Claims

1. Method for the isomerization of alpha-olefins comprising 10 to 20 carbon atoms to internal 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 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).

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 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.

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 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;
   (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.

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. 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.

12. The method according to any one of the preceding claims, wherein the amount of dimer is 5 mol% or lower.

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);
(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;
(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,

wherein the amount of dimer is 5 mol% or lower.