

Claims

1. Method for the isomerization of alpha-olefins comprising 10 to 20 carbon atoms to internal
5 olefins by using a silicon-aluminum mixed oxide composition as catalyst, consisting of:
 - (a) 75 bis 99.99% by weight of silicon dioxide (calculated as SiO_2); and
 - (b) 0.01 to 25% by weight of aluminum oxide (calculated as Al_2O_3).
2. The method according to claim 1, wherein the silicon-aluminum mixed oxide composition
10 has a BET surface area from 50 to 250 m^2/g , preferably 100 to 200 m^2/g .
3. The method according to claim 1, wherein the silicon-aluminum mixed oxide consists of:
 - (a) 85 to 99.99% by weight of silicon oxide (calculated as SiO_2); and
 - (b) 0.01 to 15% by weight of aluminum oxide (calculated as Al_2O_3).
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4. The method according to claim 1, wherein the silicon-aluminum mixed oxide is prepared by
flame hydrolysis.
5. The method according to claim 1, wherein the alpha-olefin comprises 14 to 16 carbon
20 atoms, preferably 14 carbon atoms, and mixtures thereof.
6. The method according to claim 1, wherein the olefin feedstock is an alpha-tetradecene
comprising at least 90% by weight of mono-olefinic linear alpha-olefins.
- 25 7. The method according to claim 1, comprising the steps of:
 - (a) providing the catalyst in a reaction zone, preferably in a fixed-bed reactor;
 - (b) inerting and tempering the reactor to the desired reaction temperature;
 - (c) continuously feeding the alpha-olefins first through a preheating zone and then
30 through the reaction zone, preferably from the bottom to the top, by controlling
temperature, pressure and weight hour space velocity (WHSV);
 - (d) optionally, in case of the use of slurry reactors, removing the catalyst from the
reaction mixture at the reaction outlet;
 - (e) cooling the reaction mixture after the reaction zone to a desired temperature for
further processing;
 - 35 (f) optionally collecting the isomerized product; and/or
 - (g) optionally removal of undesired by-products, e.g. by distillation, rectification,
vacuum-distillation or membrane separation.

8. The method according to claim 7, wherein the catalyst consists of shaped bodies prepared by a shaping process from silicon-aluminum mixed oxide composition, binders and temporary assistants.
- 5 9. The method according to claim 7, wherein the reaction temperature is in the range of 130 to 340°C, preferably in the range of 150 to 200°C, more preferably in the range of 160 to 190°C.
- 10 10. The method according to claim 7, wherein the weight hour space velocity (WHSV) is in the range of 3.0 to 5.5 h⁻¹, preferably in the range of 3.1 to 4.7 h⁻¹, most preferably in the range of 3.5 to 3,7 h⁻¹.
11. The method according to any one of the preceding claims, wherein the conversion rate of the alpha-olefin is 95% or higher.
- 15 12. The method according to any one of the preceding claims, wherein the amount of dimer is 5 mol% or lower.
- 20 13. Isomerized products of alpha-olefins comprising 10 to 20 carbon atoms, preferably 14 to 16 carbon atoms and most preferably 14 carbon atoms, and mixtures thereof, prepared by a method comprising the steps of:
- (a) providing the catalyst in a reaction zone, preferably in a fixed-bed reactor;
 - (b) inerting and tempering the reactor to the desired reaction temperature;
 - (c) continuously feeding the alpha-olefins first through a preheating zone and then through the reaction zone, preferably from the bottom to the top, by controlling temperature, pressure and weight hour space velocity (WHSV);
 - 25 (d) optionally, in case of the use of slurry reactors, removing the catalyst from the reaction mixture at the reaction outlet;
 - (e) cooling the reaction mixture after the reaction zone to a desired temperature for further processing;
 - 30 (f) optionally collecting the isomerized product; and/or
 - (g) optionally removal of undesired by-products, e.g. by distillation, rectification, vacuum-distillation or membrane separation.
14. Isomerized products according to claim 13, wherein the amount of dimer is 5 mol% or lower.
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