EXAMPLE XI

To the corrugated-type alpha-alumina block of Example I, 26.2 g. of alumina carrier was applied, using a similar procedure to that used in Example I. Such block was cut in half to give 2 blocks, approximately 4" by 3" with 3" length passages, each having about 13 g. of alumina deposited thereon. One of these blocks was treated with tetraamineplatinum (II) hydroxide.

40 ml. of aqueous tetraamineplatinum (II) hydroxide, containing 37.2 g. of Pt per liter of solution (equivalent to 1.5 g. Pt) was diluted with 70 ml. of deionized water. The solution was sprayed into the passages of the indicated corrugated block, first spraying from one side of the block with half the solution and then spraying from the other side of the block with the other half of the solution to effect uniform distribution of the Pt. Any solution which drained from the block was recovered and reapplied. After all of the 110 ml. were deposited on the block, it was dried thoroughly at 110° C. and then heated at 400° C. for one hour. The block was then cooled, sprayed in the same manner with an additional 110 ml. of tetraamineplatinum (II) hydroxide (containing about 1.5 g. of Pt), dried thoroughly at 110° C. and heated at 400° C. for one hour, and finally cooled. A total of about 3 g. Pt were deposited on the block which had been lined with 13 g. of alumina.

EXAMPLE XII

Hydrated alumina analyzing 2% amorphous hydrous alumina, 18% boehmite, 44% bayerite, 28% nordstrandite and 8% gibbsite, was drum dried and calcined at 340° C. for six hours to yield a composition of 86% gamma alumina and 14% boehmite. Two pounds of such drum dried alumina was added to a pellet mill with 910 mls. of deionized water and 20 ml. of concentrated HCl. The mixture was milled for approximately 18 hours at about 80 to 112 r.p.m. to obtain a thixotropic slip. To 1500 grams of the thixotropic slip were added 63.7 grams of a 40% Pt concentrate of chloroplantinic acid dissolved in 33.0 ml. of deionized water and an additional 26.0 ml. of deionized water to yield a slip having a solids content containing 5% Pt and 95% alumina. The solids were calculated to be 31.4% of the slip.

An alpha-alumina corrugated-type block as defined above and approximately 6" by 4" by 3" passage length and having seven corrugations/linear inch throughout the face of the 6" length side, weighed 865 grams. The block was made from essentially crystalline alpha-alumina having typically a surface area (total) of 0.6 $m.^2/g.$, a porosity of 0.20 cc./g. and a macropore distribution such that 5% of the pore volume is in pores of over 20,000 A. and less than 2% of the pore volume is in pores of less than 2,000 A. The block was sumberged in deionized water for one hour to fill the pores of the block with water. The block was then drained, blown through, using a high pressure air gun, for about one-half to one minute. The blown block was then weighed to determine the "water-pore volume" and was found to weigh 1,028 grams, giving the block a pore volume of approximately 163 ml. The corrugated block was then immersed in the platinum-containing alumina slip previously prepared for about one minute, while agitating the block and slip so that the slip tended to coat the entire surface of the block and its through corrugations. After shaking and gentle blowing to remove excess slip and ensure free passages, the block was weighed and found to have gained 152 grams in weight.

It was treated with H^2S for about 15 minutes, then dried in a forced-air oven at 110° C. and weighed, while warm, 934 grams. After heating the block for one hour to reach 500° C. and maintaining the block at 500° C. for one hour, it was cooled in a desiccator, and then weighed. It was determined that the block had a total net gain of 60 grams. After further treatment with a stream of air blown through the passages, the block was found to have a total net gain of 66 grams. Based on these findings and the composition of the slip containing 5% Pt, it was determined that about 3 g. of Pt and 63 g. of gamma alumina were deposited on the alpha-alumina block. Finally, the block was washed thoroughly with deionized water and then dried in a forced-air oven.

EXAMPLE VIII

A 10% alumina slurry was made of 7.90 kg. of hydrous alumina filter cake (containing 2,156 kg. alumina) and 13.3 liters of deionized water. X-ray diffraction analysis of the slurry, dried at 110° C. showed 1% amorphous hydrous alumina, 19% boehmite, 40% bayerite, 33% nordstrandite and 7% gibbsite (80% trihydrates).

A 10% aqueous solution of H_2PtCl_6 was then prepared using 284 grams of a 40% Pt concentrate of H_2PtCl_6 (equivalent to 113.5 grams Pt) and 850 mls. of deionized water. The H_2PtCl_6 solution was added slowly to the slurry, using a dropping funnel. The mixture was stirred for 15 minutes and the pH was found to be 2.1. After stirring for an additional 10 minutes, 52.2 liters of H_2S were run into the mixture at a rate of 1,740 ml. per minute. Following the addition of H_2S, the mixture was stirred one-half hour and the pH was found to be 1.1. The mixture was then stirred for an additional one and one-half hours and finally drum dried and calcined for six hours at 340° C. The resultant product, on X-ray diffraction analysis, showed 85% gamma alumina, 15% boehmite and no trihydrates.

A thixotropic slip of the calcined platinum-impregnated alumina was prepared using a similar method of that described in Example XII, but no HCl was used. Analysis of the slip showed 43.4% solids at 1100° C. X-ray diffraction analysis of a sample dried at 110° C. showed 85% gamma alumina, 15% boehmite and no trihydrates.

A water-soaked alpha-alumina block of Example XXII was immersed in the prepared slip in accordance with the procedure described in Example XII. Following the immersion procedure, the block plus slip was dried in a forced-air oven at 110° C., calcined at 500° C., washed thoroughly with deionized water, and finally dried at 110° C., in a forced-air oven. The catalyst block was calculated to have about 2 g. platinum and 45 g. of gamma alumina deposited thereon.

EXAMPLE XIV

One ounce of Pd black was dissolved in 76 ml. of conc. HNO_3. The Pd $(NO_3)_2$ thus formed was added dropwise to a solution containing 41.72 g. of $Na_2Cr_2O_7$ dissolved in 150 ml. H_2O, and 153 ml. of conc. NH_4OH. The resultant residue was filtered and washed. The filtrate had a pH of 6.8–7.0.

After being dried at 100–110° C. 10 g. of the Pd containing residue was milled with 10 g. of drum dried alumina, 50 ml. H_2O and 2 drops of conc. HCl. The alumina was the same 340° C. calcined alumina as that described in Example XII above.

A water-moistened alpha-alumina cylinder approximately 1" diameter and 2" length was immersed in the slip milled from the Pd-containing residue and alumina. The cylinder with Pd, Cr and alumina deposited thereon was heated to 360° C. and maintained at 360° C. for 1 hour. About 0.11 g. Pd and 0.16 g. gamma Al_2O_3 were deposited on the alpha-alumina cylinder.

Although the catalyst of the present invention finds particular utility in auto exhaust purification, its use is not limited thereto. It also finds utility in a variety of catalytic processes where a rugged catalyst of high surface area is desired, particularly gas phase processes occurring favorably at very high space velocity.

It is claimed:

1. A catalyst composition comprising an inert, substantially catalytically inactive refractory support having a film of catalytically active alumina, said film having a total surface area of at least about 25 square meters per