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Synthesis of Lavandulol, Safranal and Intermediates for Fragrance and Flavor Ingredients

*A precursor, prenyl aldehyde, and its use in the commercial
production of flavors and fragrances via a self-aldol condensation*

Contact

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Inventors

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Field

Flavors and fragrances industry
Pesticide industry
Therapeutics

Technology

Chemical synthesis via self-
aldol condensation under mild
conditions

Key Features

- Minimal waste from process stream
- Avoidance of hazardous raw materials
- Aqueous solution workup is minimal or avoidable

Key Benefits

- Patent covers intermediate in novel synthesis of two commercially viable flavors and fragrances.
- Cost-efficient process
- Potential for pheromone development
- Potential for therapeutic applications

Stage of Development

Synthetic routes established
Catalysts defined

Status

Seeking licensing partner

Patent Status

US Patent filed
Permission granted for filing
patent application in foreign
countries

Synthesis of naturally occurring flavors and fragrances

The reliance on naturally occurring plant raw materials for production of high value commercial products is recognized to carry with it great risk. Consistent quality and sufficient supply of raw material can be threatened in any number of ways including adverse weather, pests and geopolitics. This is particularly important in the flavors and fragrances industry where plant extraction is a major means of procuring the necessary ingredients. Synthetic production, as an alternative to natural sources, can increase certainty of supply and reduce cost and risk to manufacturers who must rely on agricultural sources.

Self-aldol condensation

The inventor has developed a unique catalytic process from which self-aldol condensation, with prenyl aldehyde, produces unexpected products in the terpene aldehyde and alcohol classes of compounds. The route leads to high yields of two commercially valuable products in the food flavoring industry and in the perfume markets. The terpenoid dehydrolavandulal, an isolated intermediate in the process, can also be used as a direct precursor for a sex pheromone for pests.

Cost-effective high yield production of products

The processes and catalysts developed and patented for producing racemic Lavandulol and Safranal can significantly reduce cost and waste over existing technologies. Additionally, the synthetic production of these products can reduce or remove reliance on natural plant resources. The current processes utilized notably replace highly corrosive acids and bases normally associated with the synthesis of this category of products with much milder reagents and conditions. The result is a positive environmental impact and reduction of hazards to employees in the workplace. The workup procedures are simpler and fewer than other reported pathways. This helps to reduce manufacturing complexity and associated costs.

Additional potentials of the patent

In addition to the utility of Safranal, (i.e. the main aromatic component found in saffron and in a mixture of its extracts), as the fragrant component of saffron, it has been investigated as a possible anticonvulsant drug and an antioxidant. The ability to efficiently produce Safranal may provide an opportunity for further medical research on its health implications, including as a satiety agent for the treatment of obesity. The patent also describes the synthesis of dehydrolavandulal. This intermediate is a direct precursor to the sex pheromone of the passion vine mealy bug - a significant threat to major US crops.

Opportunity

Loyola University Chicago is looking for a commercial partner to further develop, manufacture, and distribute this technology.