Photoreduction process modeling of copper(II) in the solid phase

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Abstract

Water-soluble compositions on the basis copper(II) compound are investigated. As photosensitive compound the copper acetate is used. Copper acetate possesses high spectral sensitivity and good solubility in water. The role of an optical sensitizer carried out anthraquinone-2,6-disulfonic acid disodium salt. Process of photochemical restoration of copper(II) is possible in the presence of secondary reducers (spirits). Sorbitol, pentaerythritol and ethanol were applied as secondary reducers. Studied photosensitive compositions are sensitive enough to ultraviolet radiation.

The kinetic analysis of copper(II) photoreduction on a dielectric surface is given. The optical density is used for an estimation depth of photochemical process. Two kinetic models of copper photoreduction are developed.

Formation of dielectric homogeneous crystalline coating on a surface at photoreduction of copper(II) is described by the kinetic equation of the first order. If the photoactivator coating has the expressed crystal structure reduction of copper(II) is described as typical topochemical reaction. Constants of reaction speed are found. Constants allow to organize photoreduction process of copper(II) in an optimum performance.