Accordingly, it is desirable to provide an alternative process for the preparation of methionine α-hydroxy analogue and derivatives thereof. In particular, it is desirable to provide a process that is industrially feasible, it is therefore desirable that the process is high yielding, direct and selective. It is desirable that the process is carried out under conditions that are industrially feasible, with regents or catalysts that enable ease of production and reduced toxic waste, such as the use of heterogenous catalysts that may be regenerated. Additionally, the provision of a process wherein the substrates are derived from renewable sources such as C2-C6 sugars, is desirable. In particular because the sugar substrates are much less toxic and much cheaper than, for example acrolein and the HCN reagent, consequently the use of sugar substrates significantly lowers the costs of production.

Summary

In one aspect of the present disclosure, there is provided a process for the preparation of a methionine α-hydroxy analogue and derivatives thereof of the formula:

R’-S-CH2-CH2-CHOH-COO-R (I)

wherein R is selected from the group consisting of H, C_1-C_8 alkyl, alkaline or alkaline-earth metals; and R’ is selected from the group consisting of H and methyl; wherein the process comprises a step of contacting glycolaldehyde in the presence of one or more further C_1-C_3 oxygenates selected from the group consisting of one or more of acetol, pyruvaldehyde, formaldehyde and glyoxal with a metallo-silicate composition in the presence of a compound comprising sulphur and a solvent,

Claims:

1. A process for the preparation of a methionine α-hydroxy analogue and derivatives thereof of the formula:

R'-S-CH2-CH2-CHOH-COO-R (I)

wherein R is selected from the group consisting of H, C1-C8 alkyl, alkaline or alkaline-earth metals; and R' is selected from the group consisting of H and methyl; wherein the process comprises a step of contacting glycolaldehyde in the presence of one or more further C1-C3 oxygenates selected from the group consisting of one or more of acetol, pyruvaldehyde, formaldehyde and glyoxal with a metallo-silicate composition in the presence of a compound comprising sulphur and a solvent, and wherein the compound comprising sulphur is selected from the group consisting of C1-C5 alkyl thiol, C1-C5 alkyl thiol salt, dimethylmercaptan, dimethyl disulphide and hydrogen sulphide.

2. A process according to claim 1, wherein the compound comprising sulphur is selected from the group consisting of methane thiol, methanethiolate alkaline salts, dimethylmercaptan, dimethyl disulphide, and hydrogen sulphide.

3. A process according to claim 1 or 2, wherein the glycolaldehyde is obtained by subjecting one or more sugars selected from the group consisting of glucose, fructose, sucrose, xylose, ; to a pyrolysis step to obtain a pyrolysis product and subsequently contacting the pyrolysis product with the metallo-silicate composition in the presence of the compound comprising sulphur and the solvent.

4. The process according to any one of claims 1 to 3, wherein the metallo-silicate composition is a zeotype material.

5. The process according to claim 4, wherein the zeotype material is one or more materials selected from the group consisting of Sn-BEA, Sn-MFI, Sn-FAU, Sn-MCM-41 and Sn-SBA-15.

6. The process according to any one of claims 1 to 5, wherein the solvent is selected from one or more of the group consisting of methanol, ethanol, 1-propanol, 1-butanol, 2-propanol, 2-butanol, DMSO and water.

7. The process according to any one of claims 1 to 6, wherein the methionine α-hydroxy analogue and derivatives thereof are selected from the group consisting of 2-hydroxy-4-(methylthio)butanoic acid, salts and esters thereof.

8. The process according to any one of claims 1 to 7, wherein the methionine α-hydroxy analogue and derivatives thereof are selected from the group consisting of 2-hydroxy-4-(methylthio)butanoic acid, 2-hydroxy-4-(methylthio)butanoic acid methyl ester and 2-hydroxy-4-(methylthio)butanoic acid ethyl ester.

9. The process according to any one of claims 1 to 8, wherein the glycolaldehyde is contacted with the metallo-silicate composition in the presence of the compound comprising sulphur and the solvent under heating.

10. The process according to claim 9, wherein the heating temperature is between 50 and 200°C, preferably of between 80 and 120 °C.

11. The process according to claim 9 or 10, wherein the heating is continued for a period of from 10 minutes to 12 hours, preferably of from 20 to 300 minutes.

12. The process according to any one of claims 1 to 11, wherein the glycolaldehyde is contacted with the metallo-silicate composition in the presence of the compound comprising sulphur and the solvent and in the presence of one or more basic components selected from the group consisting of a metal salt and a polymer resin.

13. The process according to any one of claims 1 to 12, wherein the yield of the methionine α-hydroxy analogue

and derivatives thereof are greater than the yield of methyl vinylglycolate (MVG).

14. The process according to any one of claims 1 to 13, wherein the yield of the methionine α-hydroxy analogue and derivatives thereof is greater than 15%.

15. The process according to any one of claims 1 to 14, wherein the process is a continuous process.

16. The process according to claim 15, wherein the weight hourly space velocity is between 0.005 and 10 h^{-1}, preferably between 0.1 and 1 h^{-1}.

17. The process according to any one of claims 1 to 16, wherein the methionine α-hydroxy analogue and derivatives thereof are recovered.

18. The process according to any one of claims 1 to 17, wherein the methionine α-hydroxy analogue and derivatives thereof are recovered by purification.

19. The process according to any one of claims 1 to 18, wherein the methionine α-hydroxy analogue and derivatives thereof are purified by distillation.

20. The process according to claim 7, wherein the 2-hydroxy-4-(methylthio)butanoic esters are hydrolysed.