

ABSTRACT

Development of innovative technologies for obtaining products based on isobutyric aldehyde

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The main of the doctoral thesis was to use innovative catalysts to develop an effective method for obtaining hydroxypivaldehyde and neopentyl glycol bis(2-ethylhexanoate) ester, as well as to utilize isobutyric aldehyde, a product with low margins and low application potential.

The doctoral thesis was divided into two parts: public and confidential. The first public part presents a literature review on the methods of synthesis of hydroxypivaldehyde and neopentyl glycol, and discusses the use of ionic liquids for the esterification process. Basic studies of the aldol condensation process of isobutyric aldehyde with formaldehyde in the presence of an immobilized phase transfer catalyst of poly(ethylene glycol) deposited on a polymer support, which was cross-linked with divinylbenzene (1%). The influence of the amount of catalyst, temperature, base concentration, molar ratio of substrates was determined, and the catalyst recycling was demonstrated.

The confidential part describes the conducted basic research on the aldol condensation process using a poly(ethylene glycol) phase transfer catalyst and then scales up the aldol condensation process to 10 liters. Studies on the esterification process of neopentyl glycol with 2-ethylhexanoic acid in the presence of ionic liquids are described. Market reports dedicated for Grupa Azoty ZAK S.A. on neopentyl glycol and its esters are discussed.