Short Communication

Investigation of Hydrogen Release Rate from Electrodes of Nickel-Cadmium Batteries at Their Thermal Decomposition

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In this paper, kinetics is examined of a hydrogen release at thermal decomposition of oxide–nickel and cadmium electrodes of nickel-cadmium batteries KSX-25 with operating life 6 years. The examination was conducted at fixed values of temperature: 480, 600, 800⁰C (for cadmium electrodes) and 670, 840, 880⁰C (for oxide–nickel ones). It was proved by experiments that in electrodes of nickel-cadmium batteries in a course of their long-lasting operation, a great amount of hydrogen is accumulated. The rate of the hydrogen release and the released hydrogen amount grow with decomposition temperature increase. Although at temperatures higher than 900⁰C, the released hydrogen volume does not grow any longer. This fact shows that hydrogen atoms are contained inside of ceramic-metal matrix of electrodes in a potential hole, i.e. in their bound state. Energy values were found of hydrogen atoms activation for diffusion process in ceramic-metal matrices of oxide–nickel and cadmium electrodes; they are equal to 0.37 eV and 0.34 eV respectively.

Keywords: battery, nickel-cadmium, hydrogen accumulation, thermal runaway.

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