IIT Guwahati

Lecture 2

Course BT 631

Protein Structure function and Crystallography

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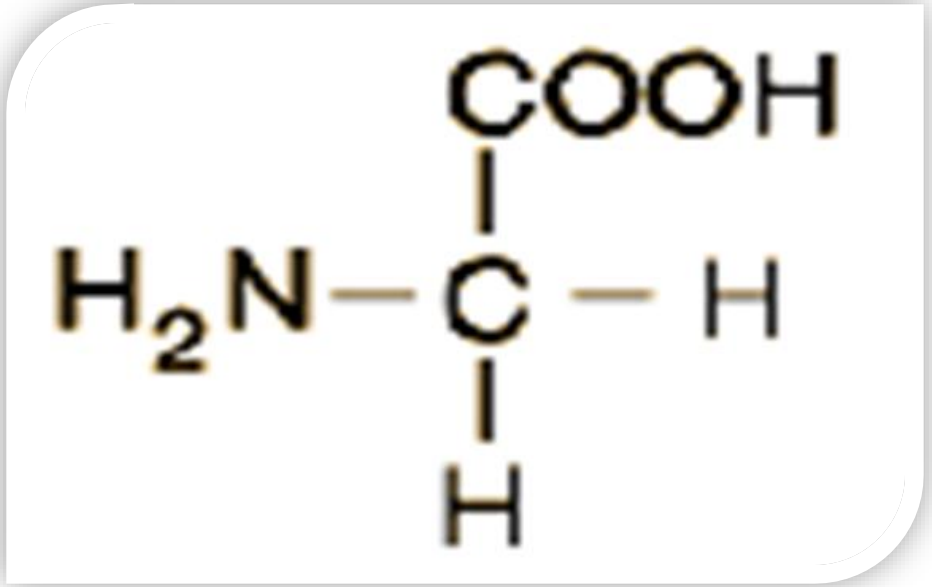
Classification of amino acids

Amino acids are classified into different groups based on side chain.

Non-Polar	Polar but Uncharged	Polar charged (+)
glycine	serine	lysine
alanine	threonine	arginine
valine	asparagine	histidine
leucine	glutamine	
isoleucine	tyrosine	**Polar charged (-)**
methionine	cysteine	aspartic acid
proline		glutamic acid
phenylalanine		
tryptophan		

Glycine

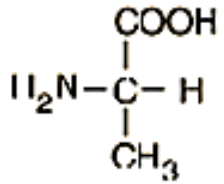
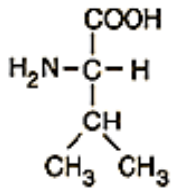
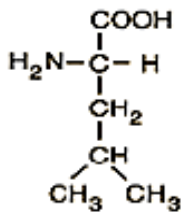
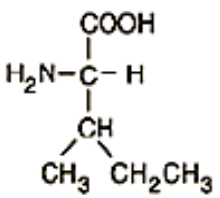
Glycine is the simplest and non-asymmetric amino acid having H-atoms as side chain.



Glycine (Gly or G)

Aliphatic Group containing Amino acids

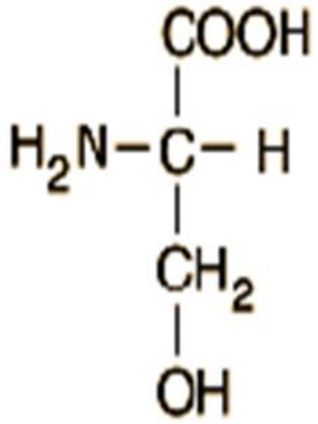
These have hydrophobic side chain. Alanine, Valine, Leucine, Isoleucine are classified in this category.

Name	Symbol	Structure
Alanine	Ala or A	
Valine	Val or V	
Leucine	Leu or L	
Isoleucine	Ile or I	

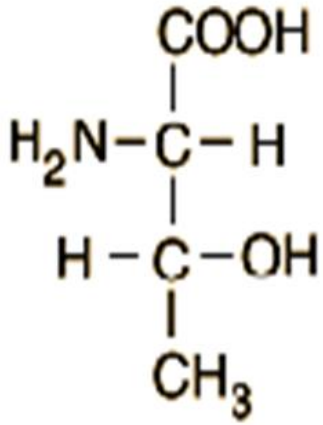
Isoleucine has asymmetry in side chain which provide extra chirality to the isoleucine Cα and C_β Carbon.

Hydroxyl Group containing amino acid

These are hydrophilic in nature generally phosphorylated. Strong nucleophile in presence of histidine and aspartic acid.



Serine Ser or S

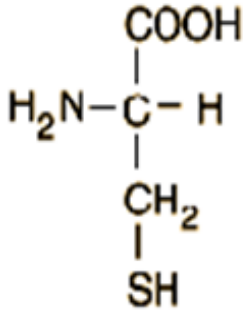
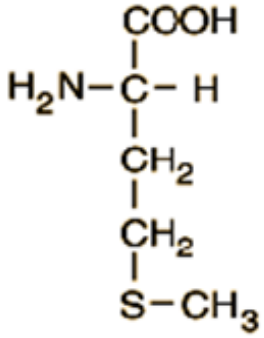


Threonine Thr or T

Threonine contains the asymmetry in side chain.

Serine is present at the active site of several enzymes, classified as serine protease.

Sulfur containing amino acids

Name	Symbol	Structure
Cysteine	Cys or C	
Methionine	Met or M	

Sulfur atom of methionine is readily methylated using methyl-iodide (CH_3I) to put label on methionine.

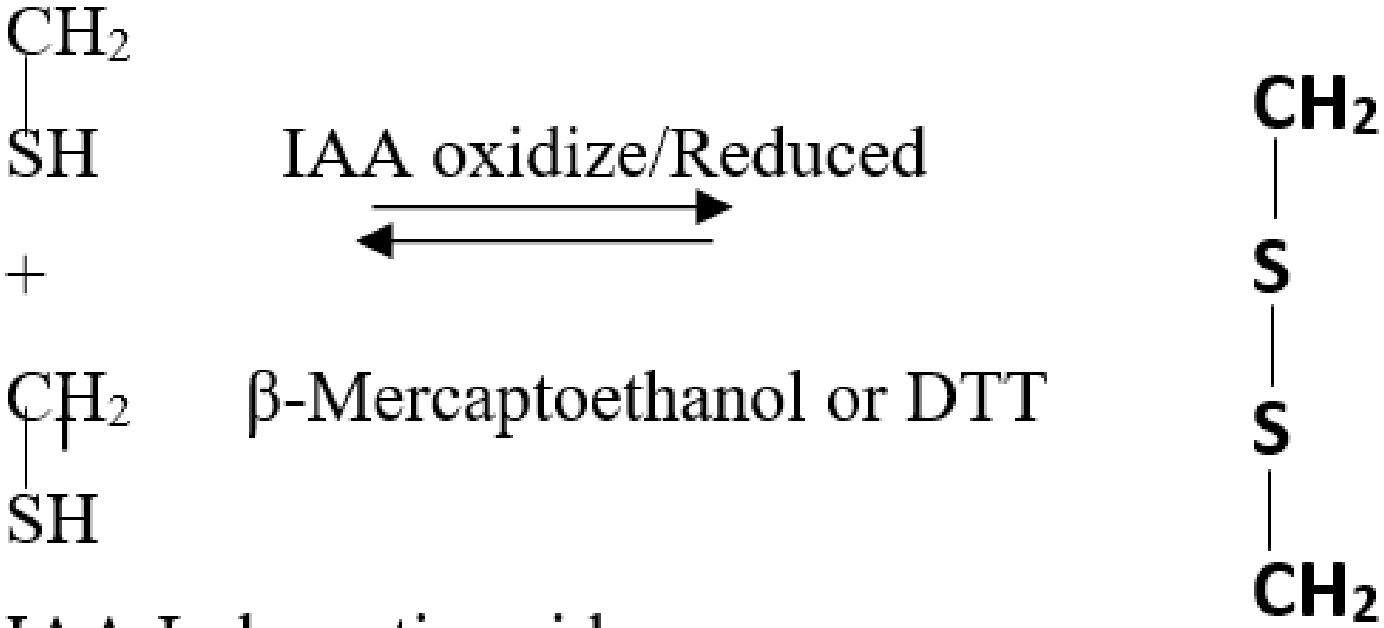
Sulfur atom of methionine interacts with heavy metal complex particularly those involving mercury and platinum such as K_2PtCl_4 or $HgCl_2$.

These are very useful in the formation of isomorphous heavy atom derivative in protein crystallography.

Sulfur containing amino acids

Cystine

Two molecules of cysteine oxidize to form cystine.



IAA:Iodoacetic acid,
DTT:Dithiothreitol