from the turbulences.

It is therefore an object of the present invention to develop a process of the type specified at the outset in such a way that the performance thereof requires less energy input at high product yields.

This object is achieved by dispersing the aliphatic C_5-aldehydes and/or the α,β-unsaturated C_{10}-aldehydes as droplets in the aqueous base, the average Sauter diameter of the droplets being in the range from 0.2 mm to 2 mm.

In a first aspect, there is provided a process for the continuous production of α,β-unsaturated C_{10}-aldehydes from aliphatic C_5-aldehydes, comprising the steps:

a) aldol condensation of aliphatic C_5-aldehydes to give α,β-unsaturated C_{10}-aldehydes in the presence of an aqueous base in a tube reactor;

b) phase separation of discharge of the tube reactor into an aqueous catalytic phase and an organic product phase;

c) separation of the organic product phase into α,β-unsaturated C_{10}-aldehydes, aliphatic C_5-aldehydes and by-products;

d) removal of a part of the aqueous phase for separating the reaction water and supplement with fresh aqueous base and subsequent return to the tube reactor;

wherein

the aliphatic C_5-aldehydes and/or the α,β-unsaturated C_{10}-aldehydes are dispersed as droplets in the aqueous base; wherein the average Sauter diameter of the droplets is in the range between 0.2 mm to 1.54 mm.

The disclosure~~invention~~ therefore provides a process for continuously preparing α,β-unsaturated

C_{10}-aldehydes from aliphatic C_5-aldehydes, which comprises the following steps:

a) aldol condensation of aliphatic C_5-aldehydes to give α,β-unsaturated C_{10}-aldehydes in the presence of an aqueous base in a tubular reactor;

b) phase separation of the output from the tubular reactor into an aqueous catalyst phase and an organic product phase;

c) separation of the organic product phase into α,β-unsaturated C_{10}-aldehydes, aliphatic C_5-aldehydes and by-products;

d) discharge of a portion of the aqueous catalyst phase to remove the water of reaction and supplementation with fresh base and subsequent recycling into the tubular reactor;

wherein the aliphatic C_5-aldehydes and/or the α,β-unsaturated C_{10}-aldehydes are dispersed as droplets in the aqueous base; and wherein the average Sauter diameter of the droplets is in the range from 0.2 mm to 2 mm.

One of the fundamental findings on which the invention is based is that a mass transfer between the phases of the reaction is particularly effective when the reactant or the