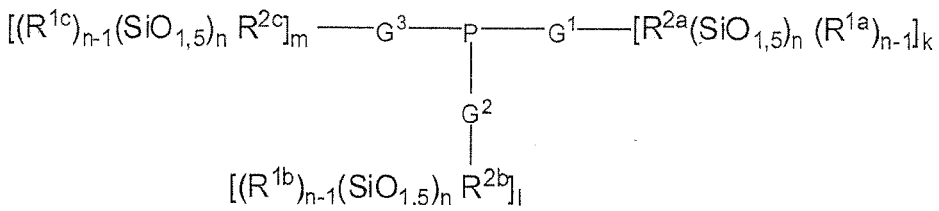
Claims

1. A~~n~~ catalytically active composition for continuous hydroformylation of olefin-containing mixtures, comprising an organic phosphorus-containing compound covalently bound to polyhedral oligomeric silsesquioxane derivatives of the formula 1



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wherein $(R^{1a,b,c})_{n-1}(SiO_{1.5})_nR^{2a,b,c}$ are polyhedral oligomeric silsesquioxane derivatives in which n = 8 and R^{1a}, R^{1b}, R^{1c} are identical and are each C_4-alkyl chains,
where R^{2a}, R^{2b}, R^{2c} are identical and are each C_2-alkyl chains,
where G1, G2, and G3 are identical and are each phenyl groups which are monovalently bound to phosphorus; and
at least one metal selected from group 8, 9 or 10 of the Periodic Table of the Elements, wherein said metal is rhodium.

~~2. A catalytically active composition containing at least one organic phosphorus-containing compound as claimed in claim 1 and at least one metal selected from group 8, 9 or 10 of the Periodic Table of the Elements.~~

~~3. The catalytically active composition as claimed in claim 2, characterized in that the metal is selected from group 9 of the Periodic Table of the Elements.~~

~~4. The catalytically active composition as claimed in claim 3, characterized in that the metal is rhodium.~~

52. A process for the continuous hydroformylation of olefin-containing mixtures, which comprises:
a) transferring a feed solution comprising an olefin-containing solution and optionally a solvent into a reaction part; and
b) introducing ~~contains a~~the catalytically active ~~mixture~~ composition as claimed in ~~any of~~ claims ~~2-4~~1 into said reaction part for carrying out the hydroformylation of said olefin-containing mixtures to form an aldehyde product.

63. The process for the hydroformylation of olefin-containing mixtures as claimed in claim 52, characterized in that the olefin-containing mixture contains olefins having from 3 to 20 carbon atoms.

74. The process for the hydroformylation of olefin-containing mixtures as claimed in claim 63, characterized in that the olefin-containing mixture is selected form the group consisting of propene, raffinate I, raffinate II, raffinate III.

85. The process for the hydroformylation of olefin-containing mixtures as claimed in claim 63, characterized in that the olefin-containing mixture contains 1-butene.

96. The process for the hydroformylation of olefin-containing mixtures as claimed in claim 63, characterized in that the olefin-containing mixture contains 1-octene.

107. The process for the hydroformylation of olefin-containing mixtures as claimed in any of claims 52 to 96, characterized in that the catalytically active composition is separated off from a stream containing the product by means of organic

nanofiltration without the use of thermal separation processes.

~~11~~8. A multiphase reaction mixture comprising:

a) an olefin-containing mixture as claimed in any of claims ~~6-9~~3-6,

b) a gas mixture containing carbon monoxide, hydrogen and

c) aldehydes,

characterized by the presence of a catalytically active composition as claimed in ~~any of~~ claims ~~2-4~~1.