Another aspect provides a tableted shaped catalyst body obtained by a process disclosed herein, containing copper, aluminum and 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 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 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 disclosure provides Cu-Al catalysts which can be produced by the processes disclosed herein.

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

The disclosure additionally provides for the use of Cu-Al catalysts

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

Yet another aspect provides a reduced shaped catalyst body which has been obtained by a process described herein, and has a pore volume of from 0.20 to 0.80 cm^3/g, preferably from 0.22 to 0.70 cm^3/g, particularly preferably from 0.25 to 0.35 cm^3/g, ~~and~~ which contains Cu(0) in a proportion in the range from 5 to 70% by weight, preferably in the range from 10 to 70% by weight, particularly preferably in the range from 20 to 50% by weight, based on the shaped catalyst body, and 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 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.

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:

aluminum sulfate, aluminum halides and mixtures thereof and is preferably selected from the group consisting of aluminum nitrate, aluminum hydroxide, aluminum oxide hydrate, aluminum chloride, sodium aluminate, aluminum oxide and mixtures thereof.

18. The process according to any of the preceding claims, wherein the transition metal compound is preferably selected from among compounds of Zn, Ti, Mn, Ni, Cr, Fe, Co, Mo, Ce and Zr and mixtures thereof, preferably from among compounds of Mn, Zn, Ce, Zr and mixtures thereof and in particular from among compounds of Mn.

19. The process according to any of the preceding claims, wherein the carbonate-containing solution is obtainable using at least one alkali metal carbonate, alkaline earth metal carbonate and/or ammonium carbonate and/or at least one alkali metal hydrogen carbonate, alkaline earth metal hydrogen carbonate and/or ammonium hydrogen carbonate, preferably using sodium carbonate and/or sodium hydrogen carbonate.

20. A reduced shaped catalyst body which has been obtained by a process according to any of claims 9 to 19 and has a pore volume of from 0.20 to 0.80 cm^3/g, preferably from 0.22 to 0.70 cm^3/g, particularly preferably from 0.25 to 0.35 cm^3/g, ~~and~~

which contains Cu(0) in a proportion in the range from 5 to 70% by weight, preferably in the range from 10 to 70% by weight, particularly preferably in the range from 20 to 50% by weight, based on the shaped catalyst body, and

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 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.

21. The shaped catalyst body according to claim 20 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.

~~22. The shaped catalyst body according to claim 21, 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.~~

~~23~~22. A tableted shaped catalyst body obtained by a process according to any of claims 1 to 19, containing copper, aluminum and 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.

~~24~~23. The use of the shaped catalyst body according to any of claims 20 to ~~23~~22 for the hydrogenation of organic compounds.

~~25~~24. The use according to claim ~~24~~ 23 for hydrogenation, wherein the organic compounds have at least one carbonyl group.

~~26~~25. The use according to claim ~~24~~ 23 or ~~25~~ 24 for the hydrogenation of aldehydes, ketones or monocarboxylic, dicarboxylic and polycarboxylic acids and/or esters thereof.