

MACROMOLECULES PROTEINS

PROTEINS ARE MADE FROM AMINO ACIDS

- Proteins are polymers
- Amino acids are called monomers
 - 20 Amino Acids



Note: This chart only shows those amino acids for which the human genetic code directly codes for. Selenocysteine is often referred to as the 21st amino acid, but is encoded in a special manner. In some cases, distinguishing between asparagine/aspartic acid and glutamine/glutamic acid is difficult. In these cases, the codes asx (B) and glx (Z) are respectively used.

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HOW A PROTEIN IS STRUCTURED

Primary – Amino Acids form a chain and are peptide bonded Secondary Tertiary – 3D shape Quaternary



Primary Protein structure sequence of a chain of animo acids

Secondary Protein structure hydrogen bonding of the peptide backbone causes the amino acids to fold into a repeating pattern

Tertiary protein structure three-dimensional folding pattern of a protein due to side chain interactions

Quaternary protein structure protein consisting of more than one amino acid chain

ACTIVITY #1

- Build a Protein molecule from a sequence of Amino Acids
 - 20 Amino Acids
 - Can build any protein due to any sequence and # of Amino Acids.
 - Characteristics of Amino Acids
 - Hydrophilic
 - Hydrophobic
 - Acidic
 - Basic
- How does the sequence of Amino Acids change the shape of the protein?



- Enzymes speed up chemical reactions
 - Are not used up and can be used again & again



Substrate

Enzyme

Active Site 7

- Transport Proteins
 - Hemoglobin O₂
 - Sickle Cell Anemia





- Structural Proteins
 - Collagen
 - Skin, ligaments, tendons, bone, hair, fur, wool, hooves, fingernails, cocoons, silk, feathers,
 - Muscle
 - Formation of DNA







Keratin

- Hormones
 - Messenger molecules that carry signals
 - Insulin 51 Amino Acids, regulates uptake of sugar in the bloodstream
 - Thyroid Hormones
 - Growth Hormones







• Protective Proteins – Antibodies (Immune System)



9 ESSENTIAL AMINO ACIDS COPY THIS LIST ON YOUR PROJECT PAPER

- Your body can make 11 of the 20 Amino Acids
- 9 of them however, you must get from your diet to represent a complete protein (Animal Protein)
- Histidine (Infants)

- Isoleucine
- Leucine
- Lysine
- Methionine
- Phenylalanine
- Threonine
- Tryptophan
- Valine

ACTIVITY #2

- PhET Website
- Biology

• Gene Expression - the Basics

PROJECT CREDIT = .25

- Research 9 foods that contain one of each of the 9 Essential Amino Acids
 - Identify the food
 - Identify the Amino Acid that it contains
 - What is the recommended daily allowance for that food
 - 1 cup, 6 ounces
- What is the result if there is a deficiency in that Amino Acid

- Nine Essential Amino Acids:
- Histidine (Infants)
- Isoleucine
- Leucine
- Lysine
- Methionine
- Phenylalanine
- Threonine
- Tryptophan
- Valine

WORKS CITED

- Chemistry in the Community, P. 604 618
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