

Claims

1. A process for the preparation of propylene oxide, comprising
 - (i) providing a reaction mixture comprising propylene, water, organic solvent, and hydrogen peroxide;
 - (ii) contacting the reaction mixture provided in (i) in an epoxidation zone with an epoxidation catalyst comprising a zeolitic material having a framework structure comprising Si, O, and Ti, and subjecting the reaction mixture to epoxidation reaction conditions in the epoxidation zone, obtaining, in the epoxidation zone, a mixture comprising propylene oxide, water, and organic solvent;
 - (iii) removing an effluent stream from the epoxidation zone, the effluent stream comprising propylene oxide, water, and organic solvent;wherein the reaction mixture provided in (i) and subjected to (ii) contains in an amount of at most 500 mg per kg hydrogen peroxide comprised in said reaction mixture at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms.
2. The process of claim 1, wherein the reaction mixture provided in (i) and subjected to (ii) contains the at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms in an amount in the range from 0 to 500 mg per kg hydrogen peroxide comprised in the reaction mixture, preferably in the range from 0 to 400 mg per kg hydrogen peroxide comprised in the reaction mixture, more preferably in the range from 0 to 300 mg per kg hydrogen peroxide comprised in the reaction mixture, more preferably in the range from 0 to 200 mg per kg hydrogen peroxide comprised in the reaction mixture, more preferably in the range from 0 to 100 mg per kg hydrogen peroxide comprised in the reaction mixture.
3. The process of claim 1 or 2, wherein the at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms is selected from the group consisting of secondary mono alcohols $C_nH_{2n+2}O$ with n being an integer in the range of from 8 to 10, mono ketones $C_mH_{2m}O$ with m being an integer in the range of from 8 to 10, diols $C_pH_{2p+2}O_2$ with p being an integer in the range of from 8 to 10, and mixtures of two or more of these compounds; preferably from the group consisting of secondary mono alcohols $C_9H_{20}O$, mono ketones $C_9H_{18}O$, diols $C_9H_{20}O_2$, and mixtures of two or more of these compounds; more preferably selected from the group consisting of secondary mono alcohols $C_9H_{20}O$, mono ketones $C_9H_{18}O$, and mixtures of secondary mono alcohols $C_9H_{20}O$ and mono ketones $C_9H_{18}O$; more preferably selected from the group of diisobutyl carbinol and diisobutyl ketone and mixtures of diisobutyl carbinol and diisobutyl ketone; wherein the at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms more preferably comprises at least diisobutyl carbinol.
4. The process of any one of claims 1 to 3, wherein providing the reaction mixture in (i) comprises
 - (i.1) providing an aqueous hydrogen peroxide solution;
 - (i.2) admixing the aqueous hydrogen peroxide solution provided in (i.1) with propylene and organic solvent, obtaining the reaction mixture;

wherein the aqueous hydrogen peroxide solution provided in (i.1) and subjected to (i.2) contains the at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms in an amount of at most 500 mg per kg hydrogen peroxide comprised in the reaction mixture.

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5. The process of claim 4, wherein the aqueous hydrogen peroxide solution provided in (i.1) and subjected to (i.2) contains the at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms in an amount in the range from 0 to 500 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution, preferably in the range from 0 to 400 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution, more preferably in the range from 0 to 300 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution, more preferably in the range from 0 to 200 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution, more preferably in the range from 0 to 100 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution.
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6. The process of claim 4 or 5, wherein the aqueous hydrogen peroxide solution provided in (i.1) and subjected to (i.2) has a total organic carbon content (TOC) in the range from 100 to 800 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution, preferably in the range from 120 to 750 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution, more preferably in the range from 150 to 700 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution, determined as described in Reference Example 5.
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7. The process of any one of claims 4 to 6, wherein the aqueous hydrogen peroxide solution provided in (i.1) and subjected to (i.2) is obtained or obtainable from an anthraquinone process.
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8. The process of any one of claims 1 to 7, wherein the epoxidation reaction conditions according to (ii) comprise trickle-bed conditions or wherein the epoxidation reaction conditions according to (ii) comprise fixed-bed conditions.
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9. The process of any one of claims 1 to 8, wherein at least (ii) is carried out continuously, wherein preferably at least (ii) and (iii), more preferably (i), (ii) and (iii) are carried out continuously.
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10. A reaction mixture for preparing propylene oxide, comprising propylene, water, organic solvent, and hydrogen peroxide, wherein the reaction mixture comprises at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms in an amount of at most 500 mg per kg hydrogen peroxide comprised in the reaction mixture.
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11. The reaction mixture of claim 10, being obtainable or obtained by a process comprising, preferably consisting of (i) as defined in any one of claims 1 to 9.

12. A catalytic epoxidation system for preparing propylene oxide, the catalytic epoxidation system comprising an epoxidation catalyst comprising a zeolitic material having a framework structure comprising Si, O, and Ti, and further comprising the reaction mixture comprising propylene, water, and organic solvent according to claim 10 or 11.
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13. Use of an aqueous hydrogen peroxide solution as epoxidation agent for preparing propylene oxide in the presence of an organic solvent and an epoxidation catalyst comprising a zeolitic material having a framework structure comprising Si, O, and Ti, wherein the aqueous hydrogen peroxide solution comprises at least one aliphatic oxygen containing compound having 8 to 10 carbon atoms in an amount of at most 500 mg per kg hydrogen peroxide comprised in the aqueous hydrogen peroxide solution.
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