

P30: Sugar esters lipase mediated synthesis from vegetable oils

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Sugar esters are surfactants which have broad applications in the food industry, cosmetics, detergents, pharmaceuticals, pesticides... They can be synthesized by chemical or enzymatic processes.

Their chemical synthesis is industrially performed at high temperature with basic catalysts. This procedure has poor selectivity (polyesterification of the sugar hydroxyl groups) and gives rise to coloured side-products. However, the enzyme catalyzed processes are notably more selective. Numerous works have been reported on the enzymatic esterification by using sugars and pure fatty acids as substrates (Chamouleau *et al.*, 2001; Ferrer *et al.*, 2005; Piccicuto *et al.*, 2001).

The originality of the present work finds its meaning in the investigation of the entire process to produce sugar esters from renewable resources.

In the prospect of a production most natural as possible, two enzymatic steps were integrated : hydrolysis of vegetable oils (olive and rapeseed oils) by the lipase of *Yarrowia lipolytica* (to produce fatty acids) and synthesis of fatty acids glucose esters catalysed by the lipase B of *Candida antarctica*.

Hydrolysis of oils were optimised by varying some parameters : temperature, emulsifier, oil / aqueous phase ratio, lipase quantity and time of reaction. For both oils, optimal conditions were : 37°C, gum arabic as emulsifier, oil / water ratio of 1/3, 100 units of lipase per ml of oil, 24 h of reaction. The percentage of free fatty acids was 60% (expressed as oleic acid) for both oils.

The optimal conditions for the glucose esters synthesis were : 60°C, sugar / fatty acid molar ratio of 1/3, 2.5g of lipase (Novozym SP435), 25 g of molecular sieve, 48h of reaction. The best synthesis yield, 50% (expressed as glucose oleate) was obtained with olive oil.

References

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