group, an optionally substituted indanyl group, an optionally substituted naphthylmethyl group, a fluorobenzyl group, a chlorobenzyl group, or a bromobenzyl group.

[0008]

Patent Document 1: JP 2006-254789 A

Patent Document 2: JP 2001-46088 A

Patent Document 3: JP 2001-314191 A

Patent Document 4: JP 2002-238581 A

Patent Document 5: JP 2007-82534 A

Patent Document 6: JP 2008-61642 A

[0009]

Non-Patent Document 1: Biochemistry, 2004, Vol. 43, p. 224

Non-Patent Document 2: Biochemistry, 2006, Vol. 45, p. 4455

SUMMARY OF THE INVENTION

[0010]

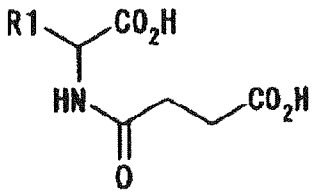
The present invention aims to provide a more efficient method for producing an L-amino acid than the conventional methods.

[0011]

As a result of eager examination to solve the above problems, the present inventors have found that the reactivity can be improved by precipitating the resulting amino acid out of the reaction system during the course of the combined reactions of racemizing an N-succinyl amino acid with N-acylamino acid racemase and specifically hydrolyzing the N-succinyl-L-amino acid with L-succinylase. Thereby, the present invention has been completed.

[0012]

That is, one aspect of the present invention is an N-succinyl amino acid represented by formula (III) or a salt thereof:



(III)

wherein R1 represents an optionally substituted C5 to C20 alkyl group, an optionally substituted C5 to C20 alkenyl group, an optionally substituted C2 to C20 alkynyl group, an optionally substituted indanyl group, an optionally substituted naphthylmethyl group, a fluorobenzyl group, a chlorobenzyl group, or a bromobenzyl group,

wherein R in formula (III) is a 4-bromobenzyl group, a 3-fluorobenzyl group, a 2-naphthylmethyl group, a 2-indanyl group, or a 6-heptenyl group. Also disclosed is a method for producing an L-amino acid by reacting an enantiomeric mixture of an N-succinyl amino acid with L-succinylase, the reaction being performed in the presence

of N-acylamino acid racemase and with precipitating the produced L-amino acid.

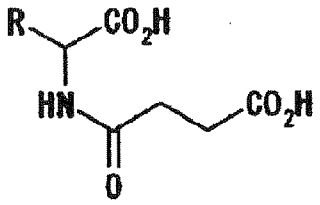
[0013]

In the production method according to the present ~~invention~~disclosure, the L-amino acid preferably has a dissolved concentration of 1% by weight or lower.

[0014]

In the production method according to the present ~~invention~~disclosure, preferably, the N-succinyl amino acid serving as a substrate is represented by formula (I):

[0015]

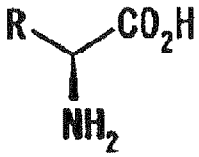


(I)

[0016]

wherein R represents an optionally substituted C1 to C20 alkyl group, an optionally substituted C2 to C20 alkenyl group, an optionally substituted C2 to C20 alkynyl group, an optionally substituted C4 to C20 aryl group, or an optionally substituted C5 to C20 aralkyl group; and the L-amino acid to be produced is represented by formula (II):

[0017]



(II)

[0018]

wherein R is the same as defined above.

[0019]

In a more preferable embodiment of the present

~~invention~~disclosure, R in formula (I) and formula (II) is a 4-bromobenzyl group, a 3-fluorobenzyl group, a naphthylmethyl group, an indanyl group, or a 6-heptenyl group.

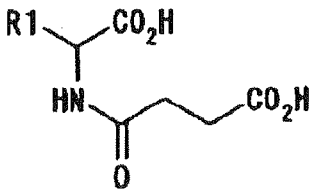
[0020]

~~In a preferable embodiment of the present invention~~In some examples, a transformant transformed with a vector that contains DNA encoding the N-acylamino acid racemase and DNA encoding the L-succinylase is used as a source of the N-acylamino acid racemase and the L-succinylase.

[0021]

~~Another aspect of the present invention~~Also disclosed is an N-succinyl amino acid represented by formula (III) or a salt thereof:

[0022]



(III)

[0023]

wherein R1 represents an optionally substituted C5 to C20 alkyl group, an optionally substituted C5 to C20 alkenyl group, an optionally substituted C2 to C20 alkynyl group, an optionally substituted indanyl group, an optionally substituted naphthylmethyl group, a fluorobenzyl group, a chlorobenzyl group, or a bromobenzyl group.

[0024]

~~In a preferable embodiment of the present invention~~In some examples, R in formula (III) is a 4-bromobenzyl group, a 3-fluorobenzyl group, a 2-naphthylmethyl group, a 2-indanyl group, or a 6-heptenyl group.

[0025]

According to the present ~~invention~~disclosure, it is possible to precipitate the resulting L-amino acid out of the reaction

system by using an N-succinyl amino acid whose dissolved concentration is low as a raw material for reaction. Therefore, the present ~~invention~~ disclosure has been found to avoid the reaction inhibition and thus enable efficient production of an L-amino acid.

BEST MODE FOR CARRYING OUT THE INVENTION

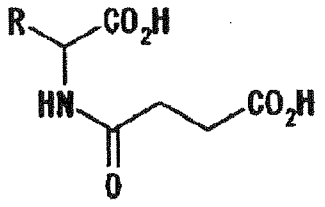
[0026]

Hereinafter, the present invention is described in detail based on non-limiting embodiments.

[0027]

The "enantiomeric mixture" herein refers to a mixture of the L-form and the D-form, with an amount of the D-form in the range of from more than 0% to less than 100%. An N-succinyl amino acid, a raw material used in the present invention, is represented by the following formula (I) and can be synthesized by various known methods.

[0028]



(I)

[0029]

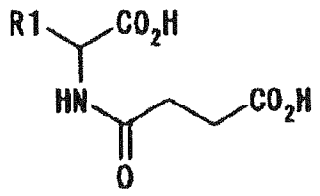
The amino acid may be produced by, for example,

1) a method of reacting, in acetic acid, an amino acid with succinic anhydride in an amount equivalent to or greater than that of the amino acid, distilling off the solvent, and recrystallizing the resulting product in ethyl acetate and /or methanol; or

2) a method of reacting an amino acid with succinic anhydride in an amount equivalent to or greater than that of the amino acid, in water while maintaining an alkaline pH, and then adjusting the pH to acidic to crystallize the

CLAIMS

1. An N-succinyl amino acid represented by formula (III) or a salt thereof:



(III)

wherein R1 represents an optionally substituted C5 to C20 alkyl group, an optionally substituted C5 to C20 alkenyl group, an optionally substituted C2 to C20 alkynyl group, an optionally substituted indanyl group, an optionally substituted naphthylmethyl group, a fluorobenzyl group, a chlorobenzyl group, or a bromobenzyl group,

wherein R in formula (III) is a 4-bromobenzyl group, a 3-fluorobenzyl group, a 2-naphthylmethyl group, a 2-indanyl group, or a 6-heptenyl group.

~~2. The N-succinyl amino acid or the salt thereof according to claim 9,~~

~~wherein R in formula (III) is a 4-bromobenzyl group, a 3-fluorobenzyl group, a 2-naphthylmethyl group, a 2-indanyl group, or a 6-heptenyl group.~~