

SNS COLLEGE OF ALLIED HEALTH SCIENCE
Affiliated to The Tamil Nadu Dr M.G.R Medical University, Chennai



DEPARTMENT OF OPERATION THEATRE AND ANAESTHESIA

TECHNOLOGY

COURSE NAME: BIOCHEMISTRY

UNIT : 1

TOPIC : ENZYMES – NOMENCLATURE & ITS CLASSIFICATION

FACULTY NAME: MITHRA V

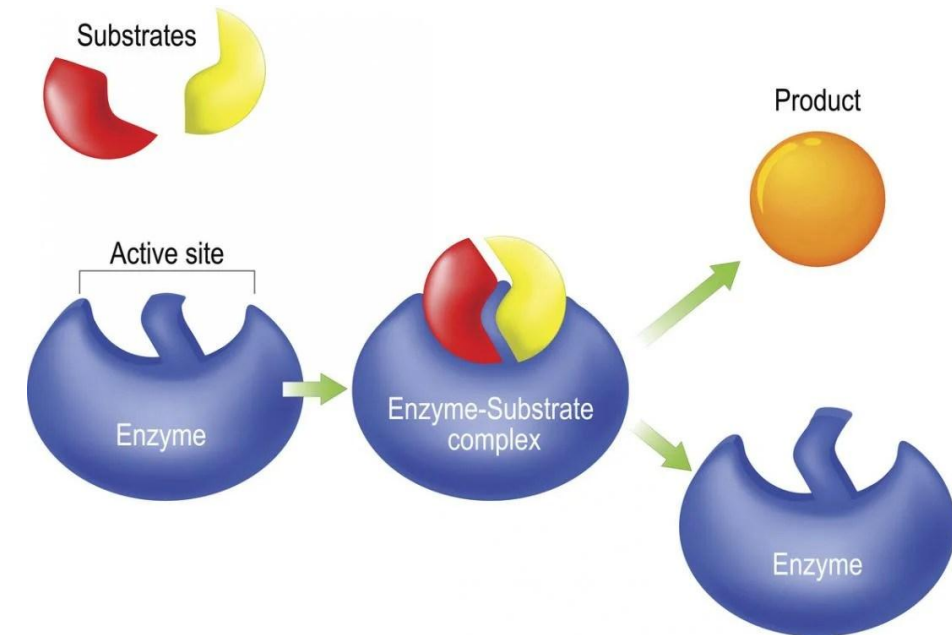
ENZYMES - DEFINE

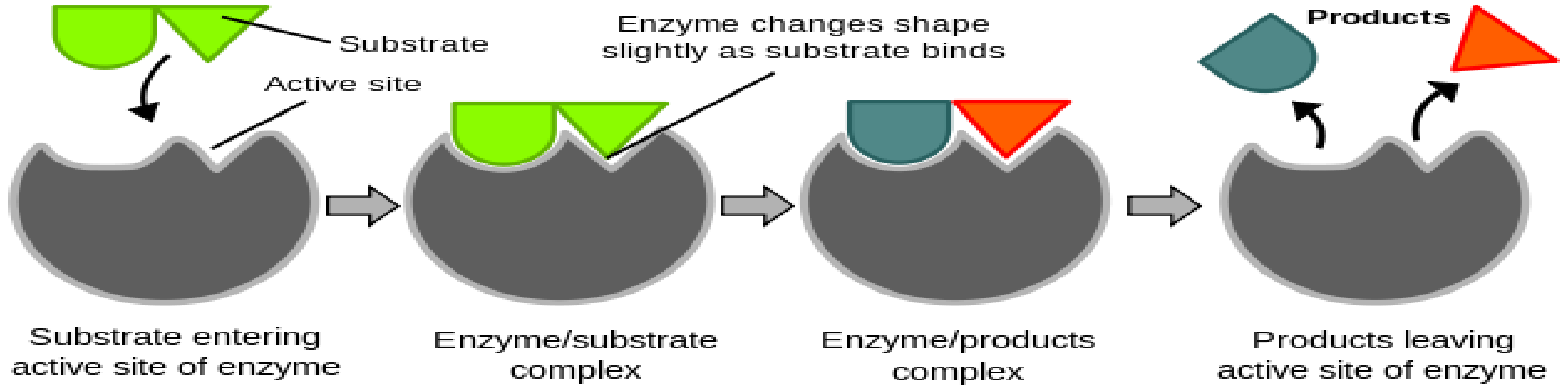
- **Globular Proteins** - speed up chemical reactions in living organisms, biocatalysts.
- i) absorption of nutrients, digestion
ii) breathing, excretion, reproduction,
iii) function of the liver and kidney.
- Enzymes are **linear chains of amino acid** sequence that fold into a specific **3D** structure.
- Sequence determines the structure, which in turn determines catalytic activity, depends on intact primary, secondary, tertiary, and/or quaternary structure.



SUBSTRATES AND PRODUCTS

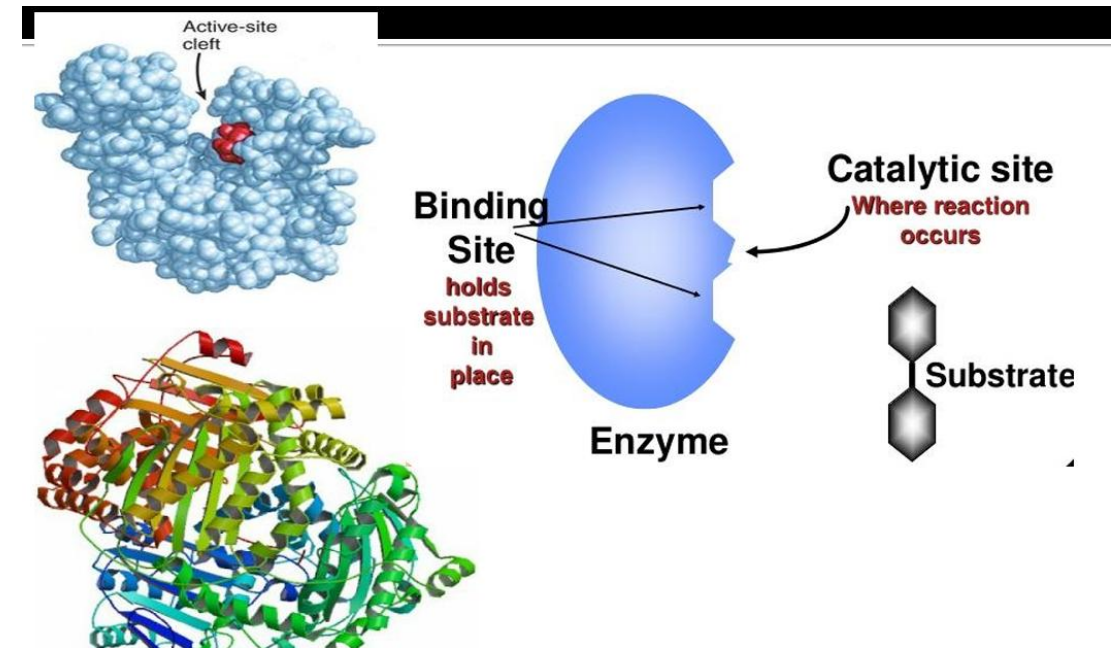
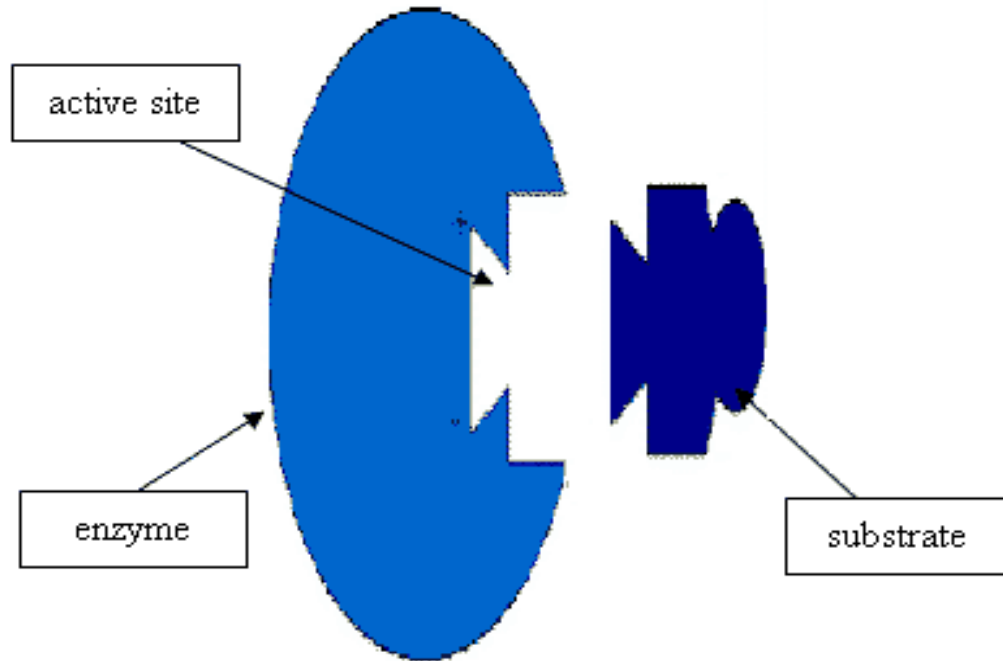
- Heating causes denaturation of the structure, leading to loss of enzyme activity (temperature-sensitive).
- Enzymes act on molecules called **substrates**, converting them into **products**.
- Substrates are the starting molecules that enzymes react with.
- Enzymes transform substrates into distinct molecules called products.





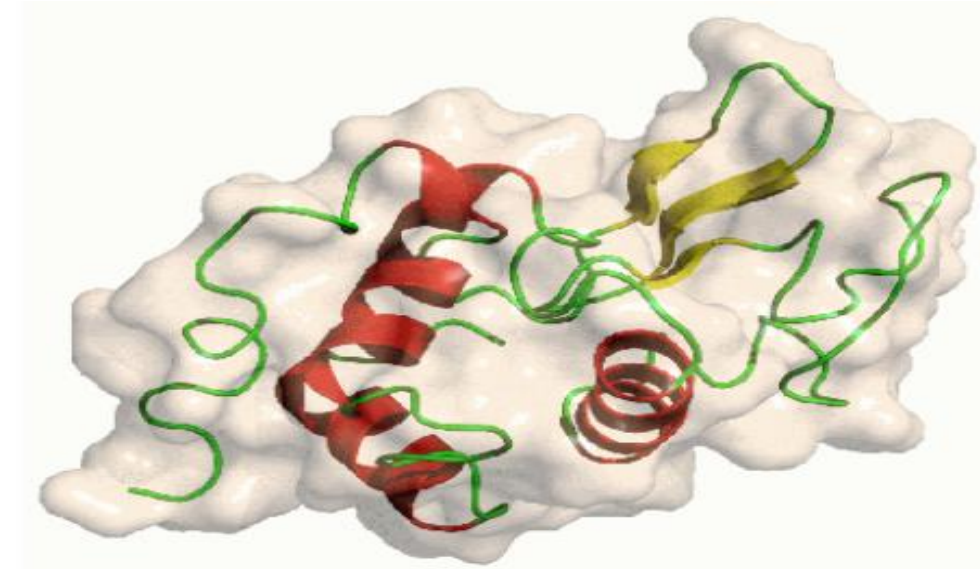
ACTIVE SITE

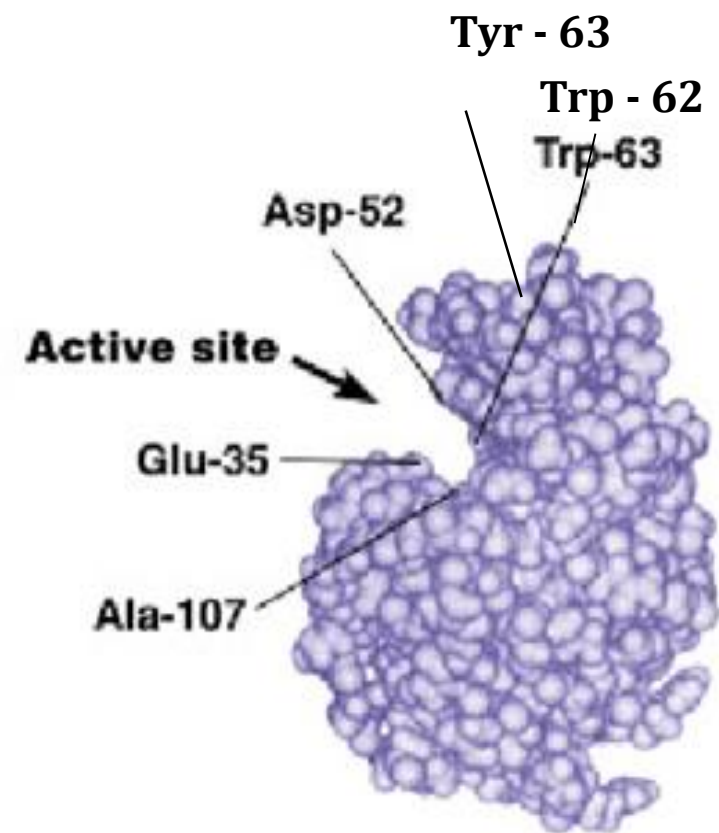
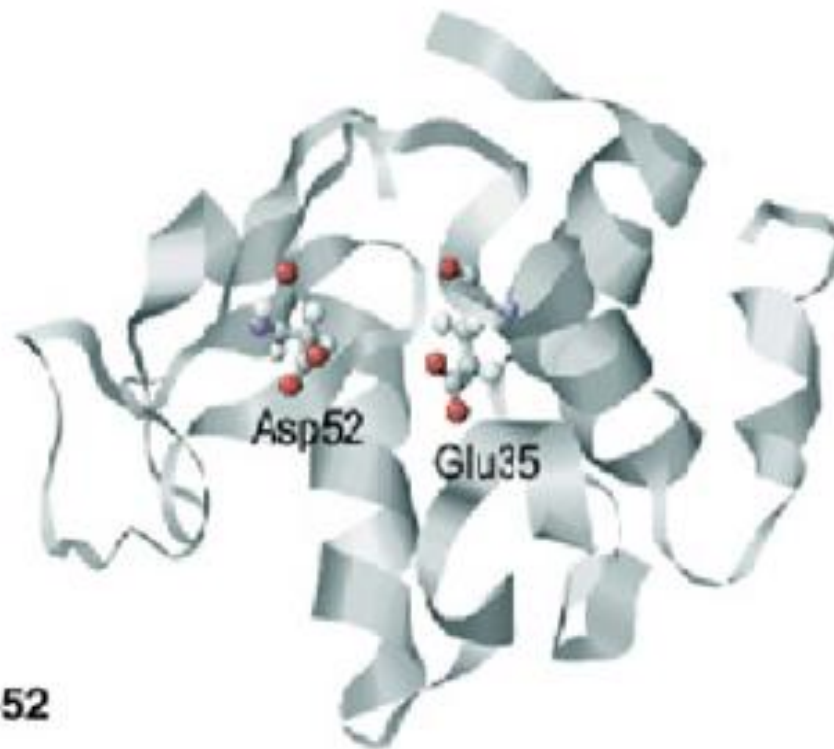
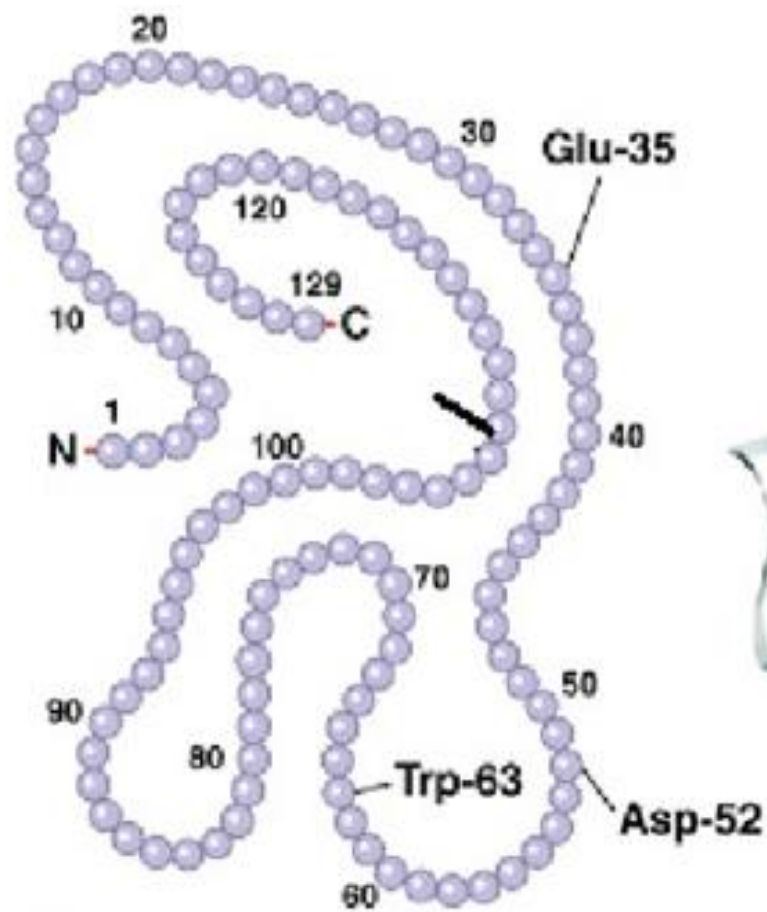
- The active site - small region where substrates bind & reactions occur.
- Has unique 3D structure formed by amino acid residues



ACTIVE SITE - EXAMPLE

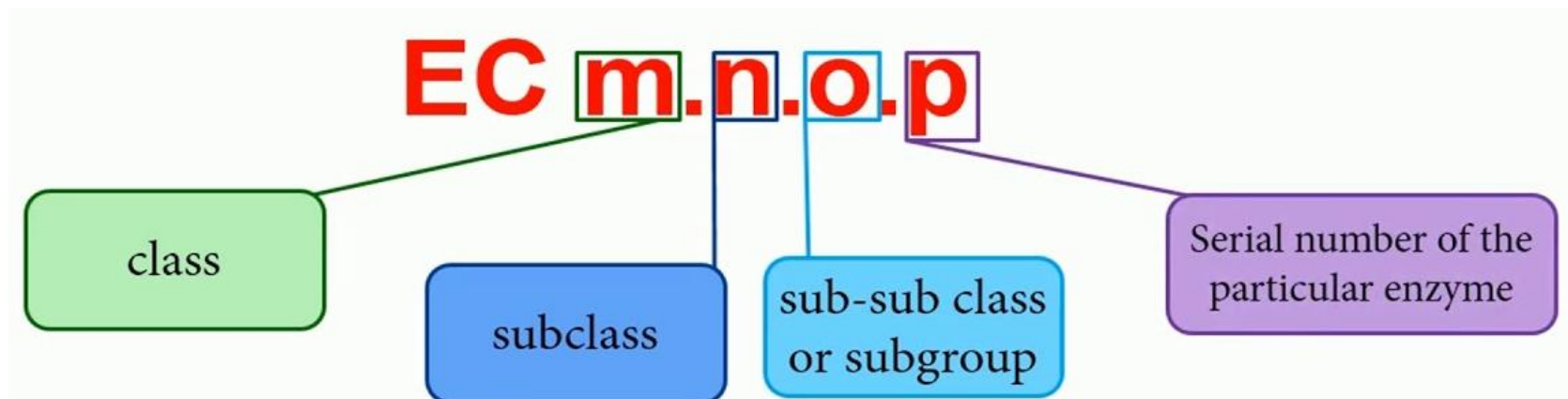
- Lysozyme (129 amino acids), the active site is formed by residues 35, 52, 62, 63 & 107.
- It is antimicrobial enzyme, small globular protein.
- Present in tears, nasal mucous, gastric secretion, milk and egg white.
- It lyse the bacterial cell wall.
- Turn over no. : 0.5/sec. and E.C. no is 3.2.1.17
- In 1922, Alexander Fleming coined the term lysozyme.





NOMENCLATURE OF ENZYME

- IUBMB (International Union of Biochemistry and Molecular Biology) recommends:
- Trivial name (common/recommended name)
- Systematic name (official name)
- Assigned a unique Enzyme Code Number (EC number) - four digits separated by dots:



Example
EC 2.7.1.1 → Hexokinase

ENZYME CLASSIFICATION

According to the IUBMB system, enzymes are grouped into 6 major classes

EC 1 OXIDOREDUCTASES

- Catalyze oxidation-reduction reactions (transfer of electrons)

EC 2 TRANSFERASES

- Catalyze transfer of functional groups from one molecule to another

EC 3 HYDROLASES

- Catalyze hydrolysis reactions (breaking bonds with water)

EC 4 LYASES

- Catalyze addition or removal of groups to/from double bonds

EC 5 ISOMERASES

- Catalyze isomerization (rearrangement within a molecule)

EC 6 LIGASES

- Catalyze joining of two molecules with energy input (usually ATP)

CLASSIFICATION OF ENZYMES

A. Oxidoreductases:



B. Transferase:



C. Hydrolases:



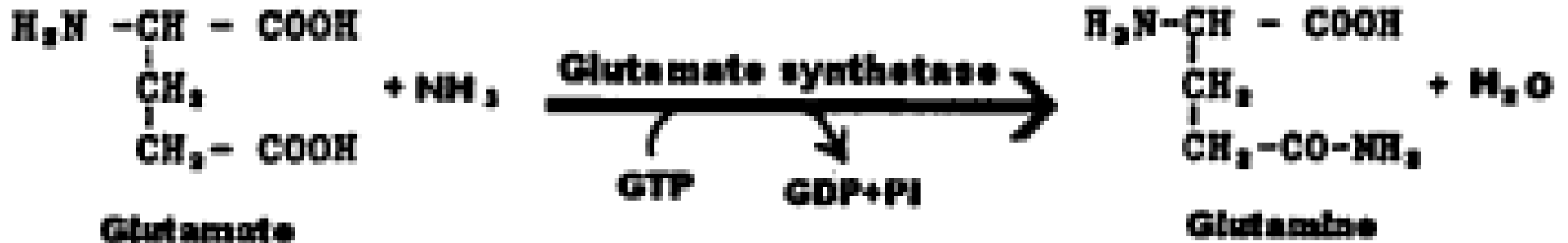
D. Lyases:



E. Isomerases:



F. Ligases:



REFERENCES

- Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis - Copeland, 3rd Edition
- <https://www.ncbi.nlm.nih.gov/books/NBK9921/> (NCBI Bookshelf – Enzyme Classification)
- <https://enzyme.expasy.org/> (ExPASy Enzyme Nomenclature Database)
- <https://www.brenda-enzymes.org/>
(BRENDA – The Comprehensive Enzyme Information System)

THANK YOU