

30 minutes. The treated monolith was dried at 120° C. and calcined for 10 hours at 538° C. The entire process was repeated. Next the coated monolith was dipped for one hour into an aqueous solution of ruthenium chloride and chloroplatinic acid containing 0.014 gram of ruthenium per milliliter and 0.017 gram of platinum per milliliter. The monolith was drained thoroughly, after which ammonia gas was passed thereover for 30 minutes. The catalyst was then reduced in hydrogen for four hours at 538° C. and atmospheric conditions. Finally, the catalyst was calcined for ten hours at 1,000° C. The product had a weight gain of 26.6 weight per cent, a surface area of 11.5 square meters per gram and contained 3.5 weight per cent barium, 0.20 weight per cent ruthenium and 0.27 weight per cent platinum.

EXAMPLE XX

This Example demonstrates that a fine powder can be suspended in the alumina sol and then added to a monolith. 9.31 grams of a composition containing barium, ruthenium, platinum and oxygen was ground and passed through a 230-mesh screen. It was dispersed with stirring into 194.01 grams of alumina sol prepared as in Example I. A monolith was dipped into the mixture with agitation for 5 minutes. The coated monolith was drained thoroughly, after which ammonia gas was passed thereover at atmospheric conditions for 30 minutes. The treated monolith was dried at 120° C. and calcined for 10 hours at 538° C. The entire process was repeated. The resultant coated monolith had a weight gain of 16.6 weight per cent, a surface area of 11.4 square meters per gram and contained 0.56 weight per cent barium, 0.22 weight per cent ruthenium and 0.06 weight per cent platinum.

The catalysts so obtained can be used for many purposes, for example, to convert nitrogen oxides in an automobile exhaust gas to nitrogen.

Obviously, many modifications and variations of the invention, as hereinabove set forth, can be made without departing from the spirit and scope thereof and, therefore, only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. A process for applying a high surface area coating to catalyst supports having a low surface area which comprises coating said support with an alumina sol mixture consisting essentially of about 2.6 to about 19 per cent by weight of aluminum, about 1.3 to about 25 per cent by weight of chlorine, about 36 to about 95.7 per cent by weight of water and about 0.4 to about 20 per cent by weight of an amine or consisting essentially of about 2.6 to about 16 per cent by weight of aluminum, about 2.2 to about 37 per cent by weight of nitrate, about 30 to about 94.8 per cent by weight of water and about 0.4 to about 17 per cent by weight of an amine and then calcining said coated support.

2. The process of claim 1 wherein said amine is hexamethylenetetramine.

3. The process of claim 1 wherein said mixture is obtained by heating aluminum metal in an aqueous solution of an aluminum salt and thereafter adding hexa-

methylenetetramine to the resulting sol.

4. The process of claim 3 wherein said aluminum salt is $AlCl_3$.

5. The process of claim 3 wherein said aluminum salt is $Al(NO_3)_3$.

6. The process of claim 1 wherein said sol additionally contains at least one metal compound.

7. The process of claim 6 wherein said metal compound is a ruthenium compound.

8. The process of claim 6 wherein said metal compound is a platinum compound.

9. The process of claim 6 wherein said metal compound is a barium compound.

10. The process of claim 1 wherein said calcination is effected at a temperature of about 260° to about 1,000° C.

11. The process of claim 1 wherein said catalyst support is a ceramic support.

12. The process of claim 11 wherein said support is composed of a magnesium aluminum silicate.

13. The process of claim 1 wherein the calcined support is further coated with a metal compound and the treated support is subjected to additional calcination.

14. The process of claim 13 wherein said metal compound is a ruthenium compound.

15. A process for applying a high surface area coating to catalyst supports having a low surface area which comprises coating said support with an alumina sol mixture consisting of about 2.6 to about 19 per cent by weight of aluminum, about 1.3 to about 25 per cent by weight of chlorine and about 56 to about 96.1 per cent by weight of water, further coating with ammonia or an amine in an amount to increase significantly the surface area of said support and then calcining the coated support.

16. The process of claim 15 wherein said amine is diethylamine.

17. The process of claim 15 wherein said amine is isopropylamine.

18. The process of claim 15 wherein said amine is triethylamine.

19. The process of claim 15 wherein said amine is pyridine.

20. The process of claim 15 wherein said amine is diethanolamine.

21. The process of claim 15 wherein the catalyst support is coated with said alumina sol and then such coated support is contacted with a gaseous amine prior to calcination.

22. The process of claim 15 wherein the catalyst support is coated with said alumina sol and then such coated support is contacted with ammonia prior to calcination.

23. The process of claim 15 wherein the catalyst support is coated with said alumina sol and then such coated support is contacted with an inert gas carrying an amine prior to calcination.

24. The process of claim 23 in which said amine is diethylamine.

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