even at elevated application temperatures.

Summary

In one aspect, the present invention is directed to a powdered catalyst material on titanium oxide basis, having a combined content of at least 90% by weight hydrated titanium oxide having general formula $TiO_{(2-x)}(OH)_{2x}$ with $0 < x \leq 1$, particularly $0.1 < x \leq 1$ (calculated as TiO_2) and silicon dioxide including hydrated precursors thereof (calculated as SiO_2), which has a specific surface area of > 300 m^2/g and an isoelectric point in the range from 4.5 - 5.9, wherein the TiO_2/SiO_2 weight ratio, determined respectively for TiO_2 and SiO_2 is at least 3, preferably at least 5, and less than 30, preferably less than 25, and the percentages by weight are relative to the total weight of the catalyst material after it has been dried at 105 °C for at least 2 hours. In another aspect, the present invention is directed to a process for preparing the powdered catalyst material on titanium oxide basis according to the present invention, in which: a. an aqueous suspension of titanium oxide hydrate particles having general formula $TiO_{(2-x)}(OH)_{2x}$ with $0 < x \leq 1$, particularly $0.1 < x \leq 1$, preferably with average particle sizes from 20 – 500 nm is reacted iwth an Si-containing compound while stirring vigorously, wherein the pH value can be maintained in the range from pH = 3 to 9, particularly 4 to 7 by the optional addition of an acid or alkaline solution, b. optionally the pH value is adjusted if necessary to the range between 4 and 7, c. the suspension obtained is filtered off, and d. the filter cake obtained is washed with water until the filtrate has a conductivity not more than 500 µS/cm. In still another aspect, the present invention refers to the use of the powdered catalyst material according to the present invention for preparing shaped bodies, particularly for catalytic application or as a support for catalytically active metals for application in the field of catalysis such as photocatalysis, Claus catalysis, Claus-Tail-Gas-treatment, SCR, Hydrotreating, Gas-to-Liquid-Process, Fischer-Tropsch-Process. In yet another aspect, the present invention refers to shaped bodies on a titanium oxide basis with content of powdered catalyst material according to the present invention with a specific surface area of > 80 m^2/g, particularly > 100 m^2/g, preferably > 120 m^2/g, particularly preferably > 150 m^2/g, most particularly preferably > 200 m^2/g.

Patent claims

1. Powdered catalyst material on titanium oxide basis, having a combined content of at least 90% by weight hydrated titanium oxide having general formula $TiO_{(2-x)}(OH)_{2x}$ with $0 < x \leq 1$, particularly $0.1 < x \leq 1$ (calculated as TiO_2) and silicon dioxide including hydrated precursors thereof (calculated as SiO_2), which has a specific surface area of > 300 m^2/g and an isoelectric point in the range from 4.5 - 5.9, wherein the TiO_2/SiO_2 weight ratio, determined respectively for TiO_2 and SiO_2 is at least 3, preferably at least 5, and less than 30, preferably less than 25, and the percentages by weight are relative to the total weight of the catalyst material after it has been dried at 105 °C for at least 2 hours.

2. Powdered catalyst material on titanium oxide basis according to claim 1, wherein the material has a photocatalytic chloroform decomposition rate of more than 0.3 $mmol/(h*m^2)$, preferably more than 0.5 $mmol/(h*m^2)$.

3. Powdered catalyst material on titanium oxide basis according to claim 1 or 2 having a total pore volume (N_2 desorption) of at least 0.3 cm^3/g, preferably more than 0.5 cm^3/g, particularly preferably more than 0.7 cm^3/g.

4. Powdered catalyst material on titanium oxide basis according to any one of claims 1 to 3, which has a specific surface area of at least 80 m^2/g, particularly at least 100 m^2/g, preferably at least 150 m^2/g after thermal treatment for 1 h at 500 °C under normal atmosphere.

5. Powdered catalyst material on titanium oxide basis according to any one of claims 1 to 4, wherein the isoelectric point is in the range from 4.7 to 5.9.

6. Powdered catalyst material on titanium oxide basis according to any one of claims 1 to 5, wherein the ratio of the height of the most intensive reflex of the anatase structure (reflex (101)) to the height of the most intensive reflex of the rutile structure (Reflex (110)) the height of the most intensive reflex of is at least 5:1, preferably at least 10:1 after deduction of a linear subsurface.

7. Process for preparing the powdered catalyst material on titanium oxide basis according to any one of claims 1 to 6, in which:
   a. An aqueous suspension of titanium oxide hydrate particles having general formula $TiO_{(2-x)}(OH)_{2x}$ with $0 < x \leq 1$, particularly $0.1 < x \leq 1$, preferably with average particle sizes from 20 – 500 nm is reacted iwth an Si-containing compound while stirring vigorously, wherein the pH value can be maintained in the range from pH = 3 to 9, particularly 4 to 7 by the optional addition of an acid or alkaline solution,
   b. Optionally the pH value is adjusted if necessary to the range between 4 and 7,
   c. The suspension obtained is filtered off, and
   d. The filter cake obtained is washed with water until the filtrate has a conductivity not more than 500 µS/cm.

8. Process according to claim 7, in which a Na_2SiO_3 solution with a SiO_2 concentration of 100 – 500 g SiO_2/l, preferably 200 – 400 g SiO_2/l, is used as the Si-containing compound.

9. Process according to claim 7 or 8, in which the pH value of the titanium oxide suspension is adjusted to pH values from 4.0 to 8.5, preferably 4.0 to 7.5, particularly preferably 4.0 to 7.0, by the optional addition of an acid or alkaline solution before the addition of the Si containing solution, and is preferably maintained at the previously set pH value during the addition of the Si containing solution.

10. Use of the powdered catalyst material according to any one of claims 1 to 6 for preparing shaped bodies, particularly for catalytic application or as a support for catalytically active metals for application in the field of catalysis such as photocatalysis, Claus catalysis, Claus-Tail-Gas-treatment, SCR, Hydrotreating, Gas-to-Liquid-Process, Fischer-Tropsch-Process.

11. Shaped bodies on a titanium oxide basis with content of powdered catalyst material according to any one of claims 1 to 6 with a specific surface area of > 80 m^2/g, particularly > 100 m^2/g, preferably > 120 m^2/g, particularly preferably > 150 m^2/g, most particularly preferably > 200 m^2/g.

12. Shaped bodies according to claim 11 with a pore volume (N_2, Total) of more than 0.2 cm^3/g, preferably more than 0.3 cm^3/g, particularly more than 0.5 cm^3/g, more preferably more than 0.55 cm^3/g, most particularly preferably more than 0.6 cm^3/g.

13. Shaped bodies according to claim 11 or 12 with a specific total surface area per volume of more than 100 000 m^2/l, preferably more than 120 000 m^2/l.

14. Use of the titanium oxide-containing shaped bodies according to any one of claims 11 to 13 as a catalyst or support for catalytically active metals for application in the field of catalysis such as photocatalysis, Claus catalysis, Claus-Tail-Gas-treatment, SCR, Hydrotreating, Gas-to-Liquid-Process, Fischer-Tropsch-Process.

15. Titanium oxide-containing shaped bodies according to any one of claims 11 to 13, having a content of 10 – 35 % by weight Mo, 0 to 6 % by weight Co and/or Ni, calculated as metal oxide (MoO_3, CoO and NiO), and the rest up to 100% by weight of titanium oxide with the general formula $TiO_{(2-x)}(OH)_{2x}$ wherein $0 < x \leq 1$, particularly $0.1 < x \leq 1$ and SiO_2, and which have a specific surface area of at least 80m^2/g, particularly at least 100 m^2/g and a pore volume of more than 0.25 cm^3/g preferably more than 0.27 cm^3/g, wherein the percentages by weight are relative to the total weight of the charged titanium oxide-containing shaped bodies.

16. Titanium oxide-containing shaped bodies according to claim 15 wherein the MoO_3 content is 18 – 30 % by weight.

17. Titanium oxide-containing shaped bodies according to claim 15 or 16, wherein the average pore size is 7 – 15 nm.