

Biocatalytic production of polyols & epoxidized oils for industry



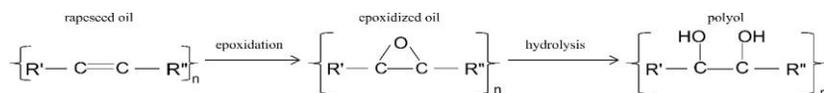
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BRIEF DESCRIPTION OF A TECHNOLOGY

The enzymatic synthesis of polyols and epoxidized derivatives from renewable resources is essential for the development of industrial biotechnology in order to meet green chemistry requirements and sustainability goals of consumers.

We have developed the technology bio-based polyol production from rapeseed oil by chemo-enzymatic route, which follows Principles of Green Chemistry from rapeseed oil. The process consists of two phases and the produced intermediate of the process is epoxidized rapeseed oil (scheme). The efficient and sustainable epoxidation process of rapeseed oil is performed at a moderate temperature using lipase and *in situ* generated linoleic peracid. In the second phase, the ion exchange resin Amberlyst-15 with strongly acidic sulfonic group is applied as a reusable catalyst, what maintains the hydrolysis process sustainable. The technology is also validated with other types of oils.

During this process two products of the synthesis process are produced: epoxidized oil and polyol (biopolyol).



Epoxidized oil can be used as natural plasticizer instead of chemical plasticizers in industries cosmetics, toys manufacturing, PVC production, dyeing, painting and polishing products manufacturing etc. Such epoxidized derivatives are natural (“green”) and biodegradable, less anti allergenic and toxic in comparison with chemical analogues. It can change phthalates, which are toxic and dangerous for health and soon will be forbidden in EU to be used as plasticizers.

Biopolyols can be applied for the production of various polyurethane foam (soft, rigid, etc.). This biopolyol have much better characteristics compared with chemical polyols: Natural („green“), can reduce polyurethane fire potential, is biodegradable, not toxic and is anti-allergenic.

PURPOSE

- The technology can be applied to produce epoxidized oils and polyols which could be used for the development of bio-based PU.
- The epoxidized oil and polyols could be applied for the replacing fossil-based counterparts in PU production, dyeing and polishing products manufacturing, cosmetics, toys manufacturing, PVC production.
- The principal of the technology could be applied in the research with the focus on the development of for novel epoxidized oils or polyols from bioresources.

TECHNOLOGY READINESS LEVEL

TRL 6

PUBLICATIONS

M. Šulcienė, A. Karalius, I. Matijošytė. Chemo-enzymatic route for the production of biopolyol from rapeseed oil. *Curr. Org. Chem.* 2014, 18: 3037-3043

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