

IMPROVED PROCESS FOR THE SYNTHESIS OF 2,5- DIHYDROXYMETHYL FURAN (BHMF) FROM 5-HYDROXYMETHYLFURFURAL (HMF)

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Reaction for the selective transformation of 5-hydroxymethylfurfural (HMF) into 2,5-dihydroxymethyl furan (BHMF) catalytically promoted by cyclopentadienone/carbonyl complexes based on a transition metal.

Protection: Italy, with possibility to extend internationally.

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INVENTION

Reaction for the selective transformation of 5-hydroxymethylfurfural (HMF) into 2,5-dihydroxymethyl furan (BHMF) catalytically promoted by cyclopentadienone/carbonyl complexes based on a transition metal, more precisely from the eighth group (iron or ruthenium). Until today, homogeneous iron-based catalysts have never been used for this reaction. The process takes place at lower temperatures and pressures than those available in the literature for the aforementioned transformation whether it exploits heterogeneous or homogeneous catalysis [ChemSusChem 2022, 15, e202200228] using a less expensive and more environmental friendly metal.

This catalyst used in a batch reactor, carrying out the reaction in a solvent that solubilizes the catalyst when cold and the product only when at higher temperatures, allows the substrate (HMF) to be quantitatively converted into the product (BHMF) with complete selectivity (60-90 °C, 1-5 bar H₂, t = 20min-3h).

The reaction can also be carried out in innovative and eco-friendly solvents. Furthermore, the catalyst can be recycled, following an innovative regeneration procedure, which allow to separate the product by simple filtration.

ADVANTAGES

- Energy saving: low operating temperatures and pressures
- Product recovery, catalyst cost and recycling
- Produced in pure form (>99%) and with high productivity (yield > 99%)
- Uses of renewable and/or sustainable solvents

APPLICATIONS

- Environmental transition towards bio-polymers (sustainable industry with zero climate impact, circular economy)
- High-added value composite materials supply chain (e.g. for automotive)
- Recycled carbon fiber enhancing

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