CLAIMS

1. Process for continuously preparing an alcohol mixture, in which an input mixture which comprises olefins and has a composition that changes over time is subjected to an oligomerization to obtain an oligomerizate and at least a portion of the olefin oligomers present in the oligomerizate are hydroformylated with carbon monoxide and hydrogen in a hydroformylation in the presence of a homogeneous catalyst system to give aldehydes, at least some of which are converted to the alcohol mixture by subsequent hydrogenation,

   characterized in that

   the composition of the oligomerizate and the composition of the aldehydes are determined,

   the temperature and/or the conversion of the oligomerization are controlled as a function of the current composition of the oligomerizate,

   and the composition of the catalyst system and/or the pressure in the hydroformylation are controlled as a function of the current composition of the aldehydes,

   wherein at least the hydroformylation is controlled in such a way that a first scalar controlled variable calculated from the composition of the aldehydes is kept constant and the first scalar controlled variable is an approximation of the viscosity of an ester mixture obtainable by esterification of the alcohol mixture or by transesterification with the aid of the alcohol mixture

   wherein the viscosity η of the ester mixture obtainable by esterification of the alcohol mixture or by transesterification with the aid of the alcohol mixture can be calculated by the formula (2):

   $$\ln(\eta) = \Sigma x_i \ln(\eta_i) \qquad (2)$$

   wherein x_i is the mole fraction of the particular isomerically pure aldehyde and η_i is the contribution of the isomerically pure aldehyde to the viscosity

   wherein the oligomerization is controlled in such a way that a second scalar controlled variable calculated from the composition of the olefin oligomers is kept constant and the second scalar controlled variable is an approximation of the iso index of the oligomerizate.

2. Process according to Claim 1,

characterized in that

the composition of the oligomerizate and the composition of the aldehydes are determined continuously, and the oligomerization and/or the hydroformylation are controlled continuously.

3. Process according to Claim 1,

characterized in that

the oligomerization is also controlled in such a way that the first scalar controlled variable calculated from the composition of the aldehydes is kept constant.

4. Process according to any of the preceding claims,

characterized in that

the input mixture comprises olefins having four carbon atoms which are oligomerized in the course of the oligomerization to give olefin oligomers having eight, twelve and sixteen carbon atoms, and the olefin oligomers having eight carbon atoms are removed from the oligomerizate and hydroformylated to aldehydes having nine carbon atoms.

5. Process according to Claim 4,

characterized in that

the input mixture is composed of a combination of the following substance mass flow rates which vary within the specified substance mass flow rate ranges with a respective rate of variation within the specified range of rates of variation:

Substance	Substance mass flow rate	Rate of variation
Isobutene:	0 kg/s to 1 kg/s	- 0.05 g/s² to 0.05 g/s²
1-Butene:	0 kg/s to 6 kg/s	- 0.30 g/s² to 0.30 g/s²
2-Butene (cis + trans):	1 kg/s to 13 kg/s	- 0.30 g/s² to 0.30 g/s²

Isobutane:	0 kg/s to 3 kg/s	- 0.15 g/s² to 0.15 g/s²
n-Butane:	1 kg/s to 7 kg/s	- 0.30 g/s² to 0.30 g/s²
Other materials:	0 kg/s to 1 kg/s	- 0.05 g/s² to 0.05 g/s²

6. Process according to any of the preceding claims,

characterized in that

the oligomerization is effected in the presence of a heterogeneous nickel catalyst.

7. Process according to any of the preceding claims, wherein the oligomerization is operated in circulation mode, in such a way that a proportion of the oligomerizate drawn off from the oligomerization is recycled into the oligomerization,

characterized in that

the conversion in the oligomerization is controlled by varying the proportion of the oligomerizate recycled.

8. Process according to any of the preceding claims,

characterized in that

the hydroformylation is effected in the presence of a homogeneous catalyst system comprising rhodium and at least two different monophosphite ligands, the composition of the catalyst system in the hydroformylation being controlled by metered addition of one of the two monophosphite ligands into the hydroformylation.

9. Process according to Claim 8,

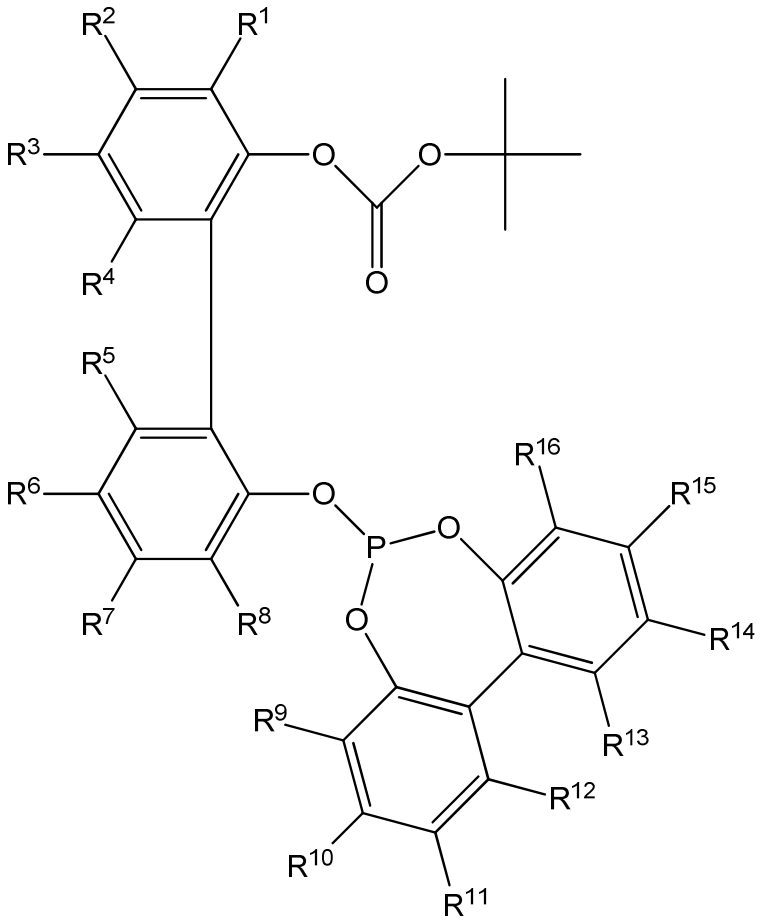
characterized in that

the one monophosphite ligand is metered in in such a way that the molar ratio of the sum total of all the monophosphite ligands to rhodium remains constant, taking account of ligand losses.

10. Process according to Claim 8 or 9,

characterized in that

the homogeneous catalyst system comprises exactly two different monophosphite ligands, the first monophosphite ligand being a compound of structural formula II, and the second monophosphite ligand being a compound of structural formula Ia, Ib or III:



Ia

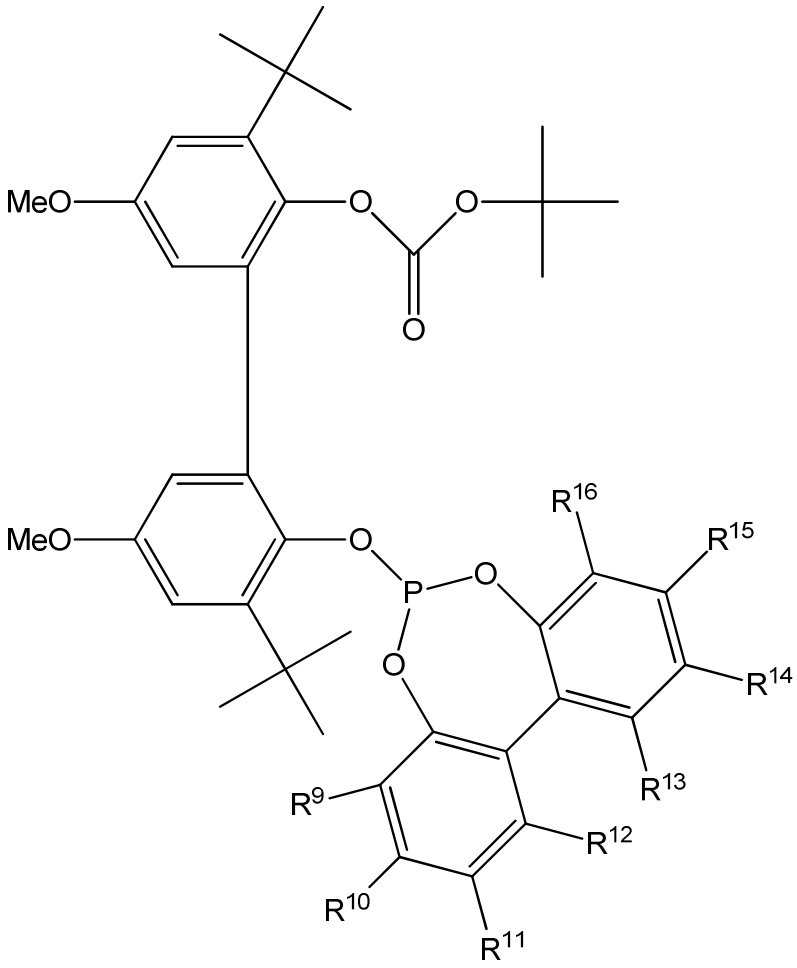
where, in Ia,

R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8 are each independently selected from:

-H, -(C_1-C_{12})-alkyl, -O-(C_1-C_{12})-alkyl, -O-(C_6-C_{20})-aryl, -(C_6-C_{20})-aryl, halogen, COO-(C_1-C_{12})-alkyl, CONH-(C_1-C_{12})-alkyl, -(C_6-C_{20})-aryl-CON[(C_1-C_{12})-alkyl]$_2$, -CO-(C_1-C_{12})-alkyl, -CO-(C_6-C_{20})-aryl, -COOH, -OH, -SO_3H, -SO_3Na, -NO_2, -CN, -NH_2, -N[(C_1-C_{12})-alkyl]$_2$;

where R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16} are each independently selected from:

-H, -(C_1-C_{12})-alkyl, -O-(C_1-C_{12})-alkyl, -O-(C_6-C_{20})-aryl, -(C_6-C_{20})-aryl, -halogen, -COO-(C_1-C_{12})-alkyl, -CONH-(C_1-C_{12})-alkyl, -(C_6-C_{20})-aryl-CON[(C_1-C_{12})-alkyl]$_2$, -CO-(C_1-C_{12})-alkyl, -CO-(C_6-C_{20})-aryl, -COOH, -OH, -SO_3H, -SO_3Na, -NO_2, -CN, -NH_2, -N[(C_1-C_{12})-alkyl]$_2$;



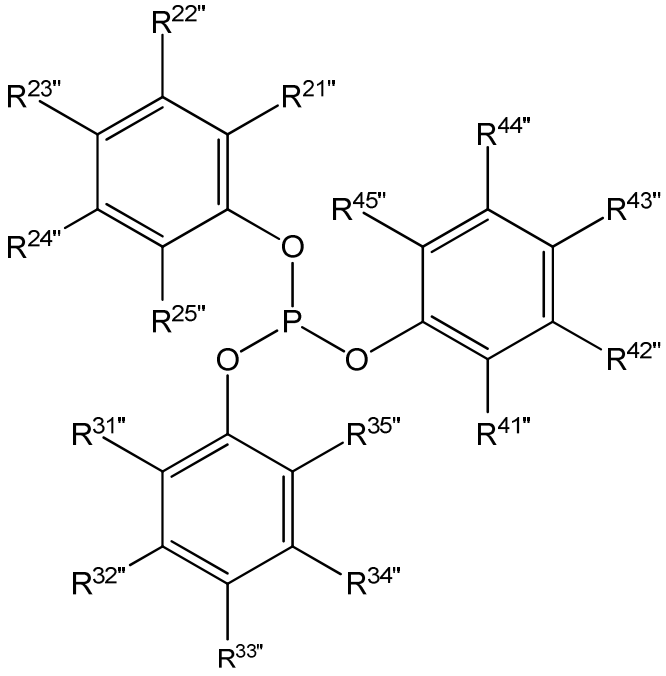
Ib

where, in Ib,

R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16} are each independently selected from:

-H, -(C_1-C_{12})-alkyl, -O-(C_1-C_{12})-alkyl, -O-(C_6-C_{20})-aryl, -(C_6-C_{20})-aryl, -halogen, -COO-(C_1-C_{12})-alkyl, -CONH-(C_1-C_{12})-alkyl, -(C_6-C_{20})-aryl-CON[(C_1-C_{12})-alkyl]$_2$, -CO-(C_1-C_{12})-

alkyl, -CO-(C_6-C_{20})-aryl, -COOH, -OH, -SO_3H, -SO_3Na, -NO_2, -CN, -NH_2, -N[(C_1-C_{12})-alkyl]$_2$;



II

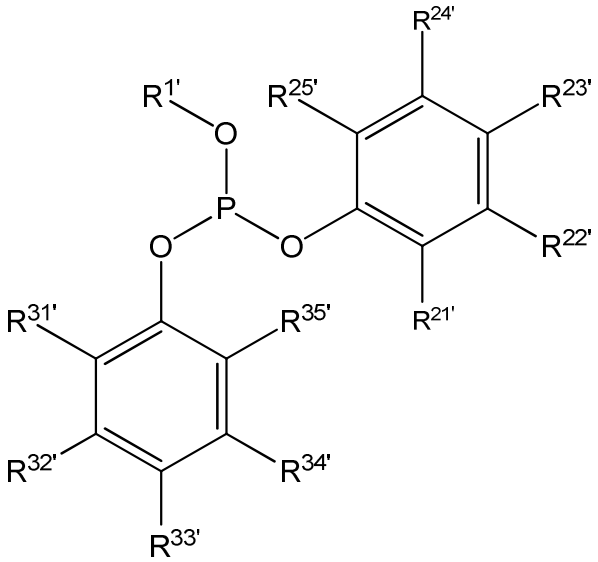
where, in II,

$R^{21'}$, $R^{22'}$, $R^{23'}$, $R^{24'}$, $R^{25'}$, $R^{31'}$, $R^{32'}$, $R^{33'}$, $R^{34'}$, $R^{35'}$, $R^{41'}$, $R^{42'}$, $R^{43'}$, $R^{44'}$, $R^{45'}$ are each independently selected from:

-H, -(C_1-C_{12})-alkyl, -O-(C_1-C_{12})-alkyl, -O-(C_6-C_{20})-aryl, -(C_6-C_{20})-aryl, -halogen, -COO-(C_1-C_{12})-alkyl, -CONH-(C_1-C_{12})-alkyl, -(C_6-C_{20})-aryl-CON[(C_1-C_{12})-alkyl]$_2$, -CO-(C_1-C_{12})-alkyl, -CO-(C_6-C_{20})-aryl, -COOH, -OH, -SO_3H, -SO_3Na, -NO_2, -CN, -NH_2, -N[(C_1-C_{12})-alkyl]$_2$.

Preferably, in II, $R^{21'}$, $R^{22'}$, $R^{23'}$, $R^{24'}$, $R^{25'}$, $R^{31'}$, $R^{32'}$, $R^{33'}$, $R^{34'}$, $R^{35'}$, $R^{41'}$, $R^{42'}$, $R^{43'}$, $R^{44'}$, $R^{45'}$ are each independently selected from:

-H, -(C_1-C_{12})-alkyl, -O-(C_1-C_{12})-alkyl, -O-(C_6-C_{20})-aryl, -(C_6-C_{20})-aryl.



III

where, in III,

$R^{1'}$ is selected from:

-(C_1-C_{12})-alkyl, -(C_3-C_{12})-cycloalkyl, and

$R^{21'}$, $R^{22'}$, $R^{23'}$, $R^{24'}$, $R^{25'}$, $R^{31'}$, $R^{32'}$, $R^{33'}$, $R^{34'}$, $R^{35'}$ are each independently selected from:

-H, -(C_1-C_{12})-alkyl, -O-(C_1-C_{12})-alkyl, -O-(C_6-C_{20})-aryl, -(C_6-C_{20})-aryl, -halogen, -COO-(C_1-C_{12})-alkyl, -CO-(C_1-C_{12})-alkyl, -CO-(C_6-C_{20})-aryl, -COOH, -OH.

Preferably, in III, $R^{21'}$, $R^{22'}$, $R^{23'}$, $R^{24'}$, $R^{25'}$, $R^{31'}$, $R^{32'}$, $R^{33'}$, $R^{34'}$, $R^{35'}$ are each independently selected from:

-H, -(C_1-C_{12})-alkyl, -O-(C_1-C_{12})-alkyl, -O-(C_6-C_{20})-aryl, -(C_6-C_{20})-aryl.