CATALYTIC ACTIVITY OF RADIATION SYNTHESISED SILVER NANOPARTICLES

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Abstract

Most of the radiation-assisted methods for silver nanoparticles synthesis are based on the photoreductions of AgNO3 aqueous solution upon exposure to UV light. Some reports refer to the reduction of noble metals in aqueous solutions by gamma irradiation, however, application of electron beam irradiation to the nanoparticles preparation is still rare. Reducing effect of Triton X-100 and its subsequent stabilizing effect on the nanoparticles are also well-known. The present work deals with the effect of accelerated electrons irradiation on the silver nanoparticles preparation by reducing of AgNO3 in Triton X-100 - water solutions.

Depending on applied dose, formation of yellow, brown and black coloured colloid systems was observed. Formation of well-dispersed silver nanoparticles was confirmed by X-rays diffraction patterns and UV-VIS spectroscopy. Radiation chemical yield (expressed as a number of species per 100 eV of absorbed energy) of silver was calculated on the results of argentometric titration with potentiometric detection measurements.

Catalytic activity of prepared systems was tested on the hydrogen peroxide decomposition. Some amount of colloid solution was injected into stirred H2O2 solution and the rate of released oxygen was measured. The reaction rate constants were determined.

Keywords: silver, nanoparticles, catalytic activity, hydrogen peroxide, e-beam irradiation, Triton X-100

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