There is thus still a need for environmentally friendly, economic processes for producing biobased amino acids and hydroxy analogues thereof from renewable, sustainable raw materials which processes are economical, flexible and suitable for large scale, industrial production.

SUMMARY

It has surprisingly been found by the present inventors that a number of important amino acids may be obtained in their hydroxy analogue form by chemo-catalytically combining glycolaldehyde (GA, first compound) and certain chemical compounds (second compound) by a simple, sustainable process, which is flexible and suitable for industrial scale production.

In one aspect, the present disclosure refers to process for producing an alpha-hydroxy reaction product of the formula I:

$$(R)CH(R')\text{-}CHOH\text{-}COOR'' \quad (I)$$

Wherein

R is -H or $-CH_3$;

R' is $-CH_3$, $-CH_2CH_3$, $-CH(CH_3)_2$, $-C_6H_5$, $-CH_2SCH_3$, $-C_8H_6N$ or $-C_3H_3N_2$; and

R'' is -H, $-CH_3$, $-CH_2CH_3$, $-CH(CH_3)_2$, $-CH_2CH_2CH_3$, $-CH_2CH_2CH_2CH_3$, $-CH_2CH(CH_3)_2$, or $-C(CH_3)_3$

Comprising the steps of

a) Providing a first compound of the formula II:

$$CH_2OH\text{-}CHO \quad (II)$$

b) Providing a second compound of the formula III:

$$R\text{-}CO\text{-}R' \quad (III)$$

Wherein

R and R' have the meanings as defined above;

c) Reacting the first compound with the second compound in the presence of a Lewis acid catalyst to provide the alpha-hydroxy reaction product.

In another aspect, the present disclosure refers to a compound of the formula I:

(R)CH(R')-CHOH-COOR'' (I)

Wherein

R is -H or -CH_3;

R' is -CH_3, -CH_2CH_3, - $CH(CH_3)_2$, -C_6H_5, -C_8H_6N or -$C_3H_3N_2$; and

R'' is -H, -CH_3, -CH_2CH_3, -$CH(CH_3)_2$, -$CH_2CH_2CH_3$, -$CH_2CH_2CH_2CH_3$, -$CH_2CH(CH_3)_2$, or -$C(CH_3)_3$

In yet another aspect, the present disclosure refers to an animal feed composition comprising one or more compounds disclosed herein and an animal feed component.

In a further aspect, the present disclosure refers to a use of one or more compounds disclosed herein, for preparing an animal feed composition.

In yet another aspect, the present disclosure refers to a use of one or more compounds disclosed herein, for preparing a polymer.

In a further aspect, the present disclosure refers to a use of one or more compounds disclosed herein, for preparing a co-polymer with lactic acid, lactide ethylene glycol or glycolic acid.

In yet another aspect, the present disclosure refers to an alpha-hydroxy reaction product obtainable or obtained by the method disclosed herein.

A first example disclosed herein relates to a process for producing an alpha-hydroxy reaction product of the formula I:

(R)CH(R')-CHOH-COOR'' (I)

Wherein

R is -H or -CH_3;

R' is -CH_3, -CH_2CH_3, - $CH(CH_3)_2$, -C_6H_5, -CH_2SCH_3, -C_8H_6N or -$C_3H_3N_2$; and

R'' is -H, -CH_3, -CH_2CH_3, -$CH(CH_3)_2$, -$CH_2CH_2CH_3$, -$CH_2CH_2CH_2CH_3$, -$CH_2CH(CH_3)_2$, or -$C(CH_3)_3$;

the process comprising the steps of

a) Providing a first compound of the formula II:

$HO\text{-}CH_2\text{-}CH{=}O$ (II)

b) Providing a second compound of the formula III:

R-CO-R' (III)

Wherein

R and R' have the meanings as defined above; and

c) Reacting the first compound with the second compound in the presence of a Lewis acid catalyst to provide an alpha-hydroxy reaction product.

Advantages of this process is that it is suitable for up-scaling and it is thus suitable for large scale production of alpha-hydroxy amino acid analogs by a process which is flexible and efficient and allows for the use of biobased starting materials, obtainable from renewable, sustainable raw materials.

Step c) may take place in a reaction zone, such as in a reactor fluid (i.e. reaction mixture). After having reacted first and second compounds (reactants), the reaction mixture will contain any unreacted reactants and any alpha-hydroxy reaction products formed. The reaction is envisaged to take place in a reactor containing the Lewis acid catalyst. The system for producing an alpha-hydroxy reaction product according to the present disclosure is quite flexible, since the same catalyst may be used to produce a variety of alpha-hydroxy reaction products, optionally in a one-pot process using two or more different compounds of formula (III). In addition the first compound is the same irrespective of which alpha-hydroxy reaction product it is desired to produce.

A second example disclosed herein relates to a compound of the formula I:

(R)CH(R')-CHOH-COOR'' (I)

Wherein

R is -H or -CH_3;

R' is -CH_3, -CH_2CH_3, - $CH(CH_3)_2$, -C_6H_5, -CH_2SCH_3, -C_8H_6N or -$C_3H_3N_2$; and

R'' is -H, -CH_3, -CH_2CH_3, -$CH(CH_3)_2$, -$CH_2CH_2CH_3$, -$CH_2CH_2CH_2CH_3$, -$CH_2CH(CH_3)_2$, or -$C(CH_3)_3$

A third example disclosed herein relates to an animal feed composition comprising one or more compounds of the formula I and an animal feed component.

A fourth example disclosed herein relates to a use of one or more compounds of the formula I for preparing an animal feed composition.

A fifth example disclosed herein relates to a use of one or more compounds of the formula I for preparing a polymer.