**Claims**

1. Process for hydroformylating C2 to C8 olefins in a reaction zone using a heterogenized catalyst system, wherein

a gaseous feed mixture containing the C2 to C8 olefins is passed together with synthesis gas over a support composed of a porous ceramic material on which the catalyst system comprising a metal from group 8 or 9 of the Periodic Table of the Elements, at least one organic phosphorus-containing ligand, a stabilizer and optionally an ionic liquid is in heterogenized form; and

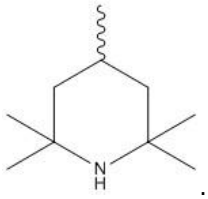
the support is in the form of a powder, in the form of a granular material or in the form of pellets and consists of a carbidic, nitridic or silicidic material or mixtures thereof, to which is applied a washcoat of the same or another ceramic material with respect to the ceramic material of the support,

wherein the organic phosphorus-containing ligand in the hydroformylation catalyst system has the general formula (VI)

$$R' - A - R'' - A - R''' \qquad (VI)$$

where R', R'' and R''' are each organic radicals, with the proviso that R’ and R’’’ are not identical, and each A is a bridging –O-P(-O)$_2$- group, where two of the three oxygen atoms -O- are each bonded to radical R’ and the radical R’’’, and

wherein the stabilizer is an organic amine compound containing at least one 2,2,6,6-tetramethylpiperidine unit of formula (I):




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2. Process according to Claim 1, wherein the nitridic ceramic is selected from silicon nitride, boron nitride, aluminium nitride and mixtures thereof; the carbidic ceramic is selected from silicon carbide, boron carbide, tungsten carbide or mixtures thereof; and the silicidic ceramic is molybdenum silicide.

3. Process according to Claim 2, wherein the support consists of a carbidic ceramic.

4. Process according to Claim 3, wherein the support consists of silicon carbide.

5. Process according to any of Claims 1 to 4, wherein the amount of the washcoat present on the support is ≤ 20% by weight, based on the total amount of support.

6. Process according to any of Claims 1 to 5, wherein the support has a median particle diameter (d50) of 0.1 mm to 7 mm.

7. Process according to any of Claims 1 to 6, wherein the hydroformylation is conducted at a temperature in the range from 65 to 200°C, preferably 75 to 175°C and more preferably 85 to 150°C.

8. Process according to any of Claims 1 to 7, wherein the pressure in the hydroformylation is not greater than 35 bar, preferably not greater than 30 bar, more preferably not greater than 25 bar.

9. Process according to any of Claims 1 to 8, wherein the catalyst system does not comprise any ionic liquid.