



Green method to prepare sorbitol from cellulose or cellulose-based waste

PRIORITY NUMBER

102023000010434

PRIORITY DATE

05/24/2023

PATENT STATUS

🟡 Filed

LICENSE

Italy

TRL

4

RESEARCH TEAM |

INVENTORS

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MANUFACTURING PROCESS | RENEWABLE & RECYCLABLE MATERIALS

The application describes a one-step CO₂-assisted hydrolytic hydrogenation process for converting cellulose into sorbitol, a widely used chemical compound. The process offers high yields of sorbitol and the use of CO₂ as a by-product, its abundance, and low cost make the process environmentally friendly and an economically viable alternative to traditional methods.

Technical Features

The conversion of cellulose, an abundant resource, into sorbitol is particularly desirable due to the widespread use of sorbitol and its derivatives in pharmaceuticals, sweeteners, cosmetics, and textiles and can contribute to the development of a sustainable bioeconomy. The process requires a cellulose-based substrate, which is then treated with water, hydrogen gas (H₂), and carbon dioxide (CO₂) at specific temperature and pressure conditions. The metal catalyst used in the reaction can be homogeneous or heterogeneous. The use of pressurized CO₂ in the reaction allows for the generation of weakly acidic aqueous solutions, which avoids the use of conventional strong acids and their associated issues such as corrosion, acid recovery, and product separation. It was possible to obtain a high sorbitol yield even when starting from cellulose-based substrate, e.g. filter paper, cotton wool, cotton fiber and a pizza cardboard box. TRL 4.

Possible Applications

- Everywhere sorbitol is used
- Food & beverage, pharmaceuticals, sweeteners and cosmetics
- Cellulose and cellulose-based waste treatment

Advantages

- One-step catalysis
- No use of strong acids
- Advantageous industrial scalability

PATENT OWNERS

Università Ca' Foscari Venezia