SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

Affiliated To The Tamil Nadu Dr. MGR Medical University, Chennai
Approved by Pharmacy Council of India, New Delhi.
Coimbatore -641035

COURSE NAME : BIOCHEMISTRY AND CLINICAL PATHALOGY

D.PHARM/ II YEAR

TOPIC:DEFINITION, CLASSIFICATION OF AMINO ACIDS BASED ON CHEMICAL NATURE AND NUTRITIONAL REQUIREMENTS WITH EXAMPLES

DESIGN THINKING STAGES IN CLASSIFICATION

Empathize: Understand the users — in this case, students, pharmacists, or researchers who use the alphabetical classification system.

Define: Clearly define the problem based on the insights from the empathize stage.

Ideate: Generate possible solutions or improvements.

Prototype: Create a tangible version of your solution

Test: Evaluate the prototype with real users.

ABOUT AMINO ACIDS

Amino Acids

Amino acids are organic compounds containing an **Amino Group** (~NH_2) and a **Carboxyl Group** (~COOH).
They are the **Building Blocks of Proteins.**

Classification of Amino Acids

Based on Chemical Nature

Neutral Amino Acids
- Glycine, Alanine, Valine

Acidic Amino Acids — $-COOH$
- Aspartic Acid, Glutamic Acid

Basic Amino Acids — $-NH_2$
- Lysine, Arginine, Histidine

Aromatic Amino Acids
- Phenylalanine, Tyrosine, Tryptophan

Sulphur-Containing Amino Acids
- Cysteine, Methionine

Hydroxy Amino Acids — $-OH$
- Serine, Threonine

Based on Nutritional Requirements

Essential Amino Acids

Valine, Lysine, Tryptophan

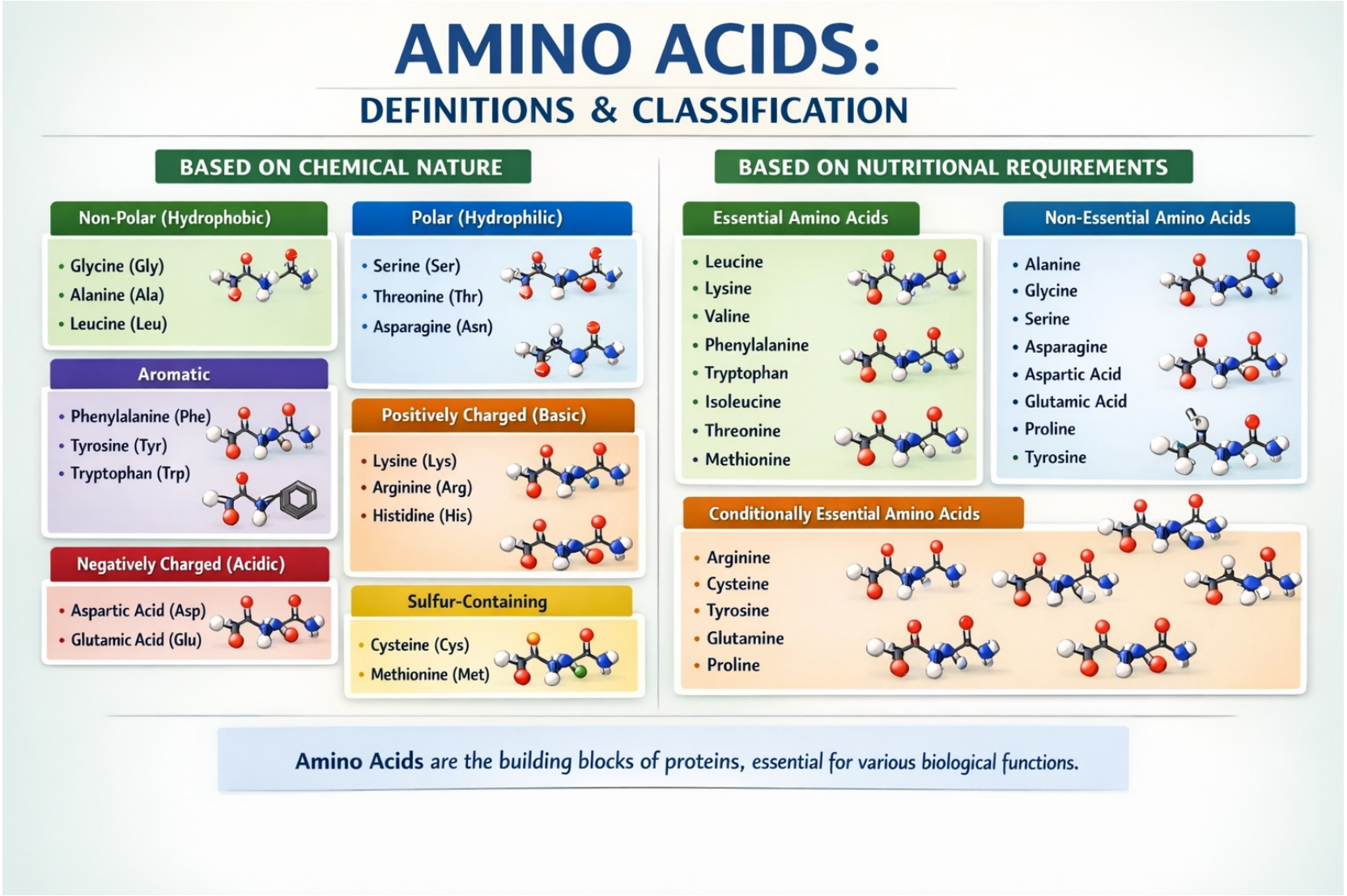
Non-Essential Amino Acids

Glycine, Glutamic Acid, Proline

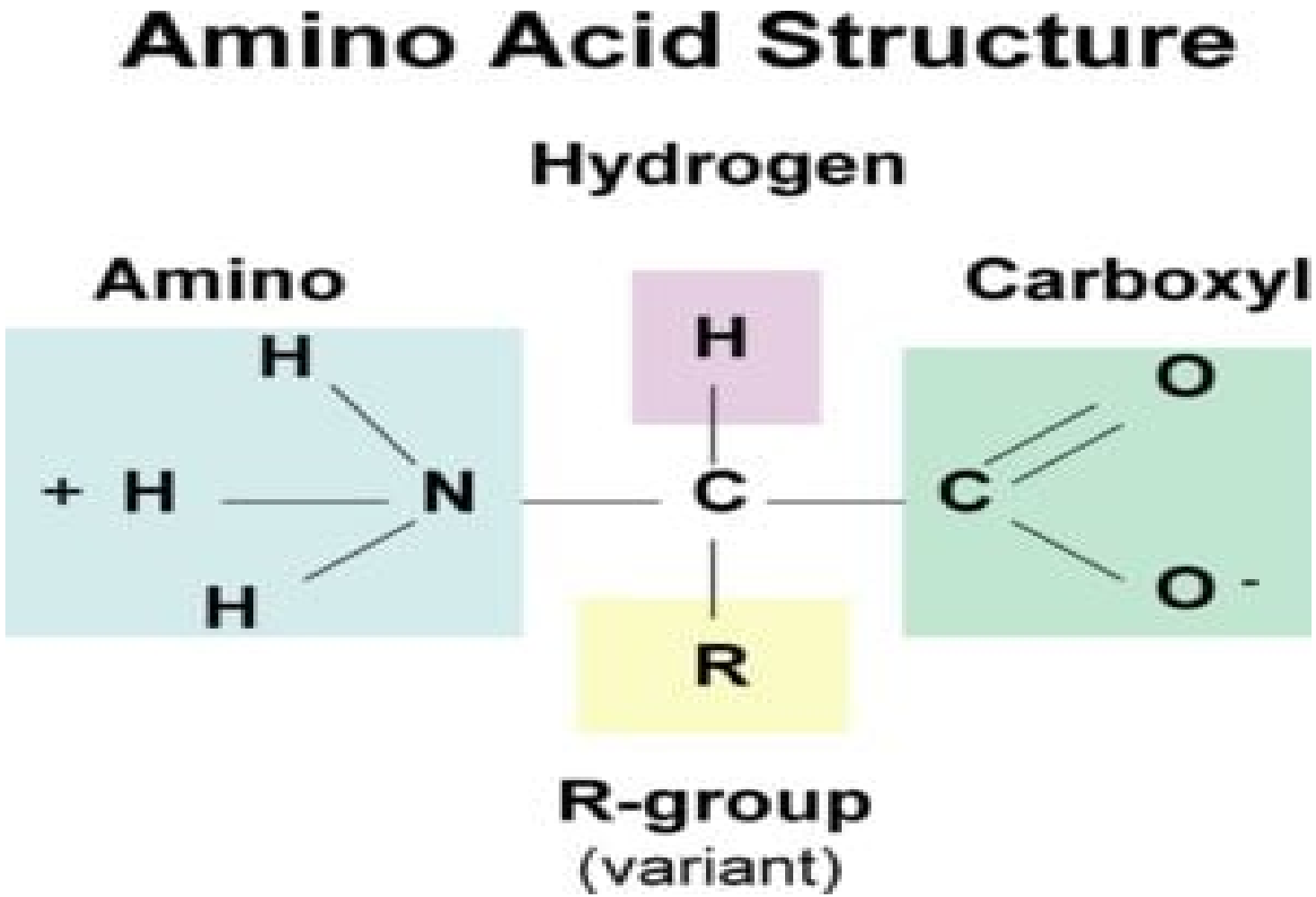
Semi-Essential Amino Acids

Arginine, Histidine

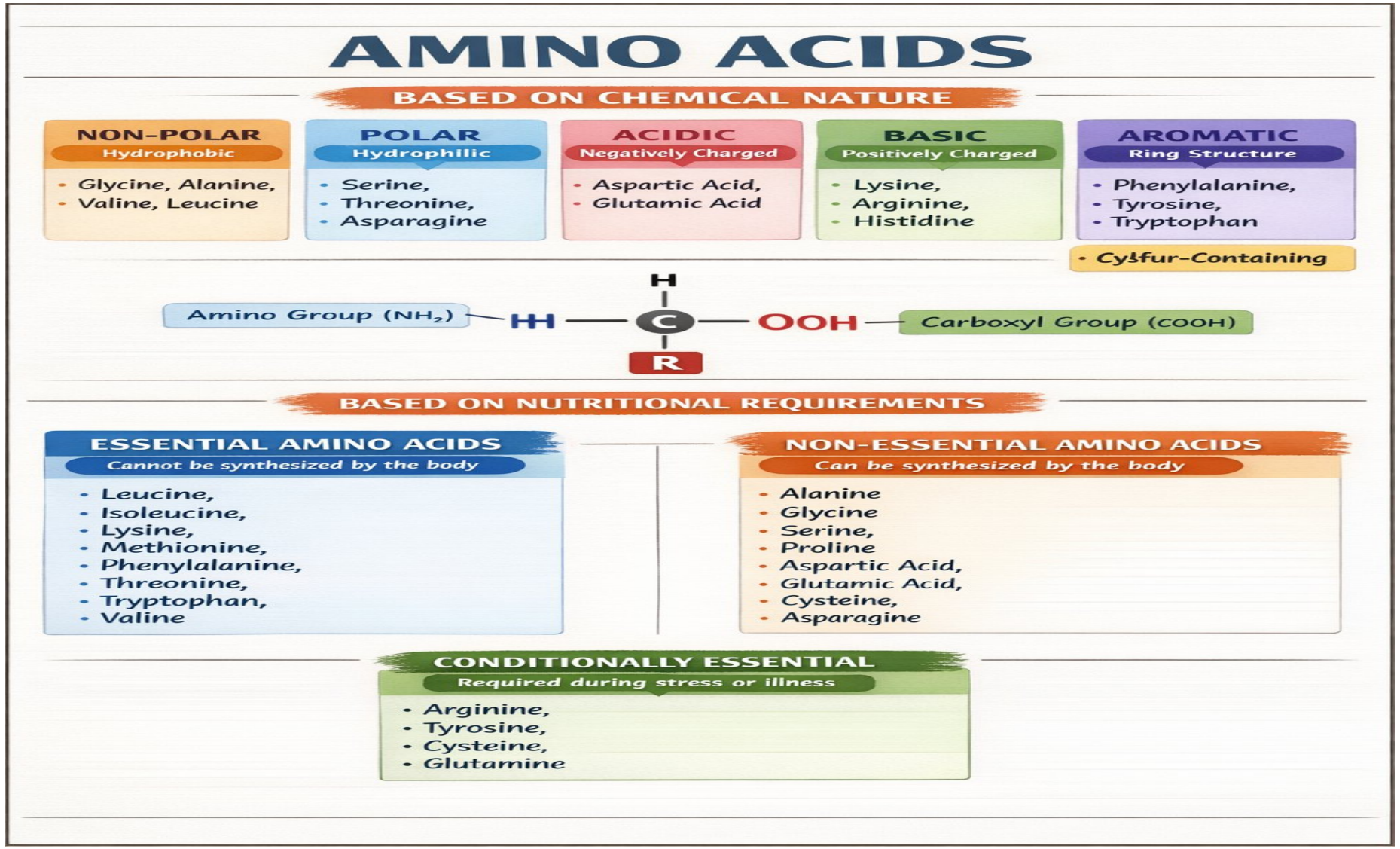
DEFINITION & CLASSIFICATION OF AMINO ACIDS

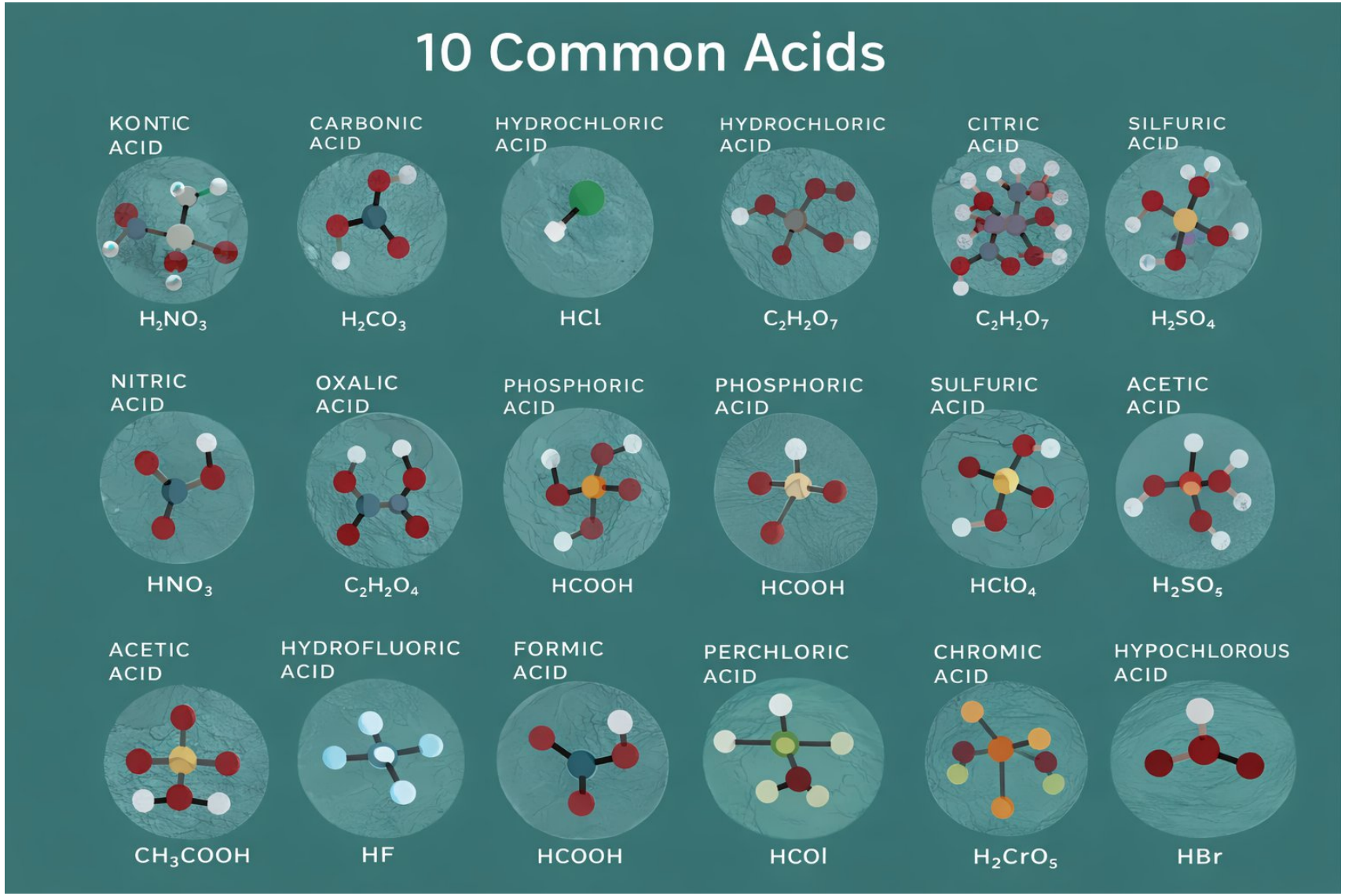


STRUCTURE OF AMINO ACIDS



BASED ON CHEMICAL NATURE OF AMINO ACIDS

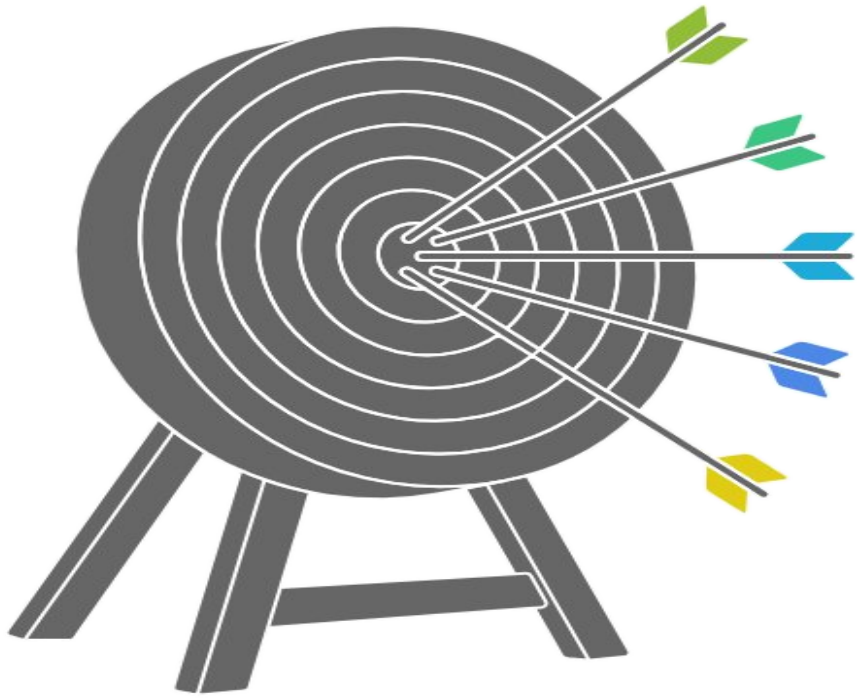



10 Common Acids
KONTIC ACID
H_2NO_3
CARBONIC ACID
H_2CO_3
HYDROCHLORIC ACID
HCl
HYDROCHLORIC ACID
$C_2H_2O_7$
CITRIC ACID
$C_2H_2O_7$
SILFURIC ACID
H_2SO_4
NITRIC ACID
HNO_3
OXALIC ACID
$C_2H_2O_4$
PHOSPHORIC ACID
HCOOH
PHOSPHORIC ACID
HCOOH
SULFURIC ACID
$HClO_4$
ACETIC ACID
H_2SO_5
ACETIC ACID
CH_3COOH
HYDROFLUORIC ACID
HF
FORMIC ACID
HCOOH
PERCHLORIC ACID
HClO
CHROMIC ACID
H_2CrO_5
HYPOCHLOROUS ACID
HBr

CLASSIFICATION OF AMINO ACIDS

www.snsgroups.com

Amino Acid Classification



Protein Formation

Essential role in building proteins

Functional Groups

Amino and carboxylic acid groups

Structural Classification

Alpha, beta, gamma amino acids

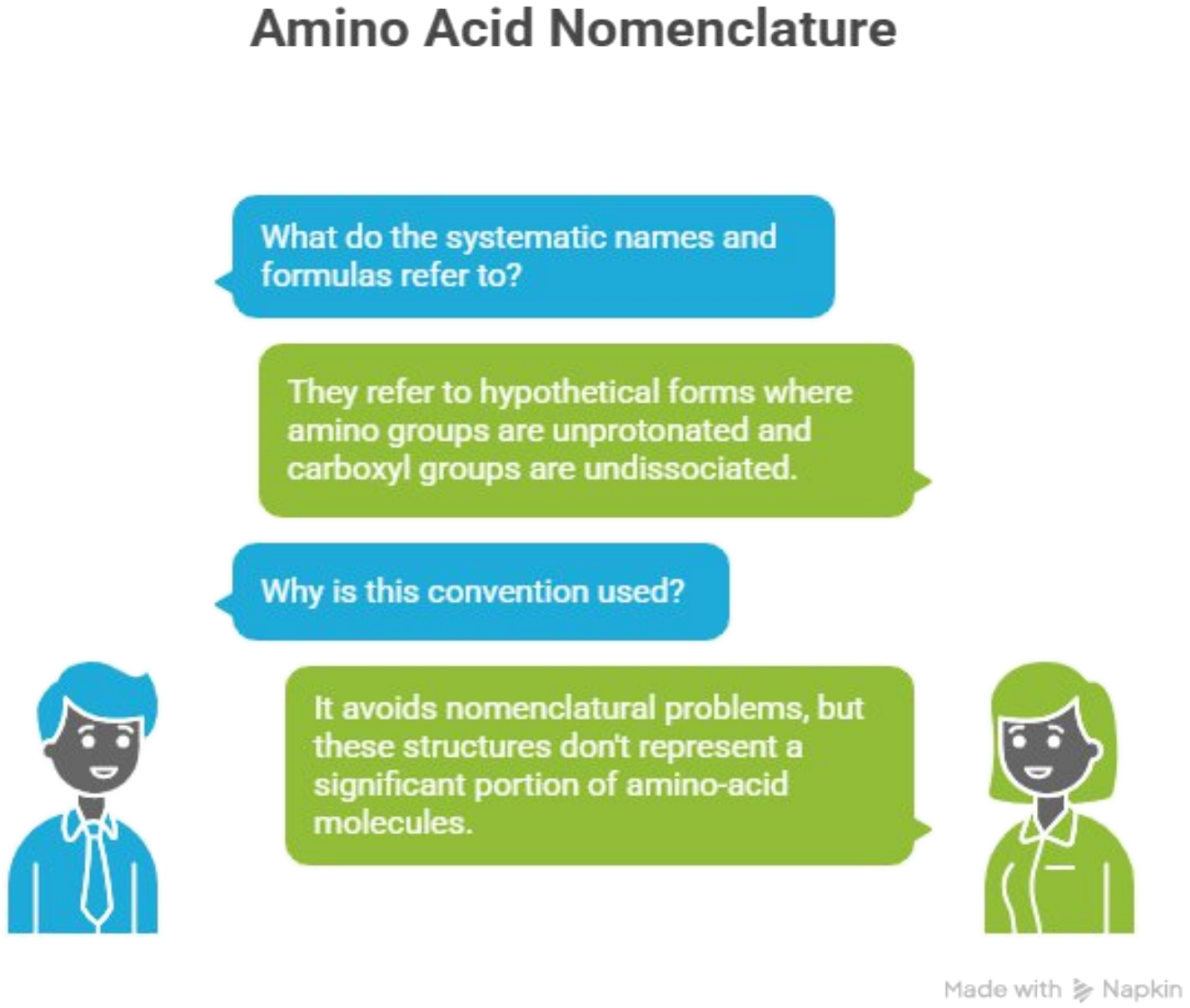
Polarity and Ionization

Properties affecting interactions

Side-Chain Groups

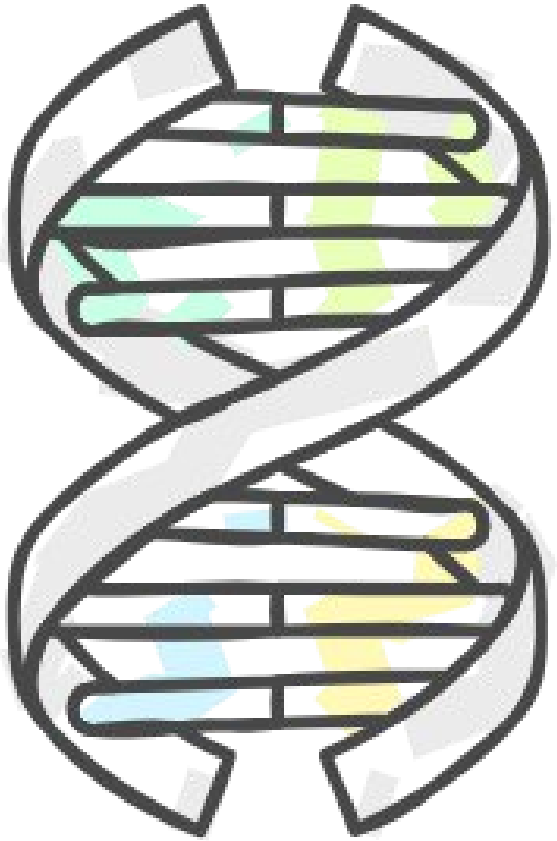
Aliphatic, aromatic, polar types

NOMENCLATURE OF AMINO ACIDS



Amino Acid Structure

α-Amino Acids



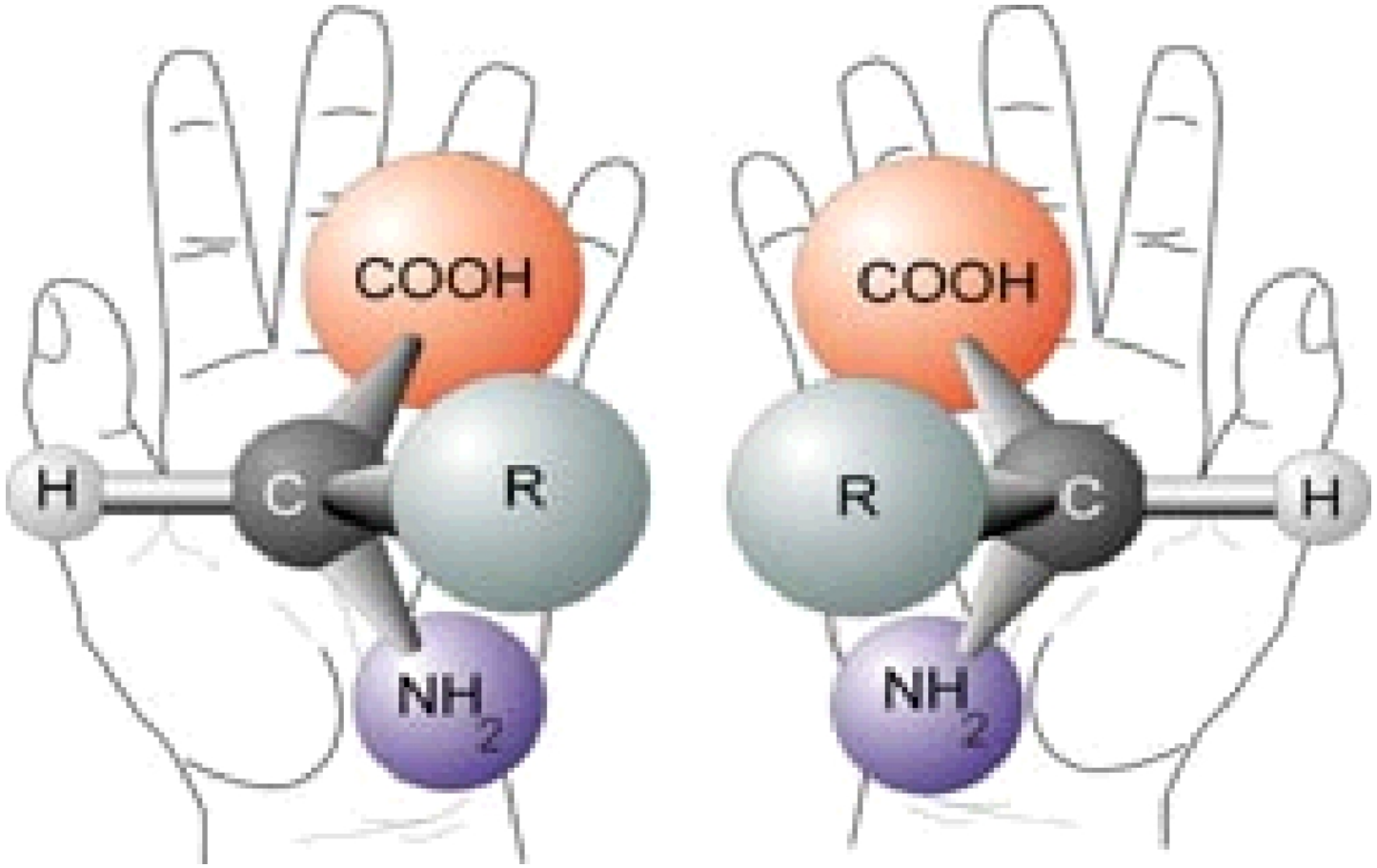
β- and γ-Amino Acids

Chirality

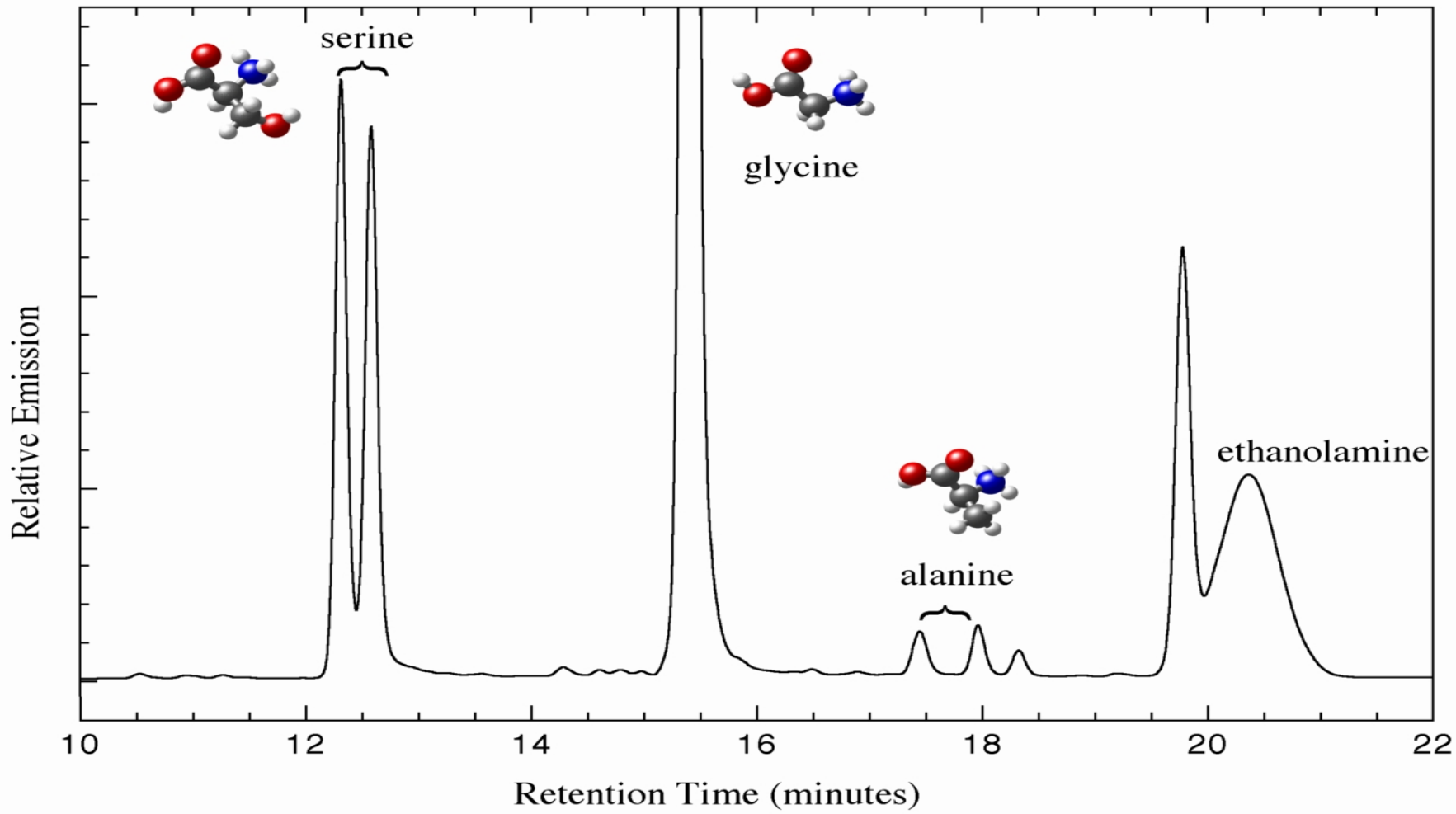
Side Chains

Made with Napkin

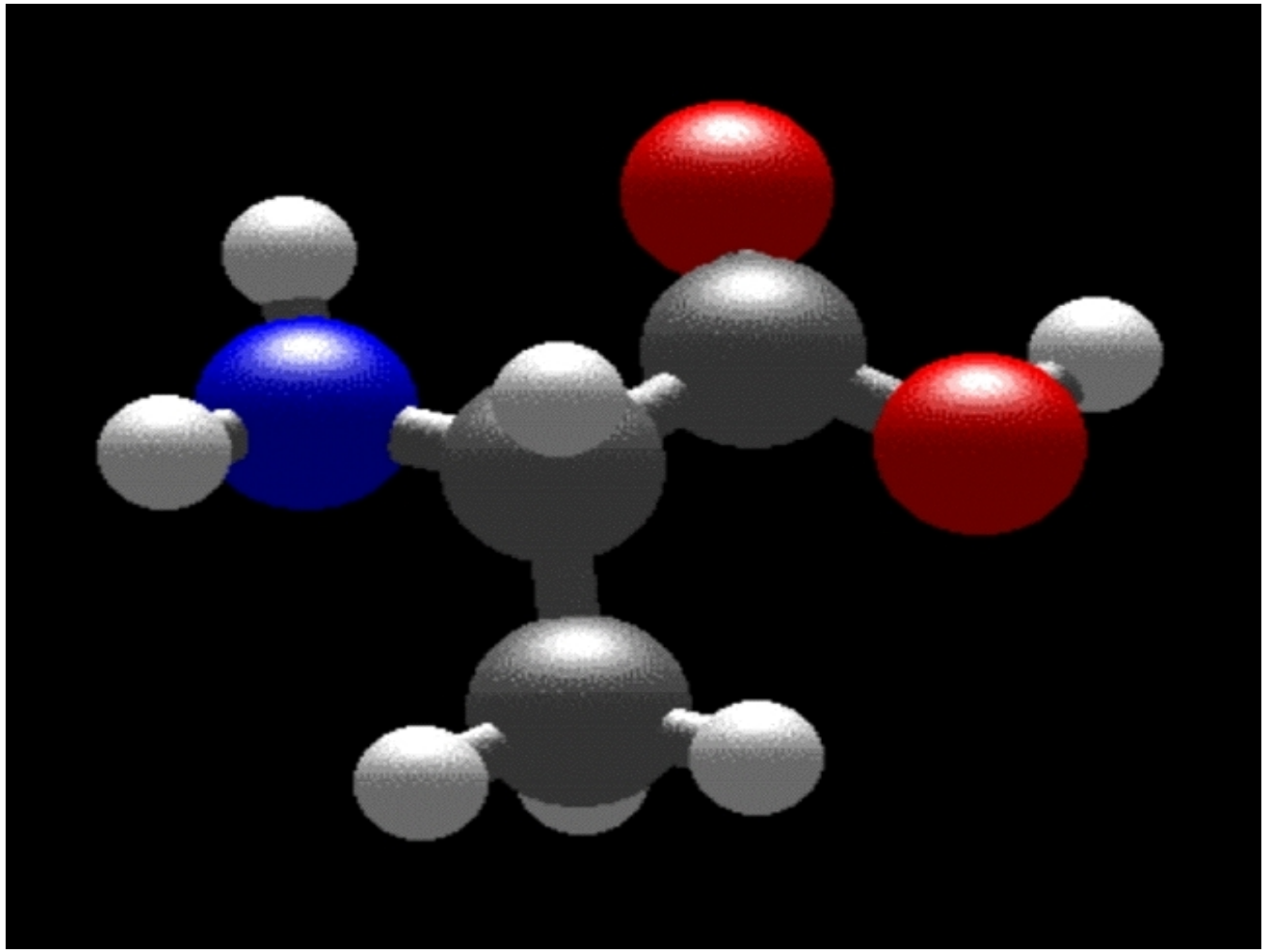
AMINO ACIDS COME IN RIGHT AND LEFT HANDED VERSIONS



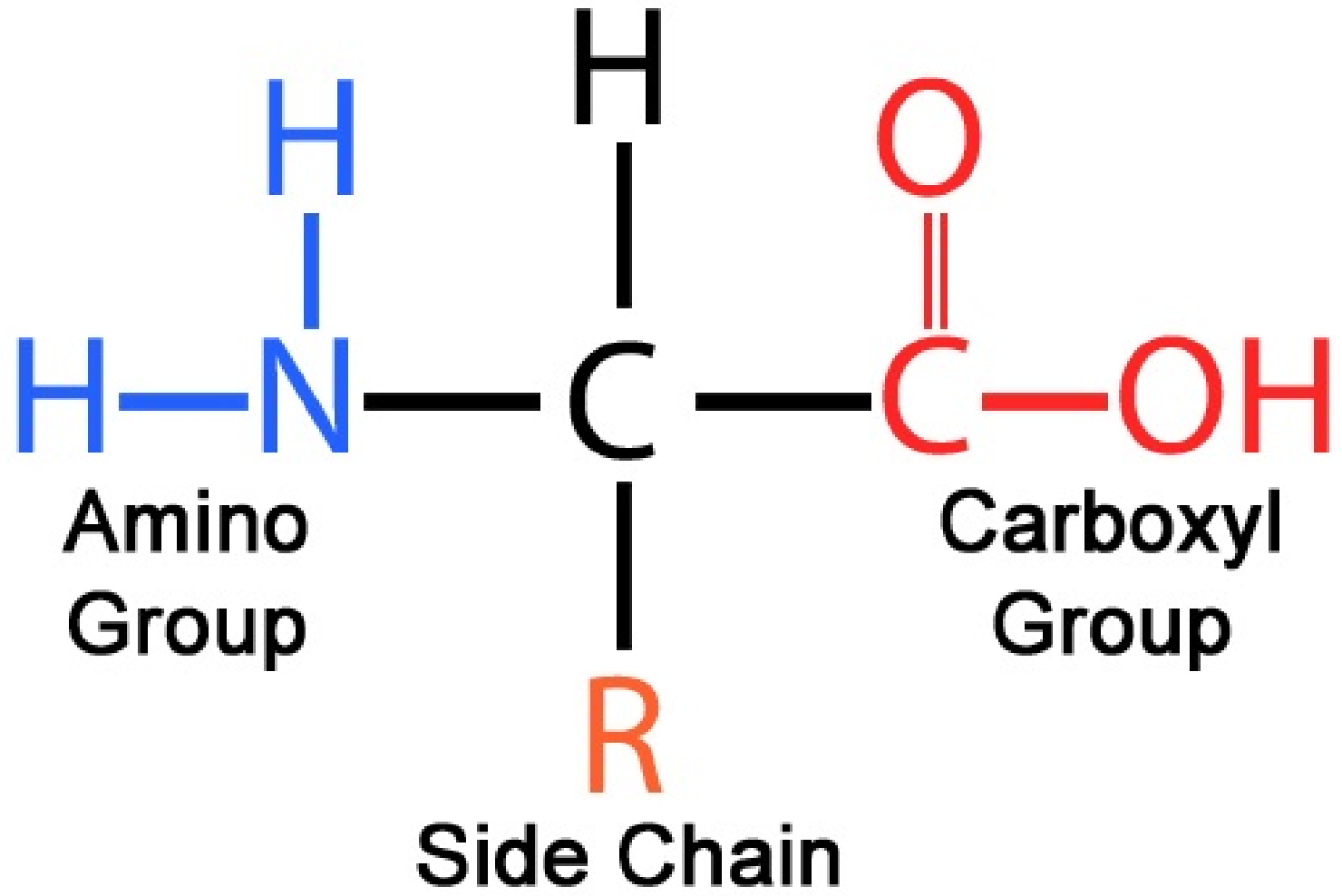
Amino Acids Produced by UV Ice Photolysis



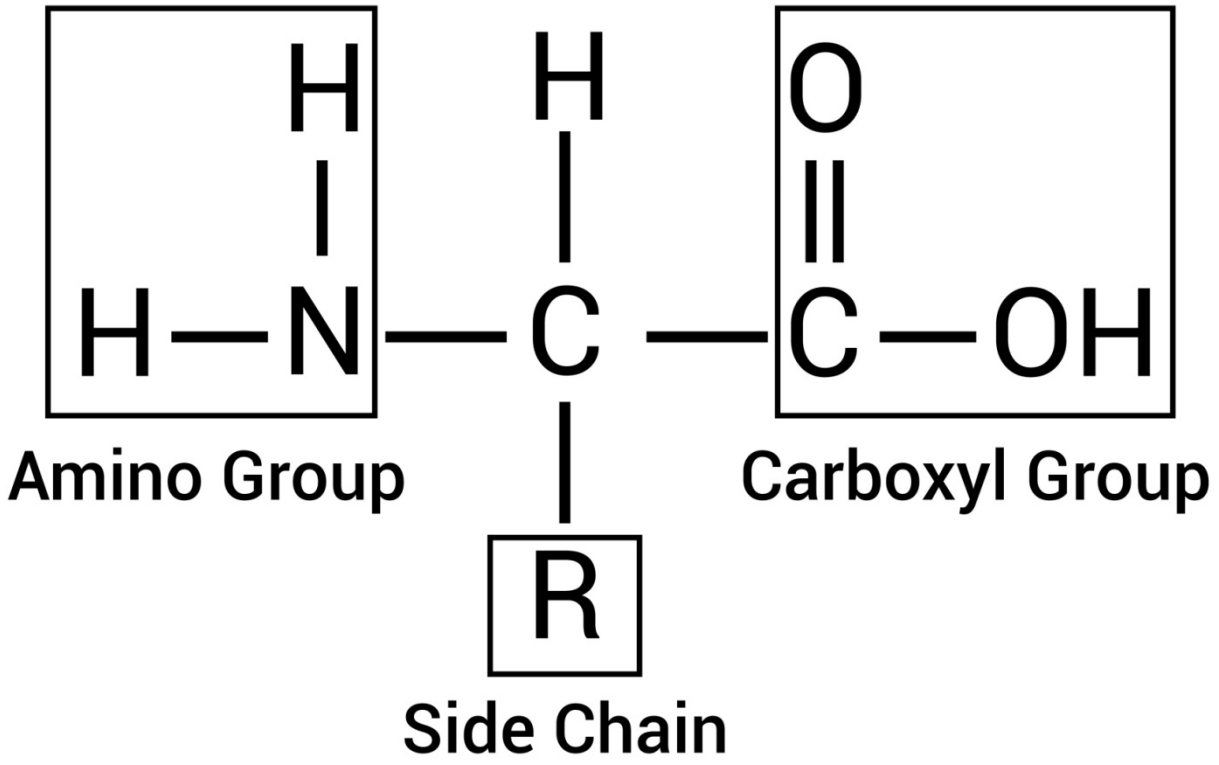
THE STRUCTURES OF THE SIMPLE AMINO ACIDS GLYCINE (LEFT) AND ALANINE (RIGHT)



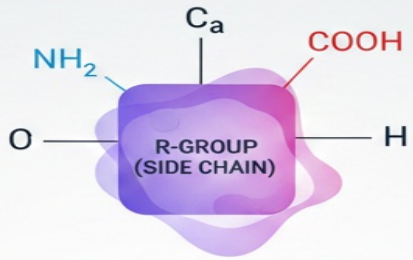
THE BASIC STRUCTURE OF ALL AMINO ACIDS



AMINO ACID CLASSIFICATION: CHEMICAL AND NUTRITIONAL



AMINO ACIDS: BUILDING BLOCKS OF LIFE



I. CLASSICIATION BY CHEMICAL NATURE

1. NON-POLAR (HYDROPHOBIC)

Alanine

Phenylalanine

2. POLAR BUT UNCHARGED (HYDROFHLIC)

Serine

3. CHARGED

Aspartate⁻

BASIC

II. CLASSIFICATION BY NUTRTIONAL REQUIREMENTS

Must come from DIET
His, Ile, Leu, Lys, Met, Phe, Thr, Trp, Val

ESSENTIAL
Body cane from DIET

NON-ESSENTIAL
Ala, Asn, Asp, Glu, Ser

CONDITIONALY ESSENTIAL
Essential during STRESS/GROWTH
Arg, Cys, Gly, Pro, Tyr

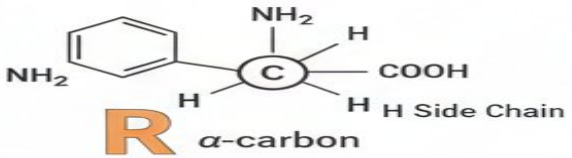
KEY EXAMPLES

Leucine, non-polar

Lysine

CLASSIFICATION OF CHEMICAL NATURE VS NUTRITIONAL REQUIREMENTS

AMINO ACID CLASSIFCATION



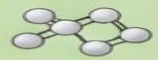
I. CHEMICAL NATURE (R-GROUP PROPERTIES)

Non-polar (Hydrohplobic)

Glycie, Alaanine, Leucrine, Isoleiutce, Phenyfalaine, Trypttohan, Meththoine

Glyicie — Leucine

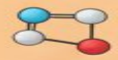
Polar Uncharged (Hydrohiphic)



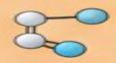
Serine, Thereene, Tyorsise, Cuisteine

Cysttine — Aspartane

Charged (pH ~ 7.4) **Basic**



Serine, Thneeine, Tyorsine, Assangaine, Glutamine, Cysteine



Acidic (–) — Lspartate +

II. NUTRITIONAL REQUIREMENTS (HUMANS)

Essential

Histisdie, Isoletine, Leucine, Lyss, Methioine, Tryptioine

Non-Essential

Alanine, Aspargaine, Lyss Phenyhoine, Thereene, Tryptlnate, Seri

Conditionaly Essential

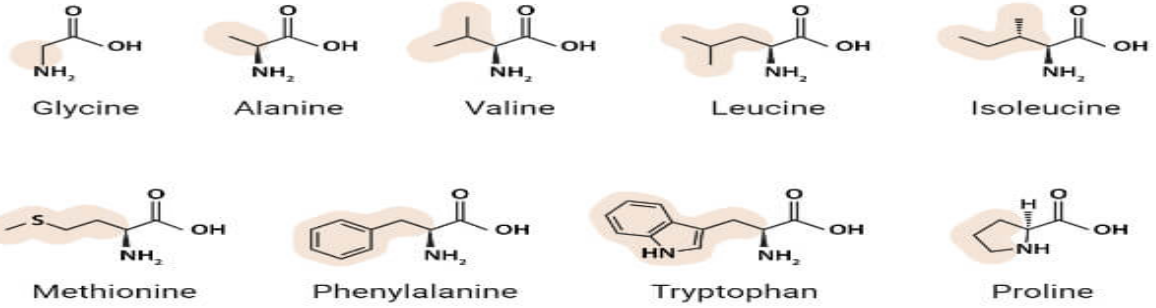
Argdinin, Cysteine, Glutamine, Glutamine, Glycine, Procine, Tyorsie

SUMMARY TABLE

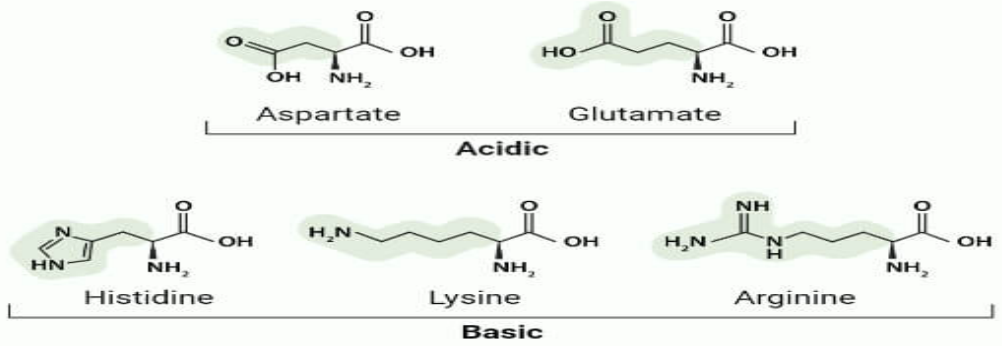
Leucine	Non-polar (Hydrohplotia)	Polar Unurred	Non-essential

Amino Acid Chart

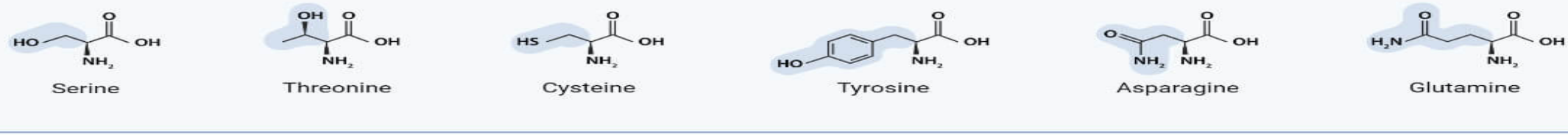
Non-polar side chains



Electrically charged side chains



Polar side chains



Microbe Notes

The Biology Notes

The Chemistry Notes

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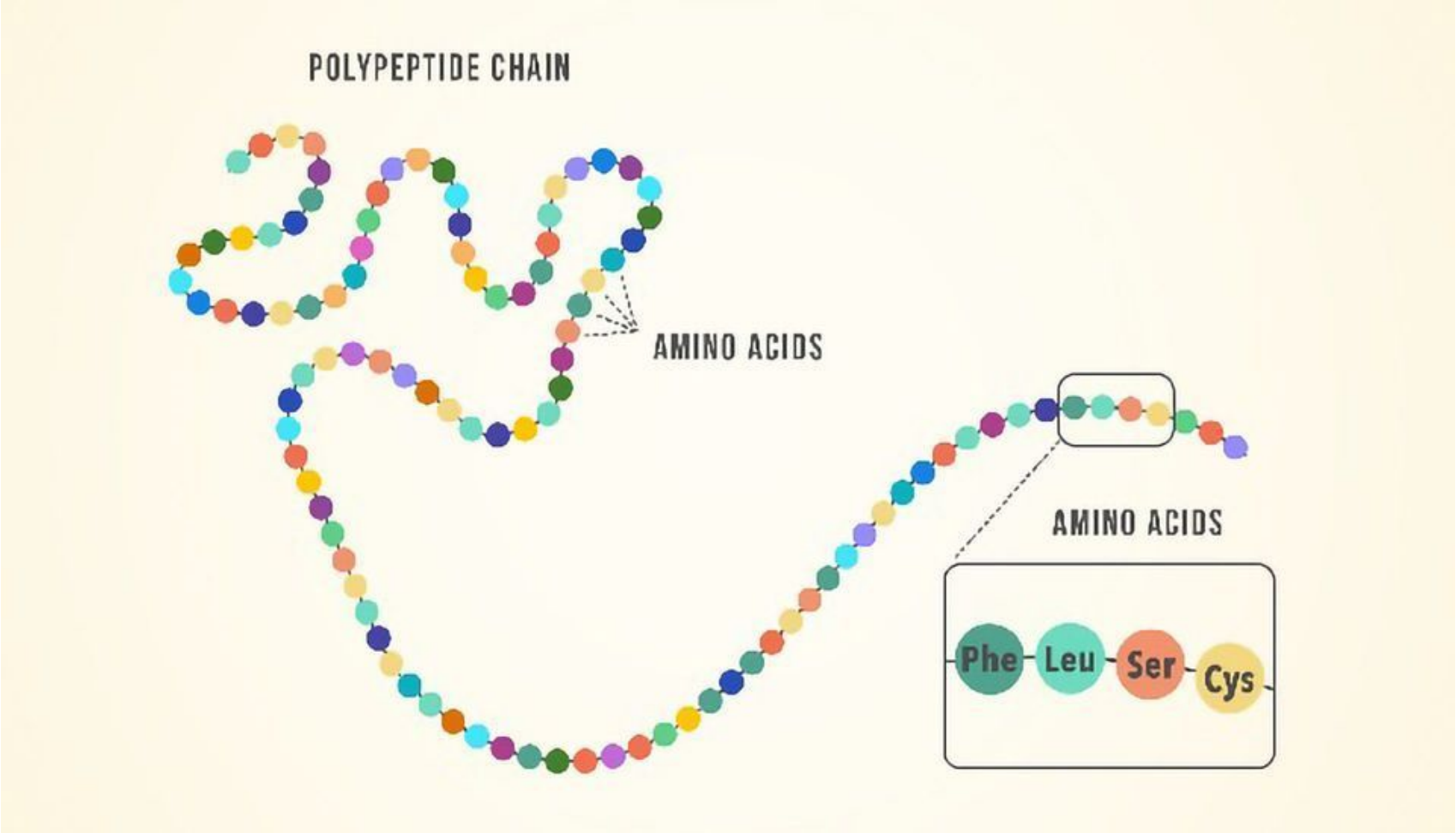
ESSENTIAL AMINO ACIDS: CHART, ABBREVIATIONS AND STRUCTURE



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5. Biochemistry Lubert Stryer, W.H. Freeman and Company.
6. Biochemistry for Pharmacy Students Pankaja Naik, CBS Publishers & Distributors.


Thank You