CLAIMS

1. A catalyst comprising palladium, bismuth, and at least one third element X selected from the group consisting of Y, Ga, and combinations thereof, wherein the catalyst further comprises a support, and wherein the support is at least one selected from activated carbon, magnesium oxide, titanium oxide, silica, alumina, silica-alumina, silica modified with alumina and/or magnesia, alumina modified with magnesia; and combinations thereof, wherein the atomic ratio of palladium to bismuth in the catalyst is from 1:0.05 to 1:10, and the ratio of X to bismuth is from 1:0.1 to 1:10.

2. The catalyst of any of the preceding claims wherein the support comprises at least one of alumina and silica.

3. The catalyst of any of the preceding claims wherein the support comprises alumina modified with magnesia.

4. The catalyst of Claims 1 to 2 wherein the support comprises silica.

5. The catalyst of Claim 4 wherein the support is modified with alumina, magnesia, or a combination thereof.

6. The catalyst of Claim 4 wherein the silica comprises pyrogenic silica.

7. The catalyst of any of the preceding claims wherein X is Y.

8. The catalyst of any of the preceding claims wherein X is Ga.