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Green synthesis of a dibasic ester using nitrilase and lipase.

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PURPOSE OF THE ABSTRACT
During the synthesis of adiponitrile, for nylon production, 2-methylglutaronitrile (2-MGN) is created as a by-product. The conversion of 2-MGN to 2-methylglutaric acid (2-MGA) through the use of a nitrilase has been shown by previous work at Northumbria University.[1] More usefully, the acid may be converted to a diester for use as a solvent in paint, however the current biocatalytic route is incomplete with several amide by-products produced (Scheme 1).

Converting 2-MGA to the corresponding diester can be completed through a Fischer esterification. However, chemical esterification when 4-APA is still present will produce the highly corrosive ammonium bisulfite, which corrodes commercial steel vessels. In this work we are screening lipase enzymes for the synthesis of diesters of 2-MGA as this will avoid the production of corrosive by-products and will lead to a fully biocatalytic synthesis.

FIGURES

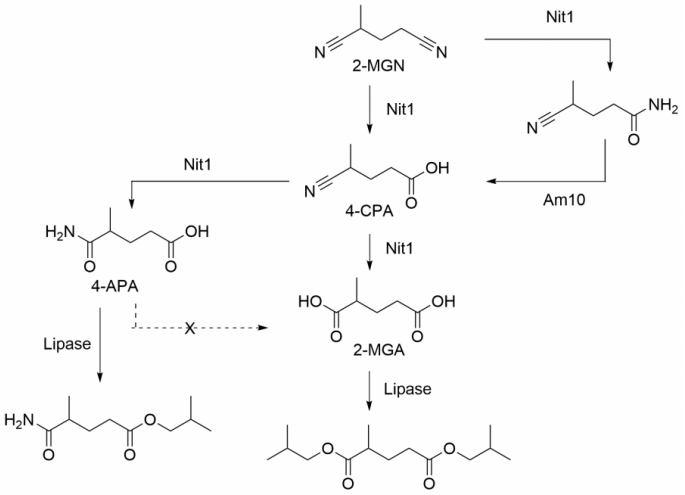

FIGURE 1

Scheme 1

The biocatalytic route from 2-MGN to diisobuyl-2-methylglutarate.

FIGURE 2

KEYWORDS

lipase | nitrilase | ester | flow

BIBLIOGRAPHY

[1] Chemoxy International Ltd, Process for Converting Nitriles, United Kingdom Pat., 2554708, 2016.