

Method for the continuous production of aldehydes

Abstract

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Process for the continuous preparation of aldehydes having from 5 to 21 carbon atoms by isomerizing hydroformylation in the homogeneous phase of olefin compositions having from 4 to 20 carbon atoms and comprising α -olefins and olefins having internal double bonds by means of synthesis gas in the presence of a homogeneous rhodium catalyst complexed with an oxygen- and/or nitrogen-containing organophosphorus ligand and free ligand at elevated temperature and elevated pressure in a multistage reaction system comprising at least two reaction zones, in which the olefin composition is firstly reacted with synthesis gas having a CO/H₂ molar ratio of from 4:1 to 1:2 at a total pressure of from 10 to 40 bar in a group of one or more first reaction zones to a conversion of the α -olefins of from 40 to 95% and the hydroformylation mixture from this group of one or more first reaction zones is reacted with synthesis gas having a CO/H₂ molar ratio of from 1:4 to 1:1000 at a total pressure of from 5 to 30 bar in a group of one or more downstream reaction zones, where the total pressure in the one or more downstream reaction zones is in each case from 1 to (T1-Tf) bar lower than in the preceding reaction zone, where T1 is the total pressure in the preceding reaction zone and Tf is the total pressure in the reaction zone downstream of the one or more first reaction zones, with the proviso that the difference T1-Tf is greater than 1 bar, and the CO partial pressure in the one or more downstream reaction zones is in each case lower than in the reaction zone preceding this reaction zone.

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