

Chemical Origin of Amino Acid Hypothesis

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Abstract

We all know that life began on earth something about 3.7 billion years ago hence the earliest form of organisms appeared and they must be small cells and as every cell contains its genetic material for defining its characteristics and according to **Harold C. Urey's** experiments that described the atmosphere of earth. In which he proved that early atmosphere contained the gases such as H₂O, CO₂, N₂, H₂ by this he won the noble prize for chemistry in 1934. All these reactions help in forming amino acids and by that the genomes are formed. This paper will give the chemical reaction of amino acid formation.

Introduction

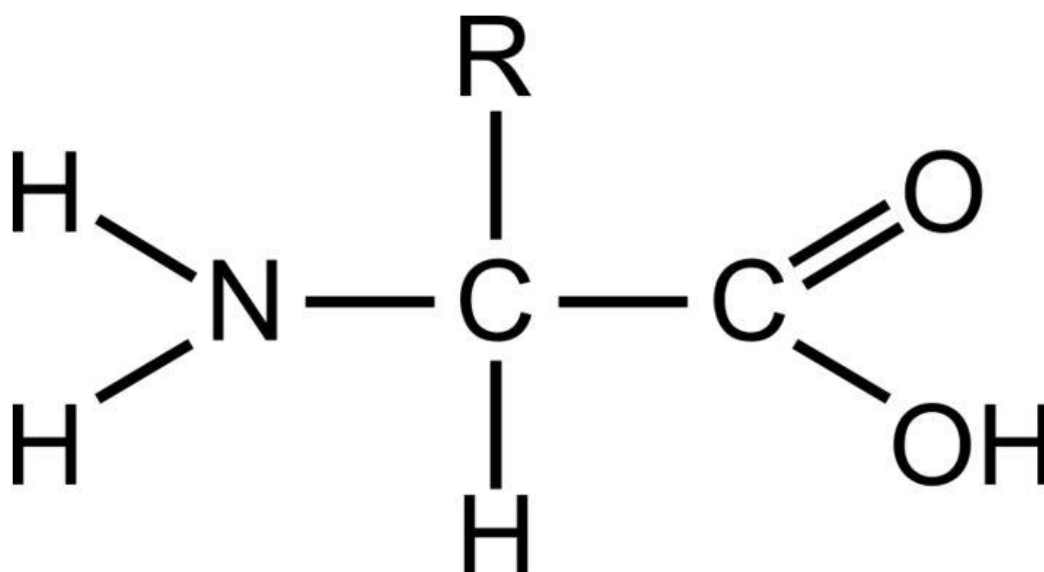
Amino acids are the building block molecule or compound of all the living organism on earth the first cells that appeared were prokaryotes which were primitive and they all had basic structures of cell in which no membrane bound organelles were there the genome was naked in cytoplasm of that cell.

It is believed that RNA is the first genetic material that was present in the organisms of early earth. Here amino acids played an important role in these actions.

Hence, amino acids are the most important compound to study and this hypothesis paper is just expansion of the work done by Miller. This paper supports "Peptide-Nucleic Acid world"

Introduction to Amino acids

Amino acids are the basic unit of protein and polypeptide. They are the compound that is most important for the living beings and everything in this world is made up of proteins cells, tissues, organs, biosphere etc.



THE BASIC STRUCTURE OF AMINO ACID

Amino acid is basically substituted methane as it contains:

- Carboxyl group
- Amino group
- Hydrogen
- Side chain

SIDE CHAIN (-R):

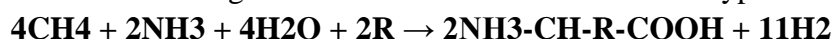
It is a variable group which decides the property of amino acid like acidic, basic, aromatic, sulphur containing etc.

The amino acids are having property to form chains with the help of peptide bonds by losing water (H^+ and OH^-).

Genomes are also formed from these long chains of amino acids through peptide bond and genome also consists other chemicals such as phosphate, sugar etc.

CHEMICAL ORIGIN OF AMINO ACID HYPOTHESIS

For understanding the formation we need to see some hypothesized detailed chemical reaction:



In this reaction we can observe that 4 moles of methane, 2 moles of ammonia, 4 moles of water and 2 moles of side chain(R) chemical which is going to decide the property of certain amino acid gives 2 moles of amino acid and 11 moles of hydrogen gas as bi-product.

Absence of any of the compound can affect the formation of amino acids.

Hence, this reaction can be called as **AMINO SYNTHESIZING REACTION** or **SINHA'S**

REACTION.

These two moles of amino acids further forms the peptide bond to form a chain of polypeptide and this chain modification and addition of other organic chemical compound leads to formation of genome.

“HENCE, AMINO ACID CAN BE CALLED AS FUNDAMENTAL COMPOUND OF ALL LIVING FORMS”.

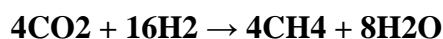
The peptide bond formation leads to formation of polypeptide and this a beginning of formation of protein molecules.

REACTION MECHANISM OF AMINO SYNTHESIZING REACTION OR SINHA'S REACTION BASED ON EXISTING RESEARCHES:

a. FORMATION OF METHANE:

Submarine vents produced certain gas like CO_2 , H_2 , N_2 etc.

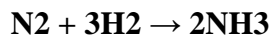
Hence the reaction for ammonia is:



Here Carbon dioxide and hydrogen gas was produced by the hydrogen vents present under deep oceans and by the combination of those chemicals under certain condition played an important role for the production of methane which is a major factor for amino acid formation

b. FORMATION OF AMMONIA:

As submarine vents produced nitrogen gas the chemical reaction between nitrogen and hydrogen formed ammonia another important factor for amino acid.



c. The **R** group was another reactant which is an important factor which reacted and attached to amino acid to decide the property of amino acid. For example: if $-\text{H}$ is attached in this reaction at the place of $-\text{R}$ then this amino acid will be called glycine.

d. Water is the main arena for all these reactions and plays an important role. 4 moles of water reacts with other reactants and contributes in formation of amino acids. All these formations figures the reaction as mentioned:

