

Activity 37: Characteristics of Amino Acids

Learning Objectives

Draw the general structure of an amino acid in the zwitterion form

Distinguish essential and nonessential amino acids

Recognize the functional groups protonated amine and carboxylate

Recognize the functional groups thiol and amide found in amino acid side chains

Introduce the three-letter and one-letter codes for the 20 common amino acids

Characterize the amino acid side chains as polar or nonpolar. If polar as acidic, basic, or neutral

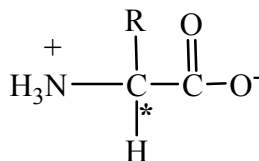
Estimated Completion Time 20 Minutes

Instructor Information

The skill development allows students to review the 20 common amino acids. Note that different textbooks classify some amino acids differently.

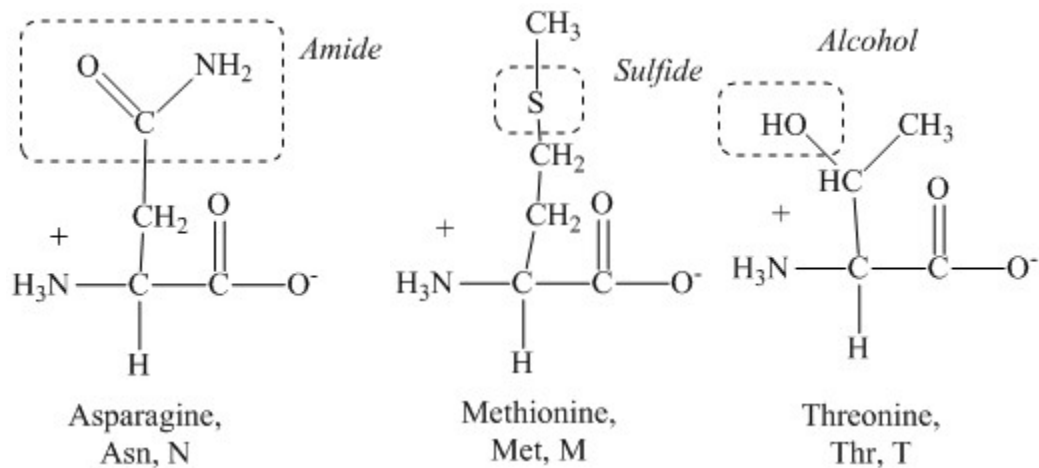
ANSWERS TO QUESTIONS

1. Essential amino acids cannot be synthesized in the body and, therefore, must be obtained in the diet.
2. An incomplete protein
- 3.



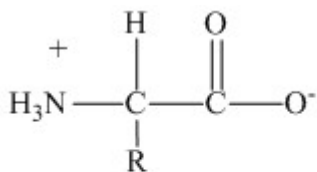
4. Protonated amine and carboxylate

5.



Asparagine is polar neutral, methionine is nonpolar, and threonine is polar neutral.

6.



General Structure for a D-Amino Acid

Activity 37: Skill Development

Name	Three-Letter Code	One-Letter Code	Functional Group in Side Chain	Polar or Nonpolar? If Polar, Basic, Acidic, or Neutral?
Alanine	Ala	A	Alkyl	Nonpolar
Asparagine	Asn	N	Amide	Polar neutral
Aspartate	Asp	D	Carboxylate	Polar acidic
Arginine	Arg	R	Protonated amine	Polar basic
Cysteine	Cys	C	Thiol	Polar neutral
Glutamate	Glu	E	Carboxylate	Polar acidic
Glutamine	Gln	Q	Amide	Polar neutral
Glycine	Gly	G	Alkyl	Nonpolar
Histidine	His	H	Imidazole	Polar basic
Isoleucine	Ile	I	Alkyl	Nonpolar
Leucine	Leu	L	Alkyl	Nonpolar
Lysine	Lys	K	Protonated amine	Polar basic
Methionine	Met	M	Sulfide	Nonpolar
Phenylalanine	Phe	F	Aromatic	Nonpolar
Proline	Pro	P	Alkyl	Nonpolar
Serine	Ser	S	Alcohol	Polar neutral
Threonine	Thr	T	Alcohol	Polar neutral
Tryptophan	Trp	W	Aromatic	Nonpolar
Tyrosine	Tyr	Y	Phenol	Polar neutral
Valine	Val	V	Alkyl	Nonpolar