Basics → Earth crust – Element analyse (C, H, O, N)

→ Living tissue

analyse → It is made up of some elements

Both earth crust & living tissue element same

When analyse living tissue → Different type

↳ chemical analysis – organic compound

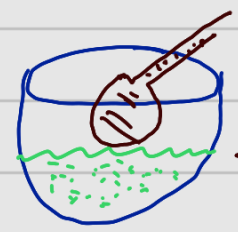
↳ Inorganic compound analysis

Amount & compound they form

Chemical Analysis (Trichloro acetic acid)

Plant

Liver

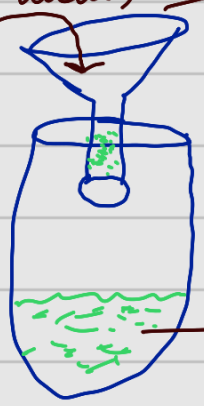


Crush in mortal pestle

↳ Trichloro acetic acid

paste

Filter



Retenate

Filtrate

↳ Acid insoluble pool

↳ polymer substance

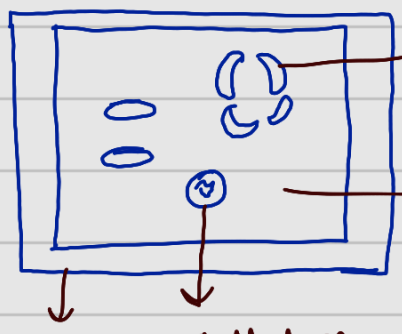
↳ Protein M.W > 800 dalton

↳ Nucleic acid

↳ Polysaccharide and Fat

↳ thousands of chemical sugar, amino acids, Nitrogenous base, nucleotide, Nucleoside, ions

M.W < 800 dalton is not polymeric



Cell wall = cellulose

(Acid insoluble pool

Protein starch

(Polymeric)

Acid insoluble pool

Sugar, ions

(Acid insoluble pool)

Acid insoluble pool	Acid soluble pool
three polymeric – protein	Sugar, amino acid, Nitrogenous base, non-polymeric
MW > 800 – poly saccharide	M.W < 800 dalton
– Nucleic acid	
+ Fatty acid	
(non polymer) MW < 800	

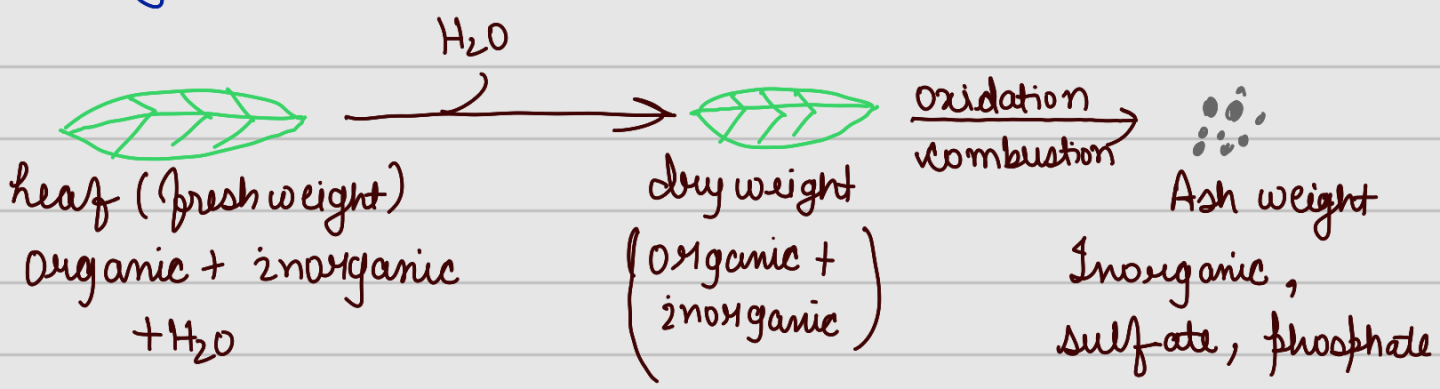
list of compound identify them in ASP and AIP

Collagen → protein → Acid insoluble pool
Glycine → Amino acid → Acid soluble pool
tRNA → Nucleic acid → Acid insoluble pool
Ribose → Sugar → Acid insoluble pool
Starch → Polymeric → Acid insoluble pool
Plasmid → DNA → Acid insoluble pool
Ribosome → organelle → Acid insoluble pool
adenosine → Nucleoside → Acid soluble pool
Sodium → Acid soluble pool

List of compound identify them in ASP and AIP

chloride
Golgi body
sulfate
Glucose
Insulin
Palmitic acid
Inulin

Inorganic analysis



Primary and Secondary metabolite

Primary metabolite
- help in physiological function
- not very different in different type of cells.
- Starch, Glucose, amino acid

(metabolite / compound part of cell, can take part in chemical reaction)

Secondary metabolite
- Some microbes plant and fungi some chemicals non-identifiable role
- They may have protective function- ecological importance
- Economic importance for us

How NCERT have details

1) Bio micromolecules → Amino acid, sugars, Nitrogenous base Nucleotide, fatty acid, cholesterol phospholipid

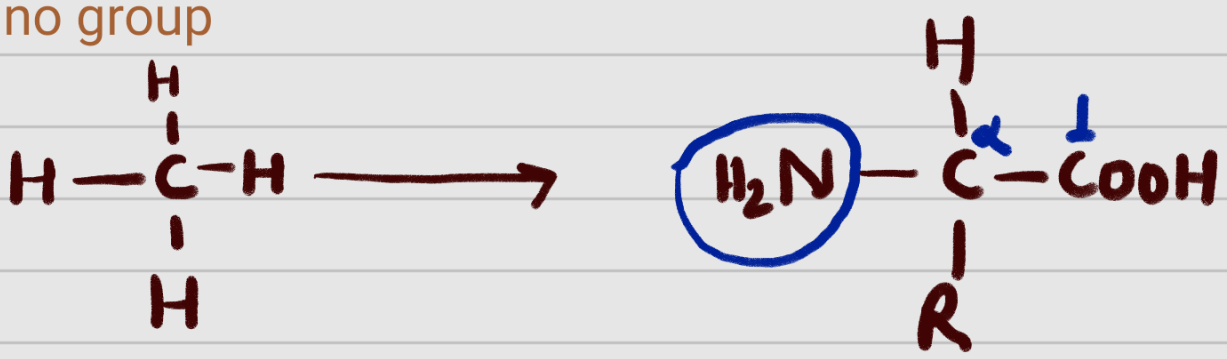
2) Bio macromolecule → Polysaccharide, proteins, nucleic acid

3) Metabolism, Enzymes

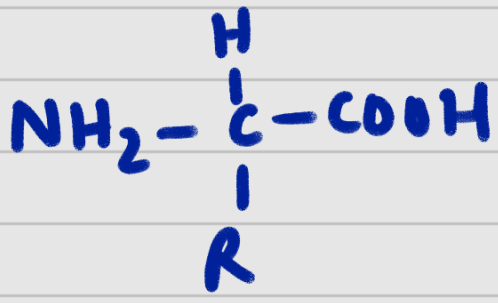
Amino Acids

Basic details → Acid insoluble pool - M. W >8 00 dalton

substituted methane- acid group,
amino group



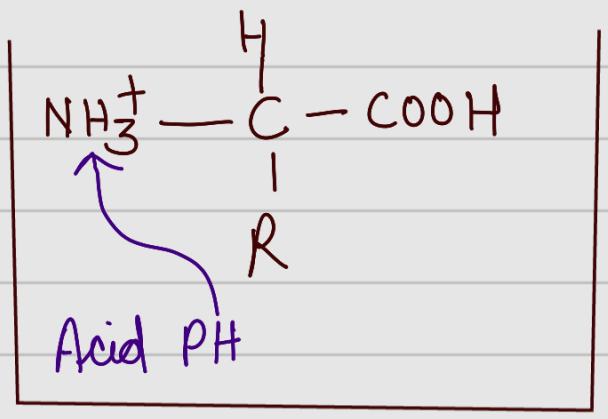
Amino acids optically active



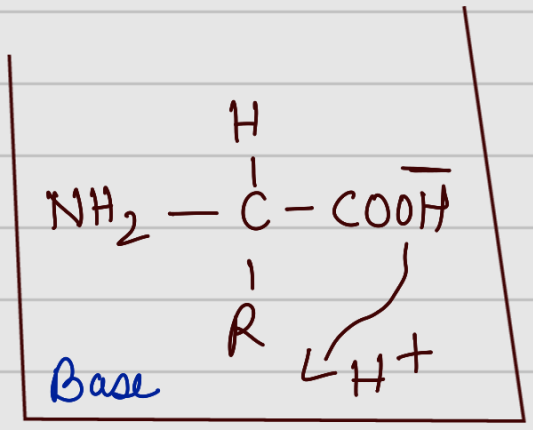
R=H ⟶ Glycine
optically inactive

mostly laevorotatory

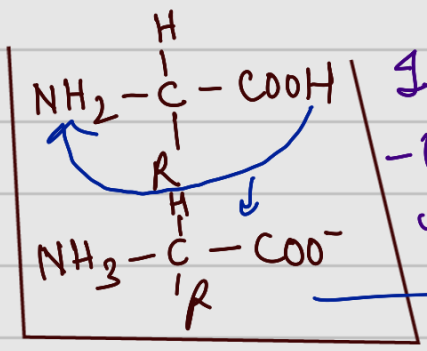
Zwitter ion



In acidic PH amino acid +ve charge

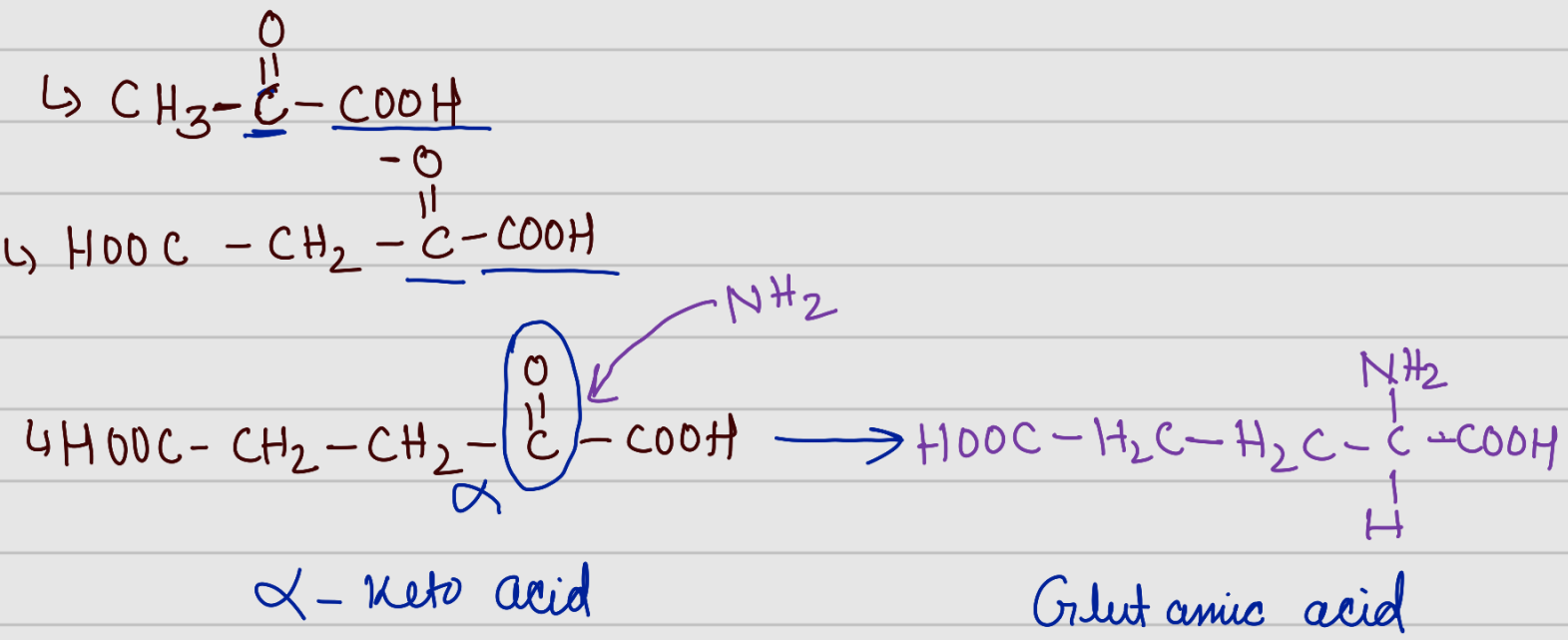


Base H^+ obtain in base -ve charge



It is klas Zwitter ion
-PH at which Zwitter ion form is klas Iso-electric.
amphoteric ion

Biosynthesis of amino acid



Essential and non Essential amino acid

In animal amino acid require in diet

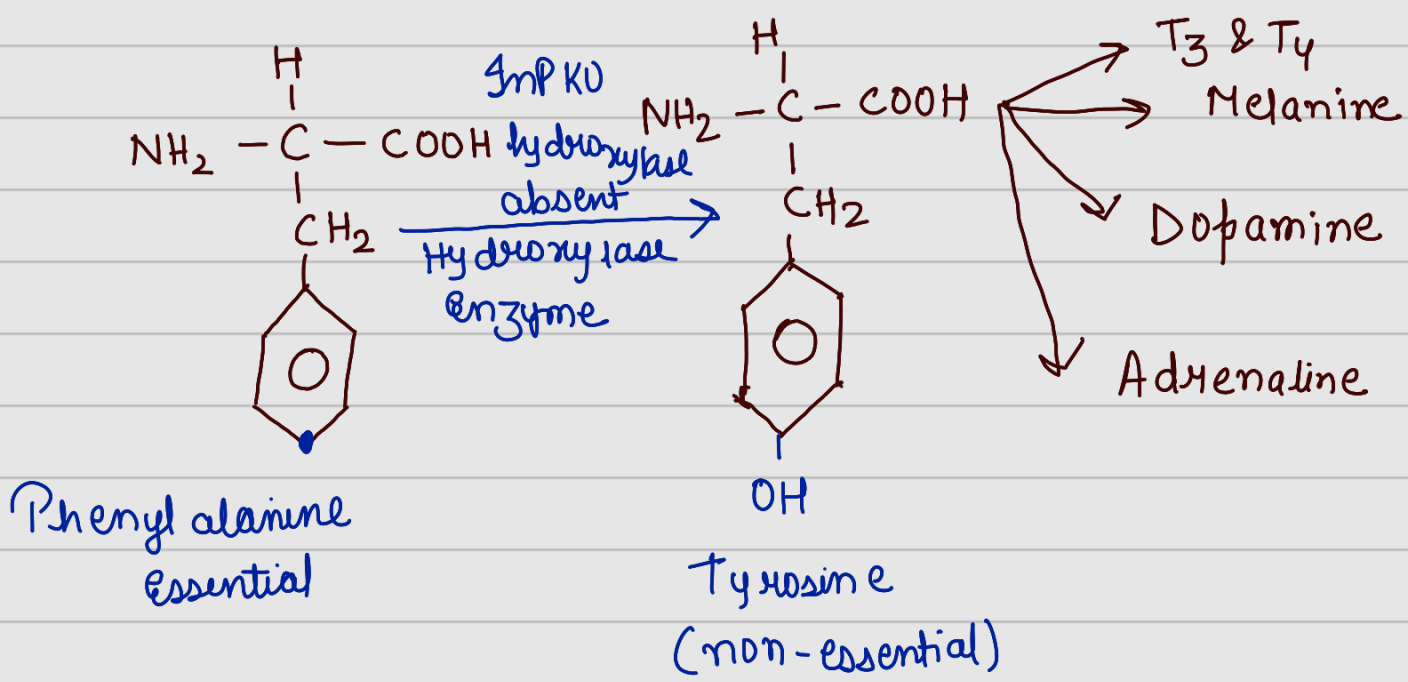
Essential amino acid

Ar → Arginine
Va → valine
H- Histidine
I → Isoleucine
L → Leucine
L → Lysine
M → Methionine
P → Phenylalanine
T → Threonine
T → Tryptophan

Histidine, Arginine, Threonine → Semi essential
↓
It essential special cases

Non essential amino acid →
synthesis occur from essential
not required in diet but require
in body

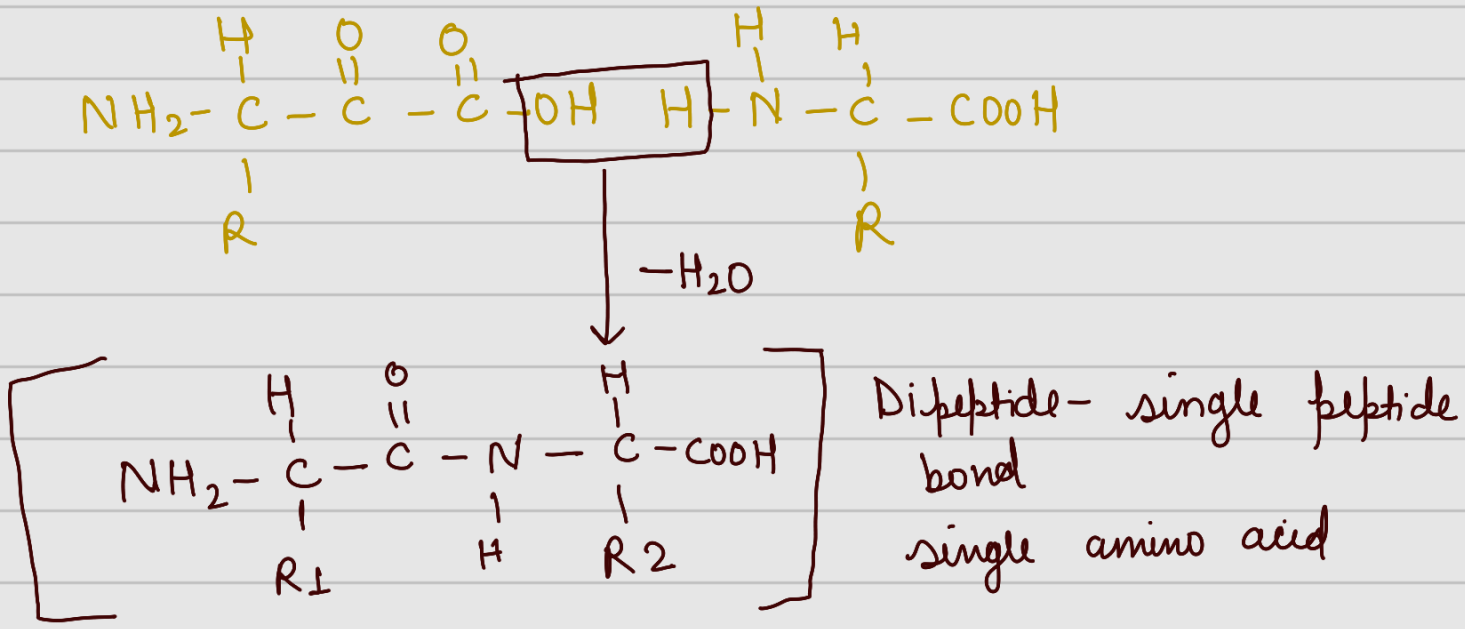
- Glycine
- Tyrosine



Phenyl alanine
Essential

Tyrosine
(non-essential)

Bond b/w amino acid



Dipeptide - single peptide bond
single amino acid

on the basis of R-group

Non polar → R- group hydrocarbon chain

G - Glycine = R = H
A - Alanine R = CH_3
V - Valine R = $-CH(CH_3)_2$

L - Leucine
I - Isoleucine
P - Phenyl alanine

Polar

Acidic - $NH_2-CH(CH_2-CH_2-COOH)-COOH$ (acid)
(Glumatic)

A - Aspartic acid
G - Glutamic acid

Basic - Extra NH_2

H - Histidine - 2 Extra NH_2

L - Lysine - 1 Extra NH_2

A - Arginine - 3 extra NH_2

→ Lysine & Arginine (Histones)

Sulfur containing → M - Methionine (non-polar) - $CH_2-CH_2-S-CH_3$

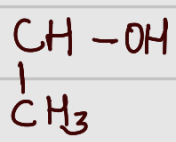
Cystiene $R-CH_2-SH$ → Disulphide bridge (S-S)

Cystine $R-CH_2-S$

OH group containing

T - Tyrosine →

T - Threonine →



S - Seriene - CH_2-OH

Aromatic → Tyrosine

Phenylalanine

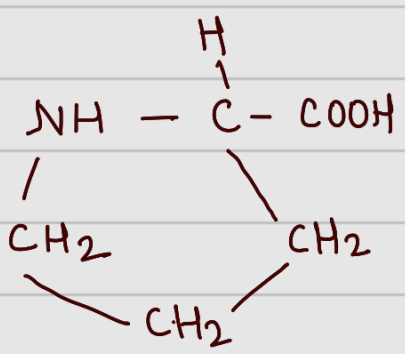
Tryptophan → Indole ring

↓

Precursor of Auxin

Imino acid →

Proline



NH- Imino group

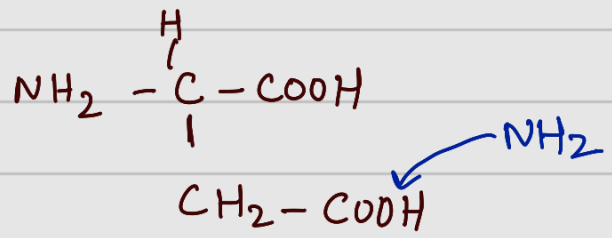
G
A
V
L
I
P
→ non-polar , Acidic → A G , Basic - H L A

Aromatic - T, T, P

-OH- T T S

-S- M C C

Aspartic acid



↓

Asparagine (amide)

Glutamine (Amide)

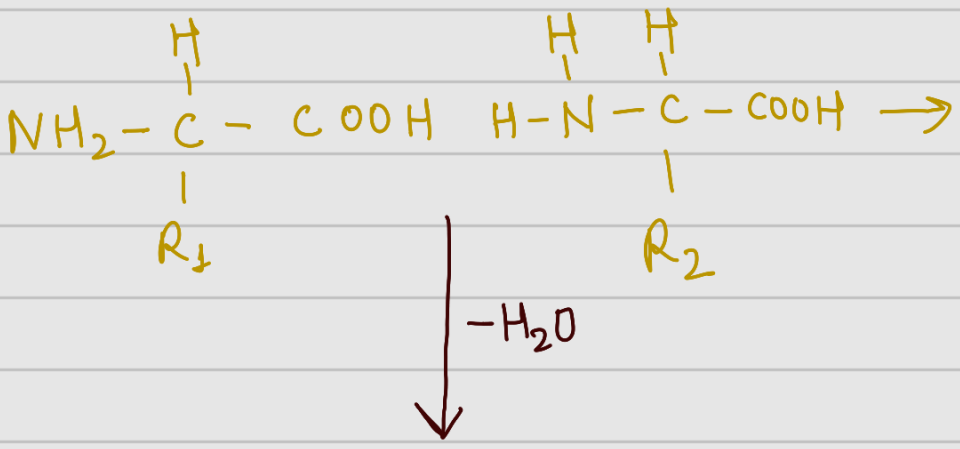
Role of amino acid or significance

1) Glycine – Simplest, optically inactive
2) Tryptophan – most complex

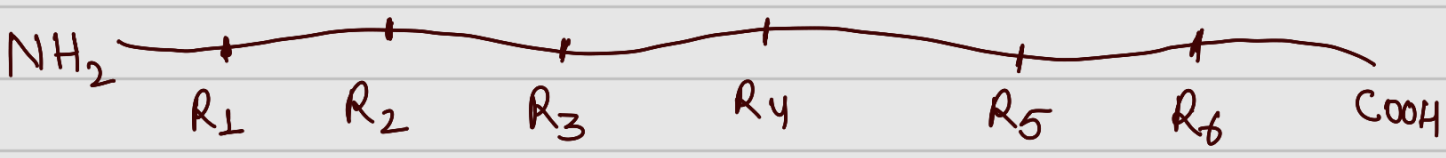
3) Tyrosine – Melanine, T_3 & T_4, adrenaline, Dopamine
4) Aspartame – artificial sweetner Asp- the

PROTIENS

Peptide Bond and polypeptide chain



Two amino acid link - Dipeptide



↳ Last amino acid

↓

Folded & Function is K) as protein

Basic Feature of protein

(1)

Heteropolymer → It is polymer of 20 different amino acid.

↳ sequence of amino acid decided by DNA

(2)

Acid insoluble pool

(3) Molecular weight – more high

(4) Maximum diversity – Biologically function
virus → protein is most diverse

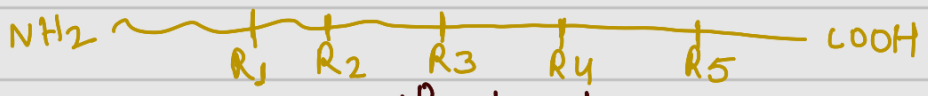
classification of protein

1) on the basis of structure

1° structure	Inorganic structure ($MgCl_2$ – formula)
2° structure	Organic
3° structure	Physics – 3-D
& Quaternary	

2) on the basis of shape → Fibrous, Globular

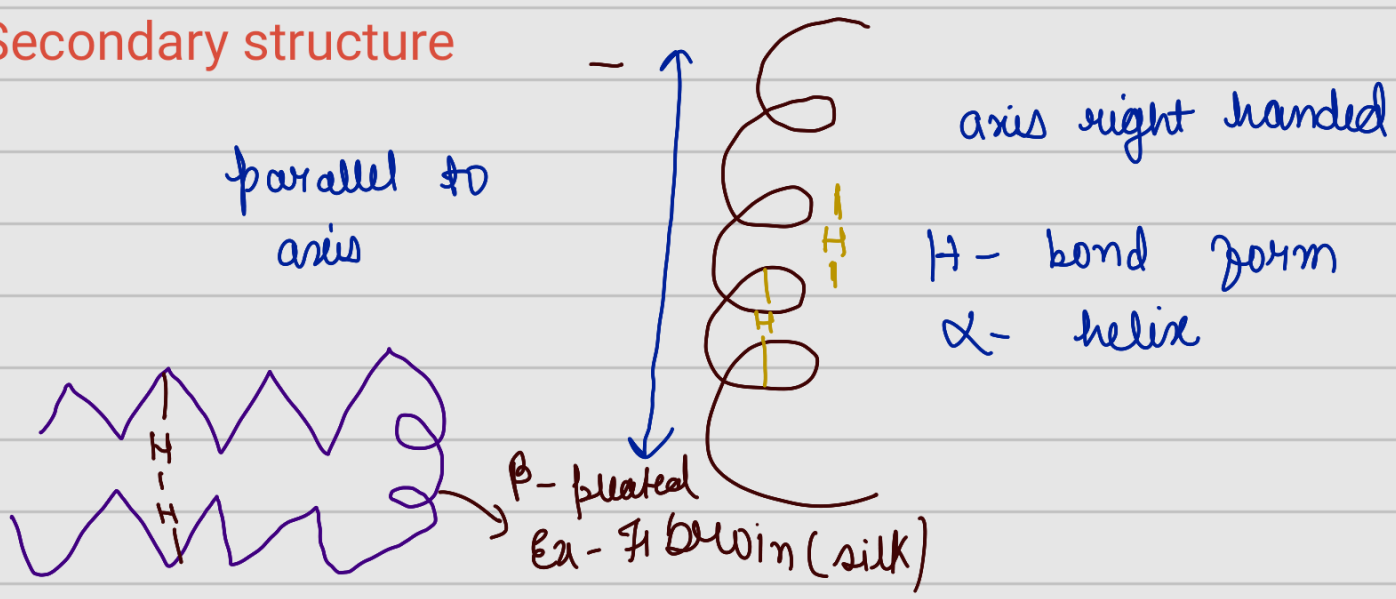
Structure of protein → 1° structure



Primary structure → 1° structure

↳ Bond – peptide (covalent)
↳ not break during denaturation
↳ sequence of amino acid decided by DNA
Ex- Growth hormone (Functional 1°)

Secondary structure



Tertiary structure

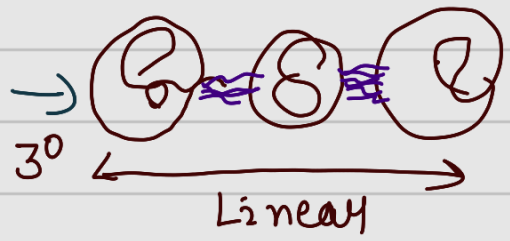
3^0 structure → Secondary structure further fold

Polar-H_2O → Many such protein for biological activity fold 3^0

Bond
- Peptide
- H- bond
- Disulphide bridge
- Hydrophobic interaction
  - ↳ ionic interaction
  - ↳ vander waal

Quaternary Structure

Quaternary →



- Quaternary → (Hb) - Haemoglobin
  - two α- Subunit
  - β- Subunit

Fibrous and Globular Structure

↓

Elongated Fibre like structure - water insoluble

on surface polar amino
3^0 or 4^0 structure
- water soluble
Ex - albumin
- Enzyme

Role of protein

- ↳ Enzymes
- ↳ antibody - Immuno globulin
- ↳ Blood clotting
- ↳ Rhodopsin, Iodopsin
- ↳ Channel, pump
- ↳ Receptors
- ↳ villi & Flagella
- ↳ muscle - contractile protein (actin, myosin)

Enzymes → Km & Vmax

Basic feature → all enzymes are made up of protein
Except some RNA

Except - RNA which act as catalyst - Ribozyme
↳ present in ribosome (23S rRNA)
+ splicing

↳ Globular protein (water soluble)

↳ Enzyme only function in aqueous medium

↳ Enzyme function in a particular →

condition high temperature and pressure →
can denature Enzyme

Inorganic catalyst → Inc. pressure & temperature
activity Increase

Some enzyme → in archaebacteria → Function high
temperature (thermostable — Taq polymerase)

How chemical reaction occur

1)physical change → in shape without breaking bond
Ba (OH) 2 + H2S02 → Baso2 + H 2 O

2) Chemical change in chemical Structure
In chemical Reaction both chemical and physical Change

Ratel speed of reaction = $\left(\frac{\text{Product form}}{\text{time}}\right)$

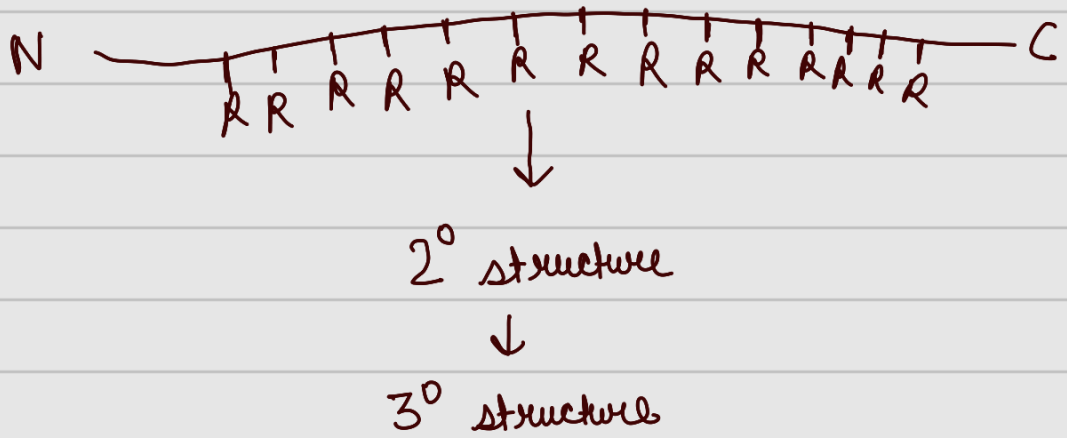
Enzyme increase rate of reaction without getting consumed in it

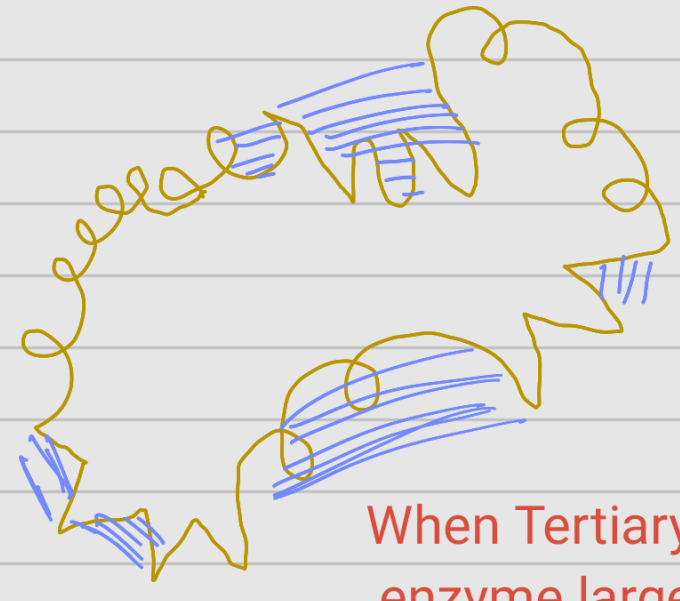
Rate of physical and chemical Change is Rate

Enzyme reaction perform - Both physical change (shake change) + chemical change (Chemically change)

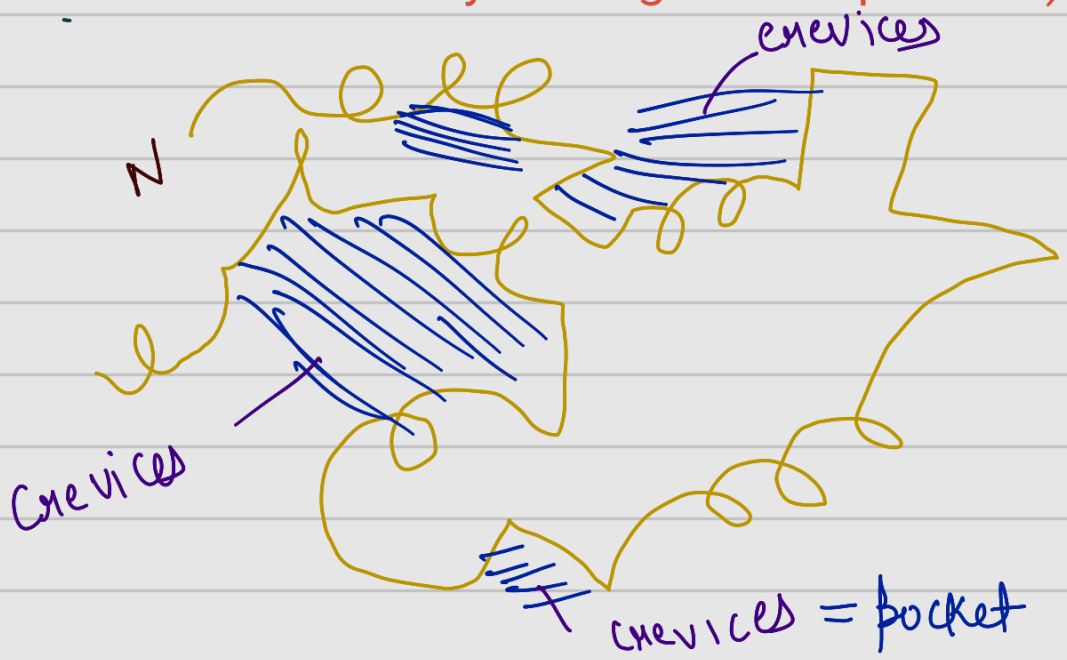
How active site form in Enzyme ?

Primary structure represented by line diagram





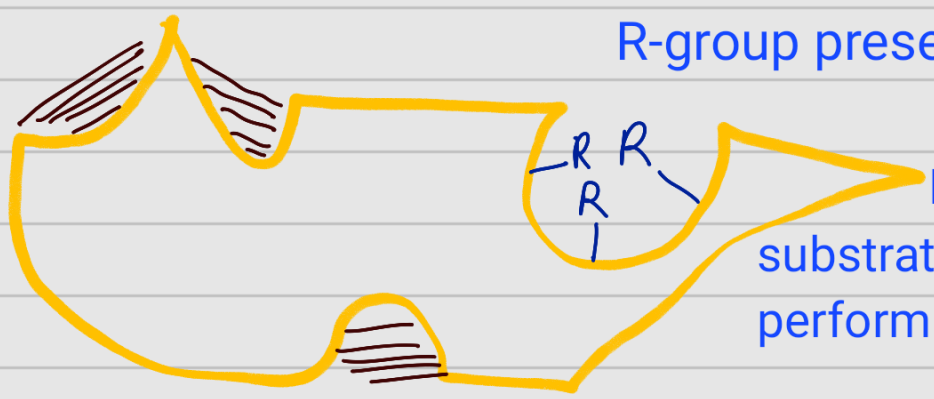
When Tertiary structure form, on surface of enzyme large no. of pockets) Crevices form.



out of all these crevices or pocket → any one pocket behave like active site

↓

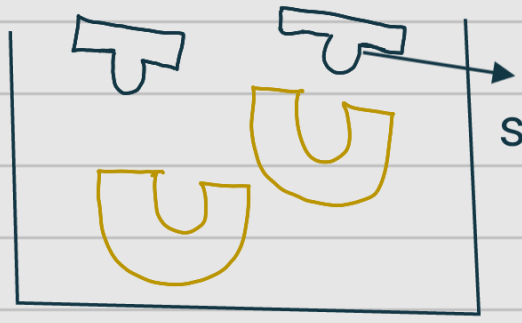
fix shape and particular R-group present



Fix type of substrate tobind and perform reaction

What are mechanism of action of Enzyme ?

1) Substrate move to Enzyme by simple diffusion.
2) Substrate binding active site is a <u>by chance</u> Event
3) Rated diffusion of substrate ↑
   chance of binding Increase ↑



Reactant (Substrate) shape for Active Site.

4) When substrate bind to active Site --> Loose Binding occur

Loose Binding ↓ Active site change itself

5) Tight Binding occur -- Active site Shape Change --> Closely associated with Substrate.
6) Now Change substrate Chemically ↓

Intermediate Stage form --> then product form (Bond Breaking & making occur)

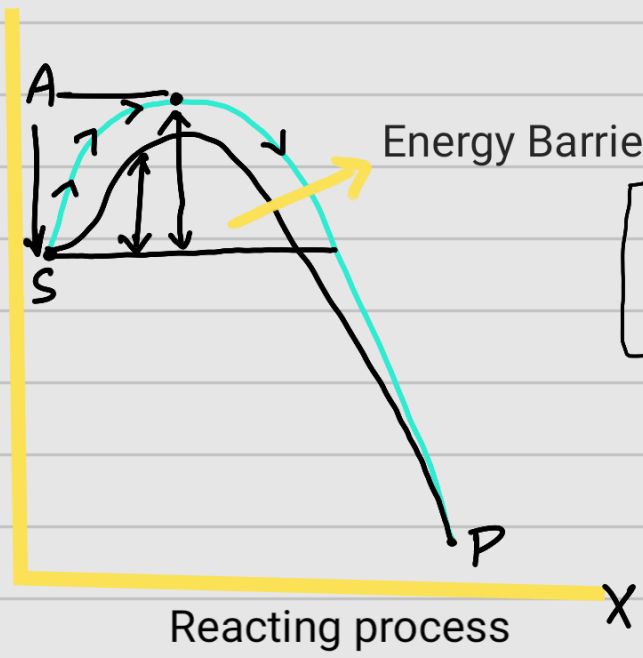
E + S --------> E.P -------> E.P -------> E + P

Complex can be Reversible

Complex Irreversible

Intermediate Stage ----> Change occur

Intermediate or Transition Stage ---> Unstable ----> in respect of Energy

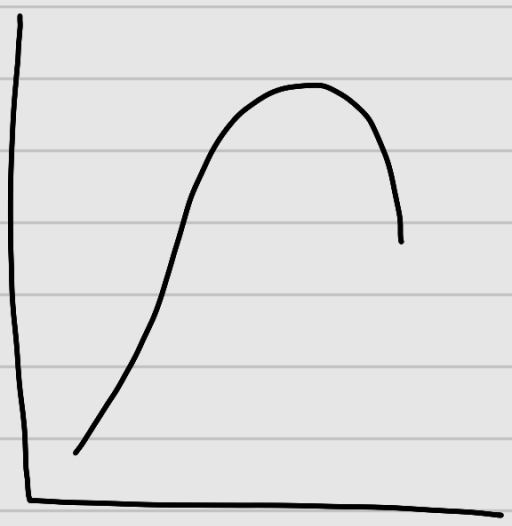


Energy Barrier = Activation Energy

Average Energy Difference b/w Substrate & Transition/ Intermediate stage

Enzyme - Alternate path

Exothermic



Endothermic