CLAIMS:

1. A heterogeneous catalyst comprising a support and a noble metal, wherein said catalyst has an average diameter of at least 200 microns and at least 90 wt% of the noble metal is in the outer 50% of catalyst volume, wherein the catalyst is produced by precipitating the noble metal from an aqueous solution of metal salts in the presence of the support, and wherein a C_2-C_{18} thiol comprising at least one hydroxyl or carboxylic acid substituent is present in the aqueous solution.

2. The catalyst of claim 1 in which the catalyst has an average diameter from 400 microns to 10 mm.

3. The catalyst of claim 2 in which at least 90 wt% of the noble metal is in the outer 35% of catalyst volume.

4. The catalyst of claim 3 in which the noble metal is selected from the group consisting of gold and palladium.

5. The catalyst of claim 4 in which the support is selected from the group consisting of γ-, δ-, or θ-alumina, silica, magnesia, titania, vanadia, ceria, lanthanum oxide and a combination thereof.

6. The catalyst of claim 5 in which the catalyst has a ratio of the longest to the shortest diameter of no more than 3:1.

7. A catalyst bed which comprises (i) a heterogeneous catalyst, wherein said catalyst comprises a support and a noble metal, and wherein said catalyst has an average diameter of at least 200 microns and at least 90 wt% of the noble metal is in the outer 50% of catalyst volume, wherein the catalyst is produced by precipitating the noble metal from an aqueous solution of metal salts in the presence of the support, and wherein a C_2-C_{18} thiol comprising at least one hydroxyl or carboxylic acid substituent is present in the aqueous solution.

8. The catalyst bed of claim 7 in which the catalyst has an average diameter from 400 microns to 10 mm and the catalyst bed further comprises a gaseous phase comprising oxygen.

9. The catalyst bed of claim 8 in which at least 90 wt% of the noble metal is in the outer 40% of catalyst volume.

10. The catalyst bed of claim 9 in which the noble metal is selected from the group consisting of gold and palladium.