

Ionone synthesis on solid acid catalysts

Verónica K. Díez, Carlos R. Apesteguía, J. Isabel Di Cosimo

Catalysis Science and Engineering Research Group (GICIC)

INCAPE-(UNL-CONICET). Santiago del Estero 2654, (3000) Santa Fe, Argentina

Abstract

Ionones (α , β and γ isomers) are extensively used as pharmaceutical intermediates and fragrances. The β -ionone isomer is used in different synthesis processes leading to vitamin A, whereas α - and γ -ionones are employed in perfume formulations. Ionones are commercially produced from citral via a two-step homogeneously-catalyzed process. In the first step, citral and acetone are contacted with diluted bases such as NaOH, Ba(OH)₂, and LiOH to give pseudoionone (PS). Then, the consecutive cyclization of PS to ionones is catalyzed by mineral acids. In this paper, the liquid-phase cyclization of PS to ionones was studied on solid acids combining Lewis and Brønsted acid sites, such as zeolite HBEA, Amberlyst 35W, SiO₂-Al₂O₃, silica-supported heteropolyacids (HPA/SiO₂) and Cs-HPA. Amberlyst 35W and HPA/SiO₂ were the most active catalysts showing that the reaction is preferentially promoted on strong Brønsted acid sites. In particular, 58.5 wt. % HPA/SiO₂ yielded about 79 % ionones after 1.5 h of reaction at 383 K. This ionone yield is comparable to the best values reported in literature for the homogeneously catalyzed reaction. The three ionone isomers were always obtained but the isomer distribution significantly changed with pseudoionone conversion, reaction time and temperature.

Para contactar a los autores: verodiez@fiq.unl.edu.ar
capesteguia@fiq.unl.edu.ar
dicosimo@fiq.unl.edu.ar

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