CLAIMS

1. A method for producing propylene oxide comprising contacting propylene with a titanium silica zeolite catalyst, hydrogen peroxide, an ammonium buffer selected from the group consisting of ammonium acetate and ammonium dihydrogen phosphate, and an R_1-OH solvent in a reaction mixture, the reaction mixture further comprising acetophenone, wherein the R1-OH solvent is 1-phenylethyl alcohol and wherein the reaction mixture comprises a ratio of acetophenone to 1-phenylethyl alcohol of 1:99 to 50:50, and the peroxide selectivity rate is greater than about 40%.

2. The method of claim 1, wherein the R_1-OH solvent further comprises from about 0.1-50% by weight of water.

3. The method of claim 1, wherein the titanium silica catalyst comprises a silica zeolite catalyst which comprises a silica framework in which silicon atoms in the silica framework have been replaced with titanium atoms and the zeolite is an aluminosilicate MWW zeolite.

4. The method of claim 1, wherein the ratio of titanium to silica in the titanium silica catalyst comprises a ratio of 0.5 to 5 titanium atoms for every 100 silicon atoms.

5. The method of claim 3, further comprising washing the titanium silica catalyst with a templating agent.

6. The method of claim 5, wherein the templating agent is piperidine, hexamethyleneimine, adamantyl ammonium hydroxide, octyltrimethylammonium hydroxide, heptyltrimethylammonium hydroxide, hexyltrimethylammonium hydroxide, or trimethyladamantylammonium hydroxide.

7. The method of claim 5, further comprising washing the catalyst with an acid after washing with a templating agent.

8. The method of claim 7, wherein the acid is nitric acid, hydrochloric acid, sulfuric acid, sulfurous acid, phosphoric acid or ammonium chloride.

9. The method of claim 1, wherein the method comprises heating the reaction mixture to a temperature between 20 °C and 250 °C.

10. The method of claim 1, wherein the method further comprises a pressure from 68.9476 kPa to 6894.76 kPa.

11. The method of claim 1, wherein the titanium silica zeolite catalyst comprises a ratio of 0.5-14 titanium atoms for every 100 silicon atoms.

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