CLAIMS

1. Precursor suitable for the production of an electrode for gas evolution in electrolytic processes, comprising a ruthenium nitrate dissolved in a chloride-free aqueous solution containing acetic acid at a concentration higher than 30% by weight.

2. The precursor according to claim 1 wherein the concentration of said acetic acid is 35 to 50% by weight.

3. The precursor according to claim 1 or 2 wherein said ruthenium nitrate is ruthenium nitrosyl nitrate at a concentration of 60 to 200 g/l.

4. The precursor according to any one of claims 1 to 3 wherein said aqueous solution comprises at least one nitrate of a rare earth.

5. The precursor according to claim 4 wherein said at least one nitrate of a rare earth is $Pr(NO_3)_2$ at a concentration of 15 to 50 g/l.

6. The precursor according to claim 4 or 5 wherein said aqueous solution comprises palladium nitrate at a concentration of 5 to 30 g/l.

7. Method for the preparation of the precursor according to any one of claims 1 to 3, comprising the preparation of a ruthenium solution by dissolution of said ruthenium in glacial acetic acid under stirring, with optional addition of nitric acid, followed by a dilution with an aqueous solution of acetic acid at a concentration of 5 to 20% by weight.

8. Method for the preparation of the precursor according to claim 4 or 5, comprising the following simultaneous or sequential steps:

- preparation of a ruthenium solution by dissolution of said ruthenium nitrate in glacial acetic acid under stirring, with optional addition of nitric acid;
- preparation of a rare earth solution by dissolution of said at least one nitrate of a rare earth in glacial acetic acid under stirring, with optional addition of nitric acid;
- mixing under optional stirring of said ruthenium solution with said rare earth solution;
- subsequent optional dilution with an aqueous solution of acetic acid at a concentration of 5 to 20% by weight.

9. The method according to claim 8 comprising a dilution step of said ruthenium solution and/or said rare earth solution with an aqueous solution of acetic acid at a concentration of 5 to 20% by weight before said mixing step.

10. Method for manufacturing an electrode for gas evolution in electrolytic processes, comprising the application of the precursor according to one of claims 1 to 6 to a metal substrate in multiple coats, with thermal decomposition at 400-600°C for a time of no less than 2 minutes after each coat.

11. The method according to claim 10 wherein said metal substrate is a mesh or a punched or expanded sheet made of nickel.

12. Electrode for cathodic hydrogen evolution in electrolytic processes comprising a metal substrate coated with a catalytic layer containing 4 to 40 g/m² of ruthenium in form of metal or oxide obtainable by the method according to any one of claims 9 to 11.

13. The electrode according to claim 12 wherein said catalytic layer further contains 1 to 10 g/m² of rare earths in form of oxides and optionally 0.4 to 4 g/m² of palladium in form of oxide or metal.

14. The electrode according to claim 13 wherein said rare earths comprise praseodymium oxide.

15. The electrode according to one of claims 12 to 14 wherein said metal substrate is made of nickel or nickel alloy.

CLAIMS

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2. The precursor according to claim 1 wherein the concentration of said acetic acid is 35 to 50% by weight.

3. The precursor according to claim 1 or 2 wherein said ruthenium nitrate is ruthenium nitrosyl nitrate at a concentration of 60 to 200 g/l.

4. The precursor according to any one of claims 1 to 3 wherein said aqueous solution comprises at least one nitrate of a rare earth.

5. The precursor according to claim 4 wherein said at least one nitrate of a rare earth is $Pr(NO_3)_2$ at a concentration of 15 to 50 g/l.

6. The precursor according to claim 4 or 5 wherein said aqueous solution comprises palladium nitrate at a concentration of 5 to 30 g/l.

7. Method for the preparation of the precursor according to any one of claims 1 to 3, comprising the preparation of a ruthenium solution by dissolution of said ruthenium in glacial acetic acid under stirring, with optional addition of nitric acid, followed by a dilution with an aqueous solution of acetic acid at a concentration of 5 to 20% by weight.

8. Method for the preparation of the precursor according to claim 4 or 5, comprising the following simultaneous or sequential steps:

- preparation of a ruthenium solution by dissolution of said ruthenium nitrate in glacial acetic acid under stirring, with optional addition of nitric acid;
- preparation of a rare earth solution by dissolution of said at least one nitrate of a rare earth in glacial acetic acid under stirring, with optional addition of nitric acid;
- mixing under optional stirring of said ruthenium solution with said rare earth solution;
- subsequent optional dilution with an aqueous solution of acetic acid at a concentration of 5 to 20% by weight.

9. The method according to claim 8 comprising a dilution step of said ruthenium solution and/or said rare earth solution with an aqueous solution of acetic acid at a concentration of 5 to 20% by weight before said mixing step.

10. Method for manufacturing an electrode for gas evolution in electrolytic processes, comprising the application of the precursor according to one of claims 1 to 6 to a metal substrate in multiple coats, with thermal decomposition at 400-600°C for a time of no less than 2 minutes after each coat.

11. The method according to claim 10 wherein said metal substrate is a mesh or a punched or expanded sheet made of nickel.

12. Electrode for cathodic hydrogen evolution in electrolytic processes comprising a metal substrate coated with a catalytic layer containing 4 to 40 g/m² of ruthenium in form of metal or oxide obtainable by the method according to any one of claims 9 to 11.

13. The electrode according to claim 12 wherein said catalytic layer further contains 1 to 10 g/m² of rare earths in form of oxides and optionally 0.4 to 4 g/m² of palladium in form of oxide or metal.

14. The electrode according to claim 13 wherein said rare earths comprise praseodymium oxide.

15. The electrode according to one of claims 12 to 14 wherein said metal substrate is made of nickel or nickel alloy.