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(57) Abstract: The invention relates in a first aspect to 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. The invention further relates in a second aspect to 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. In a third aspect, the invention relates to a 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 the second aspect. In a fourth aspect, the invention relates to the 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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