CLAIMS

1. A method for the catalytic conversion of a substance mixture containing glycerol to propanols in a fixed-bed reactor (2), wherein substrates of the catalyst comprise inorganic materials and/or metal oxides, characterised in that the substrates comprise a pore diameter at the surface of between 10 and 25 angstroms, preferably between 12 and 20 angstroms, particularly preferably of 15 angstroms, the catalyst comprising silicotungstic acid or phosphotungstic acid.

2. The method according to claim 1, characterised in that the substrates are extrudate pellets and preferably ceramic.

3. The method according to either of claims 1 to 2, characterised in that the reaction of the substance mixture containing glycerol takes place continuously in the fixed-bed reactor (2), which is preferably single-stage.

4. The method according to any one of claims 1 to 3, characterised in that mixed oxides of silicon, tungsten, zirconium and/or aluminium, preferably zirconium dioxide, aluminosilicate zeolites and/or aluminophosphate zeolites, preferably VFI zeolites and/or VPI-5 zeolites, dealuminated USY zeolites and/or aluminium dioxide are used as substrate of the catalyst, the catalyst preferably comprising a platinum doping.

5. The method according to any one of the preceding claims, characterised in that the substance mixture containing glycerol is crude glycerol, technical glycerol or purified glycerol.

6. The method according to any one of the preceding claims, characterised in that the method comprises one or more of the following steps:

removing the substance mixture containing glycerol from a storage container (3),

filtering the substance mixture containing glycerol, preferably with undissolved solids and/or diluted accompanying substances contained therein being removed, and/or

mixing the substance mixture containing glycerol with water in the mixer (5), the concentration of the glycerol preferably being adjusted to between 5 and 80 percent, particularly preferably to between 10 and 60 percent, even more preferably to between 15 and 50 percent.

7. The method according to any one of the preceding claims, characterised in that the method comprises one or more of the following steps:

heating the substance mixture containing glycerol with a heat exchanger (6), preferably an economiser,

adding hydrogen to the substance mixture containing glycerol, preferably in a static mixer (7),

returning the heat of the substance mixture reacted in the fixed-bed reactor (2) to the heat exchanger (6) for heat transfer to the substance mixture containing glycerol before the reaction, so that the method is adiabatic.

8. The method according to any one of the preceding claims, characterised in that hydrogen is recovered from the substance mixture reacted in the fixed-bed reactor (2) via a separator device (9), the recovered hydrogen preferably being recompressed subsequently in a compressor (10) and added to fresh hydrogen, the hydrogen mixture being used particularly preferably in the method at an earlier point, the recovered hydrogen even more preferably having a proportion of between 50 and 99 percent, preferably between 70 and 97 percent, of the total hydrogen used in the method.

9. The method according to any one of the preceding claims, characterised in that

propanols, preferably both 1-propanol and 2-propanol, are obtained from the substance mixture reacted in the fixed-bed reactor (2), preferably by first removing water from the substance mixture reacted in the fixed-bed reactor (2) via a treatment cascade (11) and obtaining pure propanols, the separated process water being added to a fresh water in a water mixer (12) and the water mixture being used particularly preferably in the method at an earlier point, particularly for mixing in the mixer (5), and even more preferably the recovered process water having a proportion of between 80 and 100 percent, preferably between 90 and 100 percent of the total water used in the method and/or

longer-chain hydrocarbons are built up, preferably oligomerised, from the substance mixture reacted in the fixed-bed reactor (2).

10. The method according to any one of the preceding claims, characterised in that the reaction takes place in the fixed-bed reactor (2) at a temperature between 150 and 300 °C, preferably

between 190 and 250 °C, particularly preferably between 210 and 230 °C.

11. The method according to any one of the preceding claims, characterised in that the reaction takes place in the fixed-bed reactor (2) at a pressure of between 10 and 100 bar, preferably between 15 and 75 bar, particularly preferably between 25 and 50 bar.

12. A device (1) for the catalytic conversion of a substance mixture containing glycerol, preferably crude glycerol, to propanols in a fixed-bed reactor (2), wherein the device comprises a catalyst and substrates of the catalyst comprise inorganic materials and/or metal oxides, characterised in that the substrates comprise a pore diameter at the surface of between 10 and 25 angstroms, preferably between 12 and 20 angstroms, particularly preferably substantially of 15 angstroms, the substrates preferably being extrudate pellets and preferably being ceramic,

the catalyst comprising silicotungstic acid or phosphotungstic acid.

13. The device (1) according to claim 12, characterised in that the substrates of the catalyst comprise mixed oxides of silicon, tungsten, zirconium and/or aluminium, preferably zirconium dioxide, aluminosilicate zeolites and/or aluminophosphate zeolites, preferably VFI zeolites and/or VPI-5 zeolites, dealuminated USY zeolites and/or aluminium dioxide and preferably a platinum doping, the fixed-bed reactor (2) preferably being suitable for continuous operation.

14. The device (1) according to either of claims 12 or 13, characterised in that the device comprises:

a storage container (3) for the substance mixture containing glycerol,

a filter device (4) for removing undissolved solids and/or undesirable accompanying substances contained in the substance mixture containing glycerol,

a first mixer (5) for diluting the substance mixture containing glycerol with water,

a heat exchanger (6), preferably an economiser, for heating the substance mixture containing glycerol,

a preferably static second mixer (7) for adding hydrogen to the substance mixture containing glycerol,

a line (8) for returning the substance mixture reacted in the fixed-bed reactor to the heat exchanger,

a separating device (9) for recovering hydrogen from the substance mixture reacted in the fixed-bed reactor (2) and preferably a compressor (10) for compressing the recovered hydrogen, and/or

a treatment cascade (11) for obtaining the pure propanol fraction and preferably for recovering the process water from the substance mixture reacted in the fixed-bed reactor (2) for mixing with fresh water in the water mixer (12), the water mixture obtained in this way preferably being fed to the mixer (5).

15. A catalyst for the catalytic conversion of a substance mixture containing glycerol to propanols in a fixed-bed reactor (2), wherein substrates of the catalyst comprise inorganic materials and/or metal oxides, characterised in that the substrates comprise a pore diameter at the surface of between 10 and 25 angstroms, preferably between 12 and 20 angstroms, particularly preferably substantially of 15 angstroms,

the catalyst comprising silicotungstic acid or phosphotungstic acid.

16. The catalyst according to claim 15, characterised in that the substrates are extrudate pellets and are preferably ceramic, wherein

the substrates of the catalyst preferably comprise mixed oxides of silicon, tungsten, zirconium and/or aluminium, preferably zirconium dioxide, aluminosilicate zeolites and/or aluminophosphate zeolites, preferably VFI zeolites and/or VPI-5 zeolites, dealuminated USY zeolites and/or aluminium dioxide and preferably a platinum doping and/or

the catalyst is suitable for continuous operation of the fixed-bed reactor (2).

17. A method for producing the catalyst according to claim 15 or 16 , wherein substrates of the catalyst comprise inorganic materials and/or metal oxides, characterised in that base materials for the production of the substrates of the catalyst comprise a pore diameter at the surface of between 10 and 25 angstroms, preferably between 12 and 20 angstroms, particularly preferably substantially of 15 angstroms, and in that the substrate is provided with silicotungstic acid or phosphotungstic acid.

18. The method according to claim 17, characterised in that mixed oxides of silicon, tungsten, zirconium and/or aluminium, preferably zirconium dioxide, aluminosilicate and/or aluminophosphate zeolites, preferably VFI zeolites and/or VPI-5 zeolites, and/or aluminium dioxide are used as base materials for the substrates.

19. A method for producing the catalyst according to claim 15 or 16, wherein substrates of the catalyst comprise inorganic materials and/or metal oxides, characterised in that the base material for production of the substrates of the catalyst comprises USY zeolites, the USY zeolites being dealuminated so that the substrates of the catalyst comprise a pore diameter at the surface of between 10 and 25 angstroms, preferably between 12 and 20 angstroms, particularly preferably substantially of 15 angstroms, and in that the substrate is provided with silicotungstic acid or phosphotungstic acid.

20. The method according to any one of claims 17 to 19, characterised in that the production of the catalyst comprises one or more of the following steps:

incorporating organic binders, which are subsequently burnt out without residue, the organic binder preferably being incorporated into the base materials, which are preferably in powder form, and these then being homogeneously kneaded to form a base compound, preferably a dispersion, particularly preferably a nano-dispersion, of polymers, preferably polystyrene, and water being used as the organic binders, preferably the polymer content of the dispersion being less than 5 wt.%, particularly preferably less than 1 wt.%,

extruding the pellets, preferably under a pressure of between 5 and 120 bar, particularly preferably between 20 and 100 bar, even more preferably between 40 and 80 bar, to a diameter of between 1 and 8 mm, preferably between 2 and 6 mm, particularly preferably between 3 and 4 mm, and/or a length of between 0.25 and 4 cm, preferably between 0.4 and 3 cm, particularly preferably between 0.5 and 2 cm, and preferably conditioning the pellets at a temperature between 400 and 1000 °C, preferably between 500 and 750 °C, even more preferably at 600 °C for a period of time between 24 and 168 h, preferably between 36 and 96 h, even more preferably for 48 h,

impregnating the extruded substrate with platinum, per 1000 g of substrate material, preferably with between 0.5 and 3 litres, preferably 1.5 litres, of aqueous solution of between 15 and 300 mmol/l, preferably 75 mmol/l of $H_2PtCl_6 \cdot 6H_2O$, preferably followed by drying at between 60 and 120°C, preferably 90 °C, and preferably followed by calcination for between 6 and 24 hours, preferably for 12 hours at between 250 and 450 °C, preferably 400 °C, and/or

impregnating the platinum-doped substrate with between 0.5 and 3 litres, preferably 1.5 litres between 25 and 100 mmol/l, preferably 50 mmol/l of aqueous silicotungstic acid for surface fixation of the dehydration catalyst, preferably with subsequent drying at between 60 and 120 °C, preferably 90 °C, and preferably with subsequent calcination at between 250 and 450 °C, preferably 350 °C, for between 6 and 24 hours, preferably 12 hours.