carrier can be controlled by pretreating the porous carrier with an alkaline solution of for example sodium carbonate or sodium hydroxide.

Another approach which has been found to produce particularly active catalysts is described in US 4048096. In this patent shell impregnated catalysts are produced by a process comprising the steps of (1) impregnating a carrier with aqueous solutions of water-soluble palladium and gold compounds, the total volume of the solutions being 95 to 100% of the absorptive capacity of the catalyst support, (2) precipitating water-insoluble palladium and gold compounds on the carrier by soaking the impregnated carrier in a solution of an alkali metal silicate, the amount of alkali metal silicate being such that, after the alkali metal silicate has been in contact with the carrier for 12 to 24 hours, the pH of the solution is from 6.5 to 9.5; (3) converting the water soluble palladium and gold compounds into palladium and gold metal by treatment with a reducing agent; (4) washing with water; (5) contacting the catalyst with alkali metal acetate and (6) drying the catalyst. Using this method, catalysts having a specific activity of at least 83 grams of vinyl acetate per gram of precious metal per hour measured at 150°C can, it is alleged, be obtained.

At column 5 of US 4048096 it is taught that the process described above is preferably used to prepare catalysts containing 1.65 to 3.3 grams of palladium and 0.75 to 1.5 grams of gold per litre of finished catalyst. For a typical silica support having a density of say 600 grams per litre, these ranges correspond, in % wt terms, to 0.25 to 0.54% and 0.11 to 0.25% and hence to a Au:Pd % wt ratio of from 0.23 to 0.91. The amounts of alkali metal acetate taught as being effective are 5 to 60 grams per litre preferably 25 to 35 grams per litre corresponding, in the case of potassium acetate, to 0.75 to 9.2% by weight preferably 3.8 to 5.4%.

Six examples according to the invention are disclosed in US 4048096. All of these teach the use of catalysts having a gold to palladium weight ratio in the range 0.42 to 0.45 and a gold content of 2.1 grams per litre or less. The most active catalyst

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Claims:

1. A shell impregnated catalyst for use in the production of vinyl acetate from ethylene, acetic acid and an oxygen containing gas, said catalyst having a productivity of greater than 661 grams of vinyl acetate per hour per litre of catalyst at 150°C and consisting of:

(1) a catalyst support having a particle diameter from about 3 to about 7mm and a pore volume of 0.2 to 1.5 ml per gram

(2) palladium and gold distributed in the outermost 1.0mm thick layer of the catalyst support particles, and

(3) from about 3.5 to about 9.5% by weight of potassium acetate

wherein the gold to palladium weight ratio in said catalyst is in the range 0.60 to 1.25 and, the palladium content is greater than 3.9 grams per litre of catalyst.

2. A catalyst as claimed in claim 1 wherein the gold to palladium weight ratio is in the range 0.7 to 1.05.

3. A catalyst as claimed in claim 2 wherein the gold to palladium weight ratio is in the range 0.85 to 1.05.

4. A catalyst as claimed in any one of the preceding claims wherein the potassium acetate content is 5 to 9% by weight.

5. A catalyst as claimed in any one of the preceding claims wherein the palladium content is in the range 3.9 to 6.1 grams per litre of catalyst.

6. A shell impregnated catalyst for use in the production of vinyl acetate from ethylene, acetic acid and an oxygen containing gas consisting of:

(1) a catalyst support having a particle diameter from about 3 to

about 7 mm and a pore volume of 0.2 to 1.5 ml per gram,

(2) palladium and gold distributed in the outermost 1.0 mm thick layer of the catalyst support particles, and

(3) from about 3.5 to about 9.5% by weight of potassium acetate

wherein the gold to palladium weight ratio in said catalyst is greater than or equal to about 0.9 and the palladium content is greater than 3.9 grams per litre of catalyst.

7. A catalyst as claimed in claim 6 wherein the potassium acetate content is 5 to 9% by weight.

8. A catalyst as claimed in claim 6 or claim 7 wherein the palladium content is in the range 3.9 to 6.1 grams per litre of catalyst.

9. A process for preparing vinyl acetate which comprises reacting ethylene with acetic acid in the presence of an oxygen containing gas at a temperature in the range 100 to 200°C in the presence of a shell impregnated catalyst having a productivity at greater than 661 grams of vinyl acetate per hour per litre of catalyst at 150ºC and consisting of:

(1) a catalyst support having a particle diameter from about 3 to about 7 mm and a pore volume of 0.2 to 1.5 ml per gram,

(2) palladium and gold distributed in the outermost 1.0 mm thick layer of the catalyst support particles, and

(3) from about 3.5 to about 9.5% by weight of potassium acetate

wherein the gold to palladium weight ratio in said catalyst is in the range 0.60 to 1.25 and, the palladium content is greater than 3.9 grams per litre of catalyst.

10. A process as claimed in claim 9 wherein the gold to palladium weight ratio in the catalyst is in the range 0.7 to 1.05.

11. A process as claimed in claim 10 wherein the gold to palladium weight ratio in the range 0.85 to 1.05.

12. A process as claimed in any one of claims 9 to 11 wherein the potassium acetate content of 5 to 9% by weight.

13. A catalyst as claimed in any one of claims 9 to 12 wherein in the palladium content is in the range 3.9 to 6.1 grams per litre of catalyst.

14 A process for preparing vinyl acetate which comprises reacting ethylene with acetic acid in the presence of an oxygen containing gas at a temperature in the range 100 to 200°C in the presence of a shell impregnated catalyst consisting of:

(1) a catalyst support having a particle diameter from about 3 to about 7mm and a pore volume of 0.2 to 1.5 ml per gram

(2) palladium and gold distributed in the outermost 1.0mm thick layer of the catalyst support particles, and

(3) from about 3.5 to about 9.5% by weight of potassium acetate

wherein the gold to palladium weight ratio is greater than or equal to about 0.9 and the palladium content is greater than 3.9 grams per litre of catalyst.

15. A process as claimed in claim 14 wherein the potassium acetate content of the catalyst is 5 to 9% by weight.

16. A process as claimed in claim 14 or claim 15 wherein the palladium content is in the range 3.9 to 6.1 grams per litre catalyst.