this disadvantage, pore formers are frequently added during the production of tableted catalysts in the prior art in order to achieve an increase in the pore volume. However, the addition of pore formers incurs the risk that the active catalyst material will be adversely affected by additives. Particularly when using organic pore formers which are burnt out from the catalyst in order to increase the pore volume, carbonization of the surface can take place. In addition, additives, whether organic or inorganic, always involve the risk that impurities and catalysts poisons will be introduced into the catalyst. A further disadvantage of burn-out materials as pore formers is the often very locally arising evolution of heat during burning-out. The active sites are often adversely affected thereby. In particular, sintering effects and a decrease in the dispersion of metal particles and thus a reduction in the activity of the catalysts can occur.

In view of this background, it was an object of the present invention to provide a process for producing tableted catalysts having an increased pore volume, without any pore formers being added.

A further object was to provide tableted catalysts which have a higher activity in hydrogenation reactions compared to catalysts of the prior art.

This object is achieved by the process of the invention and the catalysts obtainable thereby.

Summary of the invention

The ~~invention~~ present disclosure provides a process for producing a tableted shaped catalyst body, which comprises the following steps:

(a) combining of (i) at least one aqueous solution of copper compounds, aluminum compounds and optionally transition metal compounds and (ii) at least one aqueous carbonate-containing solution to form a precipitate, isolation of the precipitate, optionally washing of the isolated precipitate and drying of the isolated precipitate, and

(b) tableting of the dried precipitate obtained in step (a) to give the tableted shaped catalyst body.

In one aspect of the present invention, there is provided A process for producing a tableted shaped catalyst body, which comprises the following steps: (a) combining of (i) at least one aqueous solution of copper compounds, aluminum compounds and optionally transition metal compounds and (ii) at least one aqueous carbonate-containing solution to form a precipitate, isolation of the precipitate, optionally washing of the isolated precipitate and drying of the isolated precipitate to give a dried precipitate, and (b) tableting of the dried precipitate obtained in step (a), wherein step (b) comprises: (b1) calcination of dried precipitate obtained in step (a) at a temperature in the range from 250 to 900°C to give a calcined precipitate, (b2) mixing of dried precipitate obtained in step (a) with calcined precipitate obtained in step (b1) in a weight ratio of dried precipitate to calcined precipitate in the range from 2:98 to 98:2 to give a mixture, and (b3) tableting of the mixture obtained in step (b2).

Another aspect provides a shaped catalyst body obtained by a process disclosed herein.

Another aspect provides a tableted shaped catalyst body obtained by a process disclosed herein, containing copper, aluminum and optionally a transition metal selected from the group consisting of Zn, Si, Ti, Mn, Ni, Cr, Fe, Co, Mo, Ca, Ba, Ce and Zr and mixtures thereof, preferably Mn, Zn, Ce, Zr and mixtures thereof, wherein from 5 to 30%, more preferably from 10 to 25%, in particular from 15 to 25%, of the pore volume of the shaped catalyst body is formed by pores having a pore radius in the range from 500 to 2500 nm and/or from 40 to 90%, more preferably from 45 to 80%, in particular from 50 to 70%, of the pore volume of the shaped catalyst body is formed by pores having a pore radius in the range from 5 to 50 nm.

The ~~process~~ disclosure further provides a process in which part of the dried precipitate obtained in step (a) is calcined in a step (b1) and the calcined precipitate obtained from step (b1) is subsequently, in a step (b2), mixed with part of the dried precipitate obtained in step (a) and the resulting mixture is tableted in a step (b3).

The ~~invention~~ disclosure also provides a process in which the tableted shaped body obtained in step (b) or in step (b3) is after-calcined in a step (c).

Furthermore, the ~~invention~~ disclosure provides Cu-Al catalysts which can be produced by the processes ~~of the invention~~disclosed herein.

Another aspect provides the suse of the a shaped catalyst body disclosed herein for hydrogenation of organic compounds.

The ~~invention~~ disclosure additionally provides for the use of Cu-Al catalysts ~~according to the~~

~~inventiondisclosed~~ herein for the hydrogenation of organic compounds, in particular compounds containing a carbonyl function.

Detailed description of the invention

In a first embodiment, the process of the invention comprises the following steps for producing a tableted shaped catalyst body:

CLAIMS

1. A process for producing a tableted shaped catalyst body, which comprises the following steps:

(a) combining of (i) at least one aqueous solution of copper compounds, aluminum compounds and optionally transition metal compounds and (ii) at least one aqueous carbonate-containing solution to form a precipitate, isolation of the precipitate, optionally washing of the isolated precipitate and drying of the isolated precipitate to give a dried precipitate, and

(b) tableting of the dried precipitate obtained in step (a).

~~2. The process according to claim 1~~, wherein step (b) comprises:

(b1) calcination of dried precipitate obtained in step (a) at a temperature in the range from 250 to 900°C~~, preferably at a temperature in the range from 300 to 750°C, particularly preferably from 600 to 750°C,~~ to give a calcined precipitate,

(b2) mixing of dried precipitate obtained in step (a) with calcined precipitate obtained in step (b1) in a weight ratio of dried precipitate to calcined precipitate in the range from 2:98 to 98:2~~, preferably in the range from 10:90 to 90:10, more preferably in the range from 15:85 to 85:15 and particularly preferably in the range from 20:80 to 50:50,~~ to give a mixture, and

(b3) tableting of the mixture obtained in step (b2).

2. The process according to claim 1, wherein in step (b1) calcination of dried precipitate obtained in step

(a) is carried out at a temperature in the range from 300 to 750°C, preferably from 600 to 750°C,
and/or wherein in step (b2) mixing of dried precipitate obtained in step (a) with calcined precipitate obtained in step (b1) is carried out in a weight ratio of dried precipitate to calcined precipitate in the range from 10:90 to 90:10, preferably in the range from 15:85 to 85:15 and particularly preferably in the range from 20:80 to 80:20.

3. The process according to claim 1 or 2, wherein a lubricant is added to the uncalcined precipitate

23. The shaped catalyst body according to claim 20, 21 or 22 which has a bimodal pore radius distribution which preferably has a first maximum in the range from 10 to 30 nm, preferably in the range from 15 to 25 nm and in particular at about 20 nm, and/or a second maximum in the range from 500 to 2500 nm, preferably in the range from 700 to 2000 nm and in particular in the range from 800 to 1000 nm.

24. The shaped catalyst body according to claim 23, wherein from 5 to 30%, more preferably from 10 to 25%, in particular from 15 to 25%, of the pore volume of the shaped catalyst body is formed by pores having a pore radius in the range from 500 to 2500 nm and/or from 40 to 90%, more preferably from 45 to 80%, in particular from 50 to 70%, of the pore volume of the shaped catalyst body is formed by pores having a pore radius in the range from 5 to 50 nm.

25. A tableted shaped catalyst body obtained by a process according to any of claims 1 to 19, containing copper, aluminum and optionally a transition metal selected from the group consisting of Zn, Si, Ti, Mn, Ni, Cr, Fe, Co, Mo, Ca, Ba, Ce and Zr and mixtures thereof, preferably Mn, Zn, Ce, Zr and mixtures thereof,

wherein from 5 to 30%, more preferably from 10 to 25%, in particular from 15 to 25%, of the pore volume of the shaped catalyst body is formed by pores having a pore radius in the range from 500 to 2500 nm and/or from 40 to 90%, more preferably from 45 to 80%, in particular from 50 to 70%, of the pore volume of the shaped catalyst body is formed by pores having a pore radius in the range from 5 to 50 nm.

26. The use of the shaped catalyst body according to any of claims 20 to 25 for the hydrogenation of organic compounds.