

UNITED STATES PATENT OFFICE

2,489,880

AMINO ACID COMPOSITIONS AND THEIR PREPARATION

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No Drawing. Application May 11, 1945,
Serial No. 593,334

4 Claims. (Cl. 195—29)

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This invention relates to amino acid-containing compositions suitable for oral administration. It relates particularly to the production of amino acid-containing compositions from milk proteins by hydrolysis, digestion or splitting of the proteins, and to such compositions.

In general, amino acid-containing protein hydrolysates are manufactured either by hydrolyzing the protein in the presence of an acid, or by hydrolysis of the protein in the presence of an enzyme. The method involving the use of an acid results in the production of a composition that has a pleasant flavor and contains all of the amino acids essential to supply all of the requirements of the nitrogen metabolism of the human body, except tryptophane. Inasmuch as such compositions are lacking in tryptophane, they are not as desirable therapeutically as the compositions that are produced by digesting the protein with an enzyme. Such enzyme digested or hydrolyzed proteins contain all of the essential amino acids, including tryptophane, as well as other nonessential amino acids.

The principal disadvantage of the enzyme hydrolyzed protein compositions is the bitter taste that characterizes these compositions. While compositions of this latter type are suggested as being suitable for oral administration, as a practical matter, it is almost impossible to mask the bitter and lingering flavor of the composition. As a consequence, many attempts have been made to improve the flavor of the enzyme hydrolysates.

One suggestion has been to utilize three times as much of the enzyme (pancreatic gland) as the casein. The resulting product contains a relatively large proportion of a pancreas autolysate. Due to the relatively high cost of pancreatic gland and the large quantity of the gland present, the product is relatively expensive and it has a muscular hog-like flavor that is not entirely pleasant, although it is less objectionable than the bitter flavor that characterizes casein hydrolysates containing a relatively smaller proportion of an enzyme.

An object of the present invention is to provide a milk protein hydrolysate containing all of the essential amino acids and which is free from bitter or unpleasant flavor.

Another object of the present invention is to prepare milk protein hydrolysates that contain all of the essential amino acids and have a flavor that renders them suitable for oral administration.

A further object of the invention is to prepare bland enzyme hydrolysates of milk proteins in

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which relatively small quantities of enzyme are required for hydrolysis of the proteins.

An additional object of the invention is to produce a bland enzyme hydrolysate of milk proteins at relatively low cost.

Other objects of the present invention will become apparent from the following description of typical methods and products embodying the present invention.

The above noted objects of the invention have been attained by digesting the heat coagulable proteins present in whey with suitable enzymes, preferably the pancreatic gland enzymes.

More particularly, acid whey, such as, for example, acid casein whey, a by-product of the production of acid precipitated casein from skim milk, or acid cheese whey, a by-product of the manufacture of cheese, is heated for about fifteen minutes or longer in order to coagulate the lactalbumin and lactoglobulin therein. The heating of the whey can be accomplished satisfactorily in many different ways. For example, the whey may be heated by injecting steam directly into it or by heating it in a jacketed kettle or tank. Any continuous heating procedure that is capable of raising the temperature of the whey to at least 140° F. is satisfactory. After coagulation of the whey proteins, the whey is filtered to remove the coagulated material as filter cake. This cake is washed to remove liquid impurities without dissolving the protein in the cake.

The filter cake may then be treated to prevent decomposition, for example, by air drying it at a relatively low temperature (up to about 150° F.), by freezing it, or by mixing it with a preservative such as toluene. The dried product may be milled to reduce it to a relatively small particle size. The protein is then dispersed in the water and the dispersion adjusted substantially to neutrality, that is, to a pH value between about 6.5 and 7.5 with an alkaline compound, such as, soda ash.

Finely macerated hog pancreas gland is then added to the substantially neutral dispersion and the proteins are digested for a period of four to ten days. At the end of this period, the enzyme is inactivated by heating to between about 180° F. and boiling. The enzyme may be inactivated by heating the dispersion at a low temperature (about 140° F.) for a prolonged period of time or for a short time at a temperature above boiling. The dispersion may then be clarified and filtered to produce a clear filtrate. The filtrate is concentrated, preferably under vacuum and then is dried under vacuum on a roll or in any other desired way to produce a light tan colored powder.