 - Invention of Video calls in social media
 - None
 - The government has decided to sell its entire 100 per cent stake in which of the following under the proposed disinvestment process?
 - AIR India
 - LIC
 - GIC
 - IDBI bank
 - Boris Johnson has won in British elections, he belongs to which of the following political party?
 - Labour Party
 - British Nationalist Alliance
 - Conservative Party
 - Liberal Democratic Party
 - 126th amendment bill is related to...?
 - Extension of the reservation quota for SCs and STs in the Lok Sabha and the state assemblies by another 10 years
 - Extension of the reservation quota for SCs and STs and Anglo Indians in the Lok Sabha and the state assemblies by another 10 years
 - Extension of the reservation quota for SCs and STs in the Lok Sabha by another 10 years
 - Extension of the reservation quota for SCs and STs in the Lok Sabha and Rajya Sabha by another 10 years
 - Abdelmadjid Tebboune is the President of...?
 - Samoa
 - Azerbaijan
 - Sudan
 - Algeria

ANSWERS

1-C	2-D	3-C	4-B	5-A	6-C
7-B	8-D	9-C	10-B	11-A	12-C
13-A	14-D	15-C	16-B	17-D	18-C
19-B	20-A	21-C	22-A	23-D	

Telangana forms Human Rights Commission

- The Telangana government issued orders for the constitution of the Telangana State Human Rights Commission (TSHRC). Prior to this, the Andhra Pradesh Human Rights Commission (APHRC) was taking care of human rights violation issues in both the States. The last appointment as the Chairperson of APHRC was in 2017 and the last member of the commission retired in 2018. Chief Secretary SK Joshi issued orders in this regard on November 28. The move comes in the wake of the December 20 deadline to appoint a full-fledged SHRC