process is selective for the production of C_4 oxygenate compounds and the product is obtained in high yields.

Summary

In one aspect of the present disclosure, there is provided a process for the preparation of one or more C_4 oxygenate compounds of the formula $C_4H_8O_4$ from a composition comprising C_{1-3} oxygenate compounds, wherein the composition comprising C_{1-3} oxygenate compounds comprises glycolaldehyde and wherein the C_4 oxygenates are selectively formed from glycolaldehyde in the presence of a solvent and a crystalline microporous material comprising a ring pore structure selected from one or more of the group consisting of an eight-membered ring pore structure and a ten-membered ring pore structure.

In another aspect of the present disclosure, there is provided a use of C_4 oxygenate compounds prepared according to the process disclosed herein for the preparation of one or more α-hydroxy methionine analogues.

Claims:

1. A process for the preparation of one or more C_4 oxygenate compounds of the formula $C_4H_8O_4$ from a composition comprising C_{1-3} oxygenate compounds, wherein the composition comprising C_{1-3} oxygenate compounds comprises glycolaldehydeand wherein the C_4 oxygenates are selectively formed from glycolaldehyde in the presence of a solvent and a crystalline microporous material comprising a ring pore structure selected from one or more of the group consisting of an eight-membered ring pore structure and a ten-membered ring pore structure.
2. A process according to claim 1, wherein the C_4 oxygenate compounds are compounds selected from one or more of the group consisting of threose, erythrose and erythrulose.
3. A process according to claims 1 and 2, wherein the composition comprising C_{1-3} oxygenate compounds comprises one or more compounds selected from the group consisting of formaldehyde, glycolaldehyde, glyoxal, pyruvaldehyde and acetol.
4. A process according to claim 3, wherein the composition comprising C_{1-3} oxygenate compounds comprises glycolaldehyde at a concentration of at least 5 wt%..
5. A process according to claims 1 to 4, wherein the solvent is selected from one or more of the groups consisting of water, alcohol and a water and alcohol mixture.
6. A process according to claim 5, wherein the alcohol is selected from one or more of the group consisting of methanol and ethanol.
7. A process according to claims 1 to 6, wherein the crystalline microporous material comprising an eight-membered ring pore structure or a ten-membered ring pore structure,

comprises a metal selected from one or more of the group consisting of zirconium, aluminium, tin or titanium.

8. A process according to claim 7, wherein the crystalline microporous material comprising an eight-membered ring pore structure or a ten-membered ring pore structure,comprises from 0.1 wt % to 15 wt% of the metal.
9. A process according to claims 1 to 8, wherein the crystalline microporous material is a zeotype material which has a structure selected from the group consisting of CHA, LTA, MFI, MEL, MTT, MWW, TON, HEU, AEL, AFO, and FER structure.
10. A process according to claims 1 to 9, wherein the process is carried out at a temperature between 25 °C and 150 °C.
11. A process according to claims 1 to 10, wherein a prior step is performed of pyrolysing biomass or one or more oxygenate compounds selected from the group consisting of fructose, glucose, sucrose, xylose or isomers thereof, to produce a composition comprising the C_{1-3} oxygenate compounds.
12. A process according to claims 1 to 11, wherein the C_4 oxygenate compounds are hydrogenated.
13. A process according to claim 12, wherein the process is a one-step process.
14. A process according to claims 1 to 11, wherein the C_4 oxygenate compounds are isomerised and esterified in the presence of Sn-BEA.
15. A process according to claims 1 to 11, wherein the C_4 oxygenate compounds are converted to one or more compounds selected from the group consisting of erythritol and threitol.

16. Use of C_4 oxygenate compounds prepared according to claims 1 to 11 for the preparation of one or more a-hydroxy methionine analogues.