

The invention relates to environmental protection. A catalyst of the first stage of two-stage process for removal of carbon monoxide from hydrogen-containing gas mixtures, containing, by wt. %: 6.5-12.0 of copper oxide and 23.0-29.0 of cerium oxide deposited on zirconium dioxide of monoclinic modification, in the case zirconium dioxide of monoclinic modification includes modifying additives: hafnium oxide and/or iron oxide, and/or calcium oxide and/or aluminum oxide, and/or silicon oxide, and/or their any mixture with appropriate ratio of components. A method of removal of carbon monoxide from hydrogen-containing gas mixtures in the presence of hydrogen by oxidation of carbon oxide by oxygen or air in two stages, both at first and second stage at least one layer of the catalyst is used, at the first stage a catalyst containing CuO-CeO_2 deposited on zirconium dioxide is used, at the second stage a catalyst based on noble metals is used, oxygen or air into the reaction zone is fed only at the first stage, the process is carried out at the molar ratio of oxygen to carbon oxide from 0.5 to 3, under the pressure not less than 0.1 atm. At the first stage the disclosed catalyst is used. The invention reduces the process temperature while maintaining high selectivity relative to CO oxidation.