FREE NOTES · NCERT + NEET LEVEL

Bio molecules

Tissues ka chemical analysis, primary aur secondary metabolites, carbohydrates, proteins, lipids, nucleic acids, protein structure, enzymes, unpe asar karne wale factors, inhibition aur classification.

01 Chemical composition & metabolites
02 Carbohydrates aur lipids
03 Amino acids, proteins, nucleic acids
04 Proteins ki structure
05 Enzymes: kaise kaam karte
06 Classification aur co-factors
07 Extra + tricks
08 Important Q&A
09 Common mistakes
10 Practice (NEET style)
11 Quick revision

01 Chemical composition & metabolites

- Zinda tissue + trichloroacetic acid: **acid-soluble pool** (chhote molecules, <1000 Da: amino acids, sugars, nucleotides) aur **acid-insoluble** fraction (macromolecules: proteins, nucleic acids, polysaccharides; lipids bhi yahan, kyunki membrane tootkar vesicles banate).
- Jeevon me sabse zyada paani (70–90%).
- **Primary metabolites**: kaam pata (amino acids, sugars). **Secondary metabolites**: alkaloids (morphine, codeine), terpenoids, essential oils (lemongrass oil), toxins (abrin, ricin), lectins (concanavalin A), drugs (vinblastine, curcumin), polymers (rubber, gums, cellulose), pigments (carotenoids, anthocyanins).

02 Carbohydrates aur lipids

- Polysaccharides: **cellulose** (glucose ka homopolymer; plant walls; helix nahi, I_2 nahi pakadta), **starch** (helical, I_2 pakadta → neela), **glycogen** (jaanwaron ka storage), **inulin** (fructose polymer), **chitin** (amino sugars wala complex polysaccharide; arthropods ka exoskeleton).
- Chain me reducing end daayein, non-reducing baayein; monosaccharides glycosidic bond se jude.
- Lipids: fatty acids (R–COOH; saturated ya C=C wale unsaturated; palmitic acid me carboxyl C milake 16 C, arachidonic 20 C), glycerol (trihydroxy propane); mono/di/triglycerides; oils ka melting point kam (til ka tel). Membranes me **phospholipids** (lecithin); neural tissue me complex lipids.

03 Amino acids, proteins, nucleic acids

- Amino acid: α-carbon pe H, –COOH, $–NH_2$ aur R group. 20 types; acidic (glutamic acid), basic (lysine), neutral (valine), aromatic (tyrosine, phenylalanine, tryptophan). pH ke saath **zwitterion** roop badalta.
- Proteins: amino acids ke heteropolymers, **peptide bonds** se jude (dehydration). Jaanwaron me sabse zyada **collagen**; poore biosphere me sabse zyada **RuBisCO**.
- Kaam: transport (GLUT-4), hormones (insulin), enzymes (trypsin), antibodies, receptors, structure (collagen).
- Nucleotide = nitrogen base + pentose sugar + phosphate. Purines: adenine, guanine; pyrimidines: cytosine, uracil, thymine. Nucleoside = base + sugar (adenosine). Nucleotides phosphodiester bond se jude.

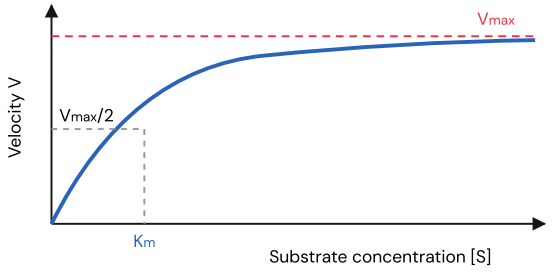
04 Proteins ki structure

Level	Kya hai
Primary	Amino acids ka kram (pehle N-terminal, aakhir me C-terminal)
Secondary	α-helix (right-handed, sabse common) ya β-pleated sheet me mudna
Tertiary	Helix ka 3-D mudna; biological activity deta
Quaternary	Do ya zyada polypeptide subunits ki arrangement; jaise haemoglobin = 2α + 2β

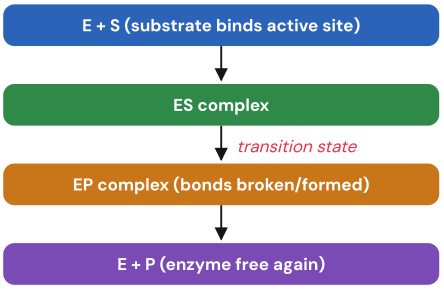
DNA (Watson–Crick model): double helix, antiparallel strands, A=T (2 H-bonds), G≡C (3 H-bonds), ek turn me 10 bp, pitch 3.4 nm, har bp pe 0.34 nm (B-DNA).

05 Enzymes: kaise kaam karte

- Lagbhag saare enzymes proteins hain (ribozymes RNA enzymes). Active site (jeb) me substrate fit hota.
- **Activation energy** kam karte; jaise carbonic anhydrase $CO_2 + H_2O \rightarrow H_2CO_3$ ko ~1 crore guna tez.
- Factors: **temperature** aur **pH** (optimum; zyada garmi se denature), **substrate concentration** (velocity V_{max} tak badhti, phir sthir).
- **Competitive inhibitor**: substrate jaisa, active site pe baithta; jaise malonate succinic dehydrogenase ko rokta. Bacterial rogon ko control karne me.



[S] ka enzyme velocity pe asar



Enzyme ka catalytic cycle

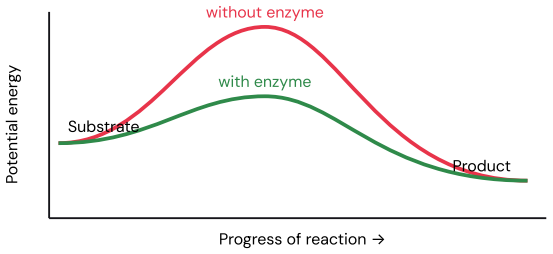
06 Classification aur co-factors

Class	Reaction
1 Oxidoreductases / dehydrogenases	Oxidation-reduction
2 Transferases	Group (H nahi) ek se doosre substrate pe
3 Hydrolases	Ester, ether, peptide, glycosidic bonds ka hydrolysis
4 Lyases	Groups hatakar double bond banana
5 Isomerases	Isomers ka aapas me badalna
6 Ligases	Do compounds jodna (C–O, C–S, C–N, P–O)

Co-factors: **prosthetic groups** (kaske jude organic; peroxidase, catalase me haem), **co-enzymes** (dheele jude; NAD, NADP me niacin), **metal ions** (carboxypeptidase ke liye Zn^{2+}). Apoenzyme (protein part) + cofactor = holoenzyme.

07 Extra + tricks

- Elements: zinda tissue me C, H, O, N sabse zyada (insaan: O 65%, C 18.5%, H 9.5%, N 3.3%); dharti ki parat me O, Si.
- Amino acids: **alcoholic** (serine, threonine), **sulphur wale** (cysteine, methionine), **aromatic** (phenylalanine, tyrosine, tryptophan). Glycine sabse saral (R = H).
- Essential amino acids (8–10) khane se aane chahiye; trick "**PVT TIM HALL**" = Phe, Val, Thr, Trp, Ile, Met, His, Arg, Leu, Lys.
- **K_m** (Michaelis constant) = aadhe V_{max} pe [S]; kam K_m = zyada affinity.
- Models: **lock and key** (Emil Fischer) aur **induced fit** (Koshland). **Non-competitive** inhibitor kahin aur judta (cytochrome oxidase pe cyanide).



Enzymes activation energy kam karte

08 Important Q&A

Q1. Lipids acid-insoluble fraction me kyun?

Lipids chhote hain par pees ne pe membranes vesicles bante jo ghulte nahi.

Q2. Starch iodine se neela par cellulose nahi kyun?

Starch helix banata jo I_2 pakadta; cellulose me helix nahi.

Q3. Competitive inhibitor kya? Example?

Substrate jaisa molecule jo active site ke liye ladta; succinic dehydrogenase ke liye malonate.

09 Common mistakes

- Kehna ki saare enzymes proteins (ribozymes RNA hain).
- Biosphere ka sabse zyada protein collagen likhna (RuBisCO hai).
- Palmitic acid ko 15 C ginna (carboxyl milake 16).
- Nucleoside (phosphate nahi) aur nucleotide mix karna.

10 Practice (NEET style)

1. Fructose ka polymer?
2. Amino acids ke beech bond?
3. Haemoglobin ke subunits?
4. NAD me kaunsa vitamin?
5. Do compounds jodne wali class?

ANSWERS

1) Inulin · 2) Peptide bond · 3) 2α + 2β · 4) Niacin · 5) Ligases

11 Quick revision: exam se 5 minute pehle

CARBS

- Starch helix + I_2 neela
- Cellulose helix nahi
- Chitin: exoskeleton

PROTEINS

- Peptide bond
- RuBisCO sabse zyada
- 4 levels, Hb quaternary

NUCLEIC ACIDS

- Purines A, G
- A=T 2, G≡C 3 H-bonds
- 0.34 nm per bp

ENZYMES

- Activation energy kam
- Malonate competitive
- 6 classes, holoenzyme

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.