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METHOD FOR PREPARING CREATINE HYDROCHLORIDE

[57] Abstract

The present invention relates to a method for preparing creatine hydrochloride, which belongs to a method for preparing guanidine or derivatives thereof, wherein hydrochloric acid and creatine monohydrate are reacted at a temperature from 25 to 40°C, then the mixture is concentrated after filtration, and the crystal is separated, washed with ethanol and dried, so as then to produce a finished product of creatine hydrochloride.

1. A method for preparing creatine hydrochloride, characterized in that, hydrochloric acid and creatine monohydrate are reacted at a temperature from 25 to 40°C, then the mixture is concentrated after filtration, and the crystal is separated, washed with ethanol and dried, so as to produce creatine hydrochloride.

2. The method for preparing creatine hydrochloride according to claim 1, characterized in that, hydrochloric acid and creatine monohydrate have a molar ratio of 1 : 1.

3. The method for preparing creatine hydrochloride according to claim 1, characterized in that, the solution after the reaction has a pH value of 1.

4. The method for preparing creatine hydrochloride according to claim 1, characterized in that, hydrochloric acid employed in the reaction has a concentration of 30%.

5. The method for preparing creatine hydrochloride according to claim 1, characterized in that, the concentration condition includes a vacuum degree of 0.09 Mpa, and a temperature of 40°C to 50°C.

6. The method for preparing creatine hydrochloride according to claim 1, characterized in that, ethanol employed for the washing is anhydrous ethanol, in an amount of 0.2 time the creatine hydrochloride after separation and spin-drying.

7. The method for preparing creatine hydrochloride according to claim 1, characterized in that, the drying temperature is from 50°C to 60°C.

METHOD FOR PREPARING CREATINE HYDROCHLORIDE

TECHNICAL FIELD

The present invention relates to a method for preparing guanidine or derivatives thereof, in particular to a method for preparing creatine hydrochloride.

BACKGROUND ART

Creatine is an amino acid synthesized from three amino acids that are arginine, glycine and methionine. Creatine can be used in the treatment of patients with Parkinson's disease and Alzheimer's disease, as well as in the treatment of muscular degeneration in the elderly. It is also a nutritious supplement for muscle building. The efficacy of creatine supplements have been recognized and accepted. Such products have effects of improving muscular performance and enhancing muscle strength. At present, there exists a need for derivatives thereof in an amount of about 5000 to 6000 tons per year around the world. As a result of poor water solubility of creatine, a substantial amount of water must be ingested to absorb sufficient amount of creatine to the human body, and thus the absorption is greatly limited in case of oral administration. In order to overcome these disadvantages, creatine supplements are mostly manufactured into various organic acid salts or inorganic acid salts before use.

In previous processes, water is added, in an amount of certain times, into creatine monohydrate, and hydrochloric acid is dropped therein, to carry out reaction with stirring. The mixture is filtered after completion of the reaction, concentrated under a high vacuum condition (not exceeding 50°C), and cooled. The crystal is separated and then washed with acetone, and dried to obtain a product.

As a result of a substantial amount of water added, by-product creatinine in the reaction will be increased accordingly, allowing the yield and product quality to be influenced, and at the same time allowing the concentration time to be increased and the whole technological process time to be extended. Due to the relatively high price and toxicity of acetone, the production cost is increased, and harm will be caused to the human body to a certain extent during the production.

SUMMARY OF THE INVENTION

In the present invention, in order to solve the problems of the long production cycle and the toxic material for the production in the prior art, there is provided a method for preparing creatine hydrochloride wherein no water is added during the production, production cycle is short, product quality is improved, and raw materials for the production have lower toxicity.

The present invention employs technical solutions as follows:

A method for preparing creatine hydrochloride, wherein hydrochloric acid and creatine monohydrate are reacted at a temperature from 25°C to 40°C, then the mixture is concentrated after filtration, and the crystal is separated, washed with ethanol and dried, so as to produce a finished product.

In the present invention, hydrochloric acid and creatine monohydrate have a molar ratio of 1 : 1, and the solution after reaction has a pH value of 1.

Hydrochloric acid employed in the reaction has a concentration of 30%.

The concentration condition includes a vacuum degree of 0.09 Mpa, and a temperature of 40°C to 50°C.

Ethanol employed for the washing is anhydrous ethanol, in an amount of 0.2 time the creatine hydrochloride after separation and spin-drying.

The drying temperature is from 50°C to 60°C.

In the present invention, the reaction temperature does not exceed 40°C, at the same time no substantial amount of water participates in the reaction, and thus side reactions are few and the yield is improved.

The concentration process of the present invention employs concentration at high vacuum and low temperature, to shorten the concentration time and ensure the product quality.

The present invention has advantages and positive effects as follows.

1. Because no water is added in the present invention, the formation of by-product creatinine in the reaction is reduced, and the product quality is improved.

2. In the existing process, because a substantial amount of water is added, concentration time is longer correspondingly; and also hydrochloric acid is dropped into the aqueous creatine solution, therefore the process is time-consuming and the production cycle is rather long. In the present invention, no water is added into reactants, thus the concentration time is greatly reduced; and the raw materials are charged, at a time, into a reaction tank, such that the production cycle is shortened, and efficiency of labor is significantly increased.

3. Ethanol is used in place of acetone as the washing liquor, to reduce the cost, reduce the toxicity, reduce the harm to the human body, and ameliorate the production environment.

DETAILED DESCRIPTION

Detailed illustration of the present invention is given below by particular examples.

Example 1

200 kg of creatine monohydrate and 160 kg of hydrochloric acid at a concentration of 30% were charged into a 1000-L reaction tank. Stirring was activated. The reaction temperature was maintained at 25°C. Creatine monohydrate was dissolved completely. The pH value was measured. If the pH value was lower than 1, the solution was adjusted to pH 1 with hydrochloric acid. After about 30 min, the reaction was terminated, and stirring was stopped. The reaction solution was filtered, then charged into a 1000-L crystallizing tank, and subjected to moisture removal under a condition of 0.09 Mpa and 50°C temperature for concentration. Crystal was occurred in the crystallizing tank at about 1.5 h. The temperature was decreased to 25°C, and the crystal was precipitated. The crystal was separated and spin-dried with a centrifuge, then washed with anhydrous ethanol accounting for 10% by weight of the wet material obtained, and spin-dried. The wet product was placed into a drying box, and fan-dried at a temperature of 60°C, so as to obtain creatine hydrochloride, at a yield of 85% and a purity of 99%.

Example 2

200 kg of creatine monohydrate and 160 kg of hydrochloric acid at a concentration of 30% were charged into a 1000-L reaction tank. Stirring was activated. The reaction temperature was maintained at 40°C. Creatine monohydrate was dissolved completely. The pH value was measured. If the pH value was lower than 1, the solution was adjusted to pH 1 with hydrochloric acid. After about 20 min, the reaction was terminated, and stirring was stopped. The reaction solution was filtered, and then charged into a 1000-L crystallizing tank. The reaction solution was subjected to moisture removal under a condition of 0.09 Mpa and 40°C temperature for concentration. Crystal was occurred in the crystallizing tank at about 2 h. The temperature was decreased to 20°C, and the crystal was precipitated. The crystal was separated and spin-dried with a centrifuge, then washed with anhydrous ethanol accounting for 10% by weight of the wet material obtained, and spin-dried. The wet product was placed into a drying box, and fan-dried at a temperature of 50°C, so as to obtain creatine hydrochloride at a yield of 85% and a purity of 99%.