# Economic evaluation of solar produced bulk and fine chemicals

Karl-Heinz Funken, Jürgen Ortner and Christian Sattler
Deutsches Zentrum für Luft- und Raumfahrt e.V.,
Solare Energietechnik, 51170 Köln, Deutschland
Phone: ++49-(0)2203-601-2766; fax: ++49-(0)2203-66900;
e-mail: juergen.ortner@dlr.de

During the last decade researchers have worked in the field of solar photochemical production of fine and bulk chemicals. The main interest was to prove technical feasibility of these solar photochemical applications. Interesting industrial photochemical processes currently in operation are the photooximation and the photooxidation. Photooximation is used to produce ε-caprolactam and lauryllactam. Fig. 1 shows the key photochemical step of the process.

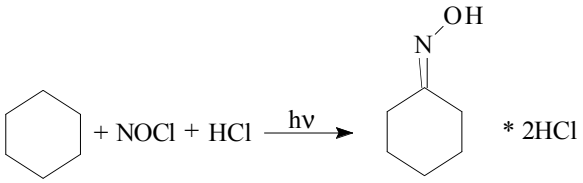


Fig. 1: Photooximation of cyclohexane

At present photooxidation is used in the synthesis of odoriferous substances like rose oxide, nerol oxide, terpineol etc.. (Fig. 2)

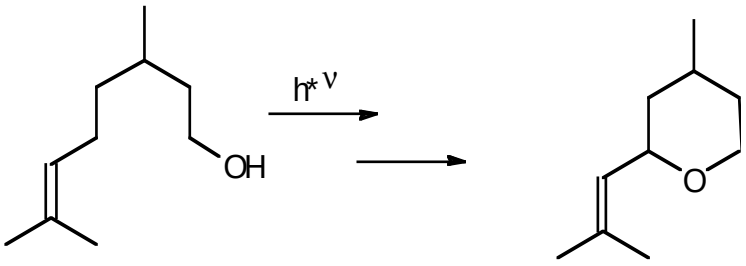


Fig. 2: Photochemical synthesis of rose oxide

The work achieved an experimental state, with which industry is becoming interested in. For industrial development of solar photochemical processes a comparison of the investment and operating costs is needed. In this paper firstly, the photochemical synthesis of ε-caprolactam will be compared for two

plant concepts. The conventional lamp-driven concept followed the process as realized on an industrial scale by Toray Ltd., Japan and the solar concept was designed at identical yearly output. Secondly, the conventional industrial photooxidation process of citronellol will be compared with a solar driven one.