

Liquid phase dehydration of methyl phenylcarbinol to styrene

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Abstract

The industrial styrene production by the method of vapor-phase methylphenylcarbinol (MPhC) dehydration was introduced for the first time in our country within the joint propylene oxide and styrene production consisting OAO «Nizhnekamskneftekhim» facility.

This process makes it economically feasible to obtain a combined product – propylene oxide and styrene. However, continuous process exploitation at the OAO «Nizhnekamskneftekhim» facility allowed revealing a number of significant faults caused by economic and environmental factors toughening. First of all it is high energy consumption due to high process temperature and high water steam consumption for steam dilution, which affects the increase in the cost of production.

In almost all technological scheme areas of this production, high boiling by-products, so-called high boiling components, are formed.

One of these problem solution versions is the transfer of production to a new technology of styrene production by MPhC dehydration, which is carried out in the liquid phase at lower temperatures (up to 190 °C) using new homogeneous highly selective catalysts that exclude the by-products formation, including high-boiling components.

The principal advantage of this technology is to reduce the cost of marketable styrene by reducing energy costs (heat, recycled water, water vapor, fuel gas, electricity), reducing the metal consumption of the technological scheme and increasing styrene production by reducing the amount of waste.

The comparative tests results with three samples of homogeneous catalysts activity in the MPhC dehydration into styrene process are presented in the work.

The tests were carried out under conditions of periodically and continuously operating laboratory installations made of glass, equipped with dosing, condensation, separation and collection systems for reaction products. Quantitative composition of reaction products is identified by chromatography methods.

As a result of the conducted tests, in the presence of the used catalysts, the process control modes were selected, and the installations efficiency was checked.

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