of esters of 2-hydroxy-3-butenoic acid provide a higher combined yield of esters of lactic acid and 2-hydroxy-3-butenoic acid, together with providing a higher conversion of the sugar. These advantages also apply to the preparation of the α-hydroxy methionine analogues.

Summary

In one aspect of the present disclosure, there is provided a continuous flow process for the preparation of one or more esters of lactic acid and 2-hydroxy-3-butenoic acid or an α-hydroxy methionine analogue from a sugar in the presence of a solid Lewis acid catalyst and a solvent comprising an organic solvent and water, wherein the water is present in an amount of up to or equal to 10 vol. % of the organic solvent.

Disclosure of the invention

It has now been discovered that the presence of water in the organic solvent of a continuous flow reaction facilitates Lewis acid catalyst stability for continuous flow reactions. Deposition of carbonaceous species on the catalyst leading to deactivation or poisoning of the catalyst Lewis acid active sites is not observed to any industrially significant extent. Retention in activity, i.e. stability of the catalyst, results in the continued high yields of the desired product for sustained reaction durations of continuous flow reactions.

The present invention relates to a continuous flow process for the preparation of one or more esters of lactic acid and 2-hydroxy-3-butenoic acid or α-hydroxy methionine analogues from a sugar in the presence of a solid Lewis acid catalyst and a solvent comprising an organic solvent and water, wherein the water is present in an amount of up to or equal to 10 vol. % of the organic solvent.

If an α-hydroxy methionine analogue is desired, a compound comprising sulfur needs to be present in addition to a solid Lewis acid catalyst and a solvent comprising an organic solvent and water.