PROCESS FOR OBTAINING LEVULINIC ACID ESTERS, IN PARTICULAR ALKYL LEVULINATES

CODICE URTT

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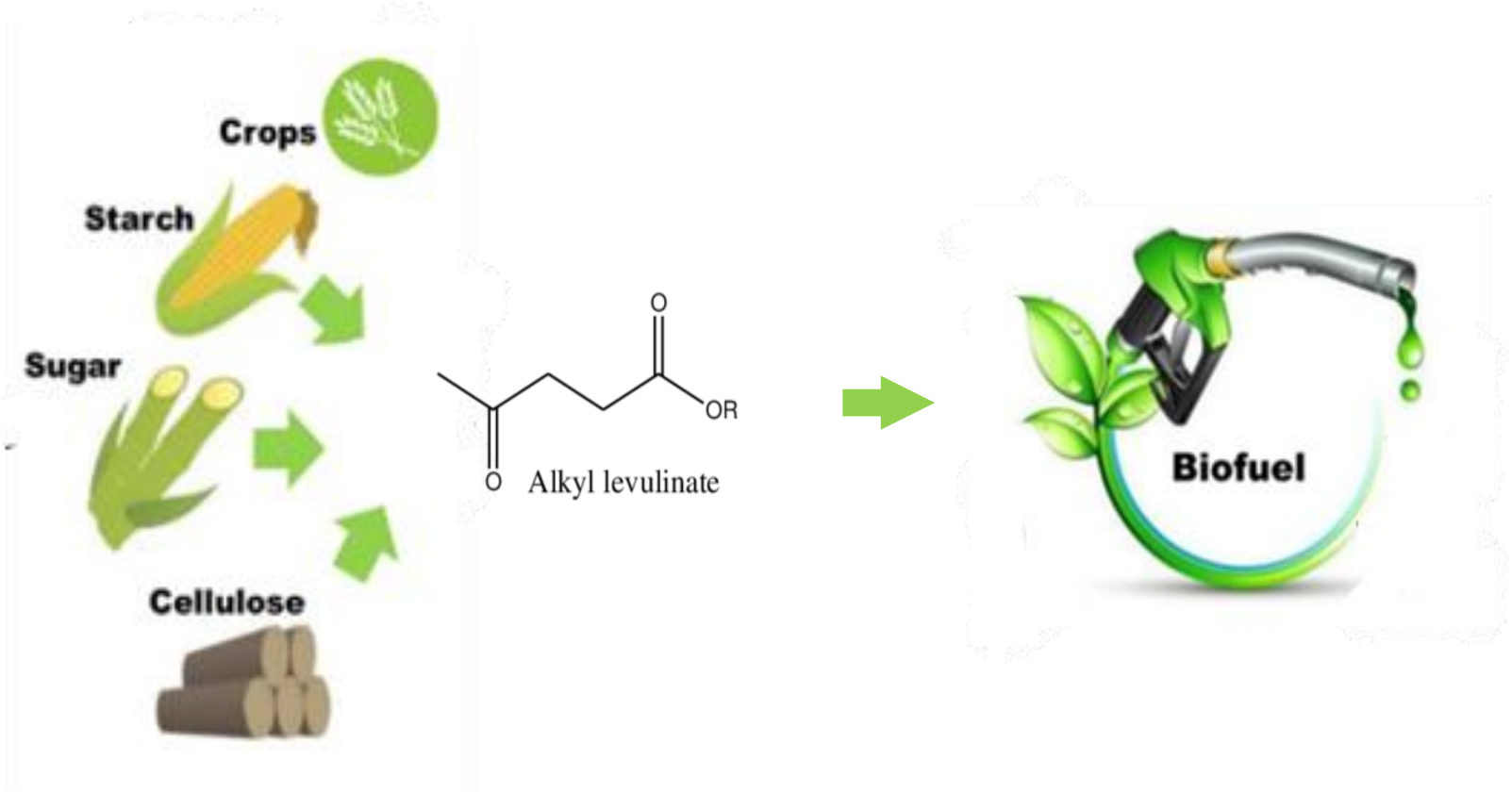
The Invention

Brief description

Levulinic acid esters, in particular alkyl levulinates (ALs), are compounds of considerable interest in the chemical and process industries. Currently, they are widely used as solvents and intermediates for the synthesis of, in particular, **fine chemicals and lubricants**. Possible and more important applications are also envisaged for the production of **biofuels and their direct use in internal combustion engines in blends with petrol, diesel or biodiesel**.

Various processes are known, to date, for obtaining alkyl levulinate from a cellulosic biomass and an alcohol. These synthesis methods have the disadvantage that they involve numerous catalytic steps and require careful and costly purification of the intermediate products, which significantly increase production costs and exacerbate plant construction costs.

Drawings and Images



Our patented process is useful to obtain levulinic acid esters by direct alcoholysis of carbohydrates, such as C6 monosaccharides and/or polysaccharides thereof and/or chitin and/or chitosan, with a predetermined alcohol, takes place at a reaction temperature preferably between 100°C and 220°C for a time preferably between 30 and 300 minutes and in the presence of a co-solvent with specific properties, in addition to a conventional acid catalyst; said alcohol and said co-solvent are preferably separated from the reaction mixture after conversion and then, recycled back to the conversion step.

Industrial applicability

Currently, alkyl levulinates are widely used as solvents and intermediates for the **synthesis of fine chemicals and lubricants**. Possible and more important applications are also envisaged for the production of **biofuels** and their direct use in internal combustion engines in blends with **petrol, diesel or biodiesel**.

The following products can be used as a source of carbohydrates for obtaining levulinic acid esters by direct alcoholysis:

- biomasses of various kinds, such as cellulosic and ligno-cellulosic biomass from agricultural and forestry activities,
- wastes from industries such as agro-food industries, sugar and paper mills, or
- wet fractions of municipal solid waste.

→ The reaction conditions of the patented method limit or unexpectedly prevent the formation of solid materials such as huminic by-products by reducing alcohol consumption, increasing yield and simplifying the separation of the desired ester from the reaction mixture ←

Possible evolution

The interest for the Alchil Levulinates (ALs), obtained with the innovative method, cover a wide range of applications, from the **synthesis of fine chemicals, biosurfactants, biolubricants** and to the most important application in **biofuels**, since the ALs produced from short-chain alcohols (C1-C2) are known to be **additives for petrol and diesel/biodiesel**.

The presence of oxygen in the molecules of interest makes combustion cleaner in terms of reduced smoke numbers and CO and unburnt emissions.

The research team intends to collaborate with working groups of medium and large companies interested in the use of ALs for production and/or use in biofuels.
The team is open to meet industrial partners to describe the advantages that the innovative patent procedure could provide if adopted in an industrial environment. Of course, a new collaboration with large industries in the sector could provide subsequent input for further developments and the possibility of extending patent protection to more States worldwide, considering the strong interest that researchers and companies, especially from Asian countries, have been showing in recent years in these issues.

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