Claims

[Claim 1]. Catalyst system for olefin metathesis, the catalyst system comprising:

a) a first system zone comprising a layered double hydroxide and not containing any further catalytic active species or only containing further catalytic active species in such amounts not significantly influencing the catalytic properties of the first system zone; and

b) a second system zone comprising a metathesis catalyst;~~.~~

~~2. Catalyst system according to claim 1,~~ wherein the first system zone is placed immediately upstream with respect to the second system zone.

[Claim 2~~3~~]. Catalyst system according to claim 1~~ or 2~~, wherein the metathesis catalyst comprises a transition metal selected from Group VIA and VIIA of the Periodic Table of Elements supported on an inorganic support.

[Claim 3~~4~~]. Catalyst system according to any of the preceding claims, wherein the metathesis catalyst further comprises 0.1 to 60 percent by weight of zeolite, preferably 0.5 to 30 percent by weight, more preferably 1 to 20 percent by weight.

[Claim 4~~5~~]. Catalyst system according to any of the preceding claims, wherein the metathesis catalyst further comprises 0.1 to 80 percent by weight of a layered double hydroxide, preferably 0.5 to 50 percent by weight, more preferably 1 to 30 percent by weight.

[Claim 5~~6~~]. Catalyst system according to any of the preceding claims, wherein the metathesis catalyst further comprises a binder.

[Claim 6~~7~~]. Catalyst system according to any of the preceding claims, wherein the weight ratio of the layered double hydroxide comprised in the first system zone and the metathesis catalyst comprised in the second system zone (layered double hydroxide to metathesis catalyst ratio) is from 0.5:1 to 10:1 by weight, preferably from 1:1 to 5:1, even preferred 2:1 to 4:1.

[Claim 7~~8~~]. Catalyst system according to any of the claims ~~3~~ 2 to ~~7~~6, wherein the transition metal of the metathesis catalyst is selected from the group consisting of molybdenum, tungsten, and rhenium, and mixtures thereof.

[Claim 8~~9~~]. Catalyst system according to any of the claims ~~3~~ 2 to ~~8~~7, wherein the inorganic support of the metathesis catalyst is selected from the group consisting of silica, alumina, titania, zirconia, and mixtures thereof, preferably is silica.

[Claim 9~~10~~]. Catalyst system according to any of the claims 3~~4~~ to 8~~9~~, wherein the zeolite of the metathesis catalyst is selected from the group consisting of ZSM-5, X-zeolite, Y-zeolite, β-zeolite, MCM-22, ferrierite, and mixtures thereof, preferably from ZSM-5, Y-zeolite, and ferrierite.

[Claim 10~~1~~]. Catalyst system according to any of the preceding claims, wherein the layered double hydroxide comprised in the first system zone and/or the layered double hydroxide of the metathesis catalyst comprises a first metal selected from the group consisting of Li, Ca, Mg, Mn, Fe, Co, Ni, Cu, Zn, and mixtures thereof, preferably Ca, Mg, Zn, and mixtures thereof.

[Claim 11~~2~~]. Catalyst system according to any of the preceding claims, wherein the layered double hydroxide comprised in the first system zone and/or the layered double hydroxide of the metathesis catalyst comprises a second metal selected from the group consisting of Al, Ga, In, Mn, Fe, Co, Cr, Ni, V, Ti, Zr, Y, and mixtures thereof, preferably is Al.

[Claim 12~~3~~]. Catalyst system according to any of the preceding claims, wherein the layered double hydroxide comprised in the first system zone and/or the layered double hydroxide of the metathesis catalyst comprises an anion selected from the group consisting of chloride, bromide, carbonate, bicarbonate, hydrogen phosphate, dihydrogen phosphate, nitrite, borate, nitrate, sulfate, phosphate, hydroxide, fluoride, iodide, and mixtures thereof, preferably carbonate and/or nitrate.

[Claim 13~~4~~]. Olefin metathesis process comprising contacting a feed stream, the feed stream comprising an olefin, with the catalyst system according to any of the preceding claims.

[Claim 14~~5~~]. Olefin metathesis process according to claim 13~~4~~, wherein the feed stream comprises a linear olefin selected from the group consisting of C2 linear olefin, C3 linear olefin, C4 linear olefin, C5 linear olefin, C6 linear olefin, and mixtures thereof.