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New method of running the bisphenol A synthesis process using the set of two-zone reactors

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ABSTRACT

The paper presents a new development concept for the bisphenol A synthesis process with use of the innovative two-zone reactors, packed with promoted ion exchange resin catalyst. The operating characteristics of the two-zone reactor have been described using a realistic mathematical model.

Empirical studies supporting the modelling calculations were conducted using a pilot reactor similar to the industrial case, utilizing real-life reaction mixtures obtained from industrial BPA synthesis plant.

An acceptable model accuracy measured by correlation coefficient (0.926) and the linear regression coefficient (0.99) was obtained. The comparative studies have been performed with the use of the subject innovative two-zone reactor and the reference "conventional" single-stage one.

The two of 14-month production cycles of the synthesis unit utilising two-zone reactors and a single stage one have been described in detail.

In the case of a BPA synthesis process unit built around a two-zone reactor, it was possible to obtain significantly higher values both for increase of a BPA mass fraction ($\Delta w_{BPA} = 0.171$) and for selectivity ($S_{BPA} = 97.3\%$) when compared with the synthesis process based on a single-stage reactor. It is also possible to achieve and maintain high stability of the above-mentioned parameters in the course of a production cycle.