In the light of this prior art, it is an object of the invention to provide a process for the aldolization of aldehydes which can be operated particularly economically.

The object is achieved by using a reaction mixing pump as reactor.

The disclosure~~invention~~ therefore provides a process for preparing α,β-unsaturated aldehydes, in which a catalytic aldol condensation of starting aldehydes in the presence of an aqueous base is carried out within a reactor through which continuous flow occurs, wherein the reactor is a reaction mixing pump. The pump here serves not only as means of transporting alkali, aldehyde and product but at the same time also as reactor.

In a first aspect, there is provided a process for preparing α,β–unsaturated aldehydes, in which a catalytic aldol condensation of starting aldehydes in the presence of an aqueous base is carried out within a reactor through which continuous flow occurs, characterized in that the reactor is a reaction mixing pump, characterized in that the reaction mixing pump has the following features: a) a fixed pump housing, b) an impeller which is mounted so as to be able to rotate in the pump housing and has a plurality of radially extending mixing chambers which are open in the direction of the circumference of the impeller, c) a mixing channel which encloses the mixing chambers and extends within the pump housing along the circumference of the impeller, d) at least one inlet for reaction starting materials and an outlet for reaction products, with inlet and outlet being connected so as to allow fluid flow by the mixing channel, e) a motor, by means of which the impeller can be rotated.

Carrying out an aldol condensation by means of a reaction mixing pump exceeds expectations as to the economics of the process to a surprising degree. This may be attributed to the fact that the reaction mixing pump simultaneously exercises a positive influence on three factors related to the economics of the process: firstly, mention may be made of the comparatively small holdup of a reaction mixing pump, which reduces the dead proportion of the invested capital. Furthermore, the specific mechanical energy consumption of the reaction mixing pump is low since it achieves effective generation of turbulence. Finally, there is surprisingly an improved selectivity, i.e. a better yield of the α,β–unsaturated aldehydes to be produced with low formation of undesirable by-products. The latter effect in particular was not foreseeable.

Overall, the advantages of the process of the invention are the high yield of α,β-unsaturated aldehydes in a single pass and the small space requirement of the sub-plant for preparing the mixture of crude α,β-unsaturated aldehydes (mixture before distillation) and the lower capital investment compared to a plant having a conventional reactor.

Advantageous embodiments of the invention are set forth in the dependent claims and can be derived from the description which now follows and the examples.

Starting materials

The process of the invention is suitable for the reaction of aldehydes or aldehyde mixtures which