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Acute toxic properties of nanodispersed manganese oxide aerosol during inhalation exposure

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Manual anodispersed manganese oxide is a nanomaterial commonly used as a matrix in the production of sorbents by the method of extreme ultraviolet laser ablation, sensor electrodes, and cathode catalysts in the coating on carbon rods by electrochemical deposition. The production process is associated with the emission of nanodispersed manganese oxide (MnO2) aerosol in the air within the work areas thus creating a risk of inhalation exposure for workers. The study of the physical properties of nanodispersed MnO2 using SEM and dynamic light scattering showed that the average size of the tested material is 15-29 nm, and the particles are whisker-shaped. The assessment of acute toxic potency performed in accordance with the international IECD standard (Test № 436:2008, IDT) in the inhalation system using a full-body camera showed that nanodispersed manganese oxide is acutely toxic when inhaled in the form of aerosol. CL50 for Wistar rats with a body mass of 190±10 g exposed for 4 hours totals 120 mg/m3 (hazard category 1 in accordance with GOST 12.1.007). Acute intoxication is primarily characterized by irritating and neurotoxic effects confirmed by the results of morphological studies. A histological characteristic of the changes in the cerebral tissues indicate the location of pathological changes primarily in the cerebellum in the form of ischemia evident in the expansion of pericellular spaces and development of a cellular pattern.

Biography

Nina V. Zaitseva, Fellow of Russian Academy of Science, Doctor of Science in Medicine, Director of the Federal Scientific Center for Medical and Preventive Health Risk Management Technologies. Prof Zaitseva has appropriate experience and qualifications and 20-year experience of managing an integrated team of researchers in interdisciplinary research directions. Research interests are: Fundamental and applied aspects of human ecology. Mechanisms of environmental impact on human health. Health risk assessment and medical and preventive technologies of health risk reduction. More than 380 key publications in risk assessment, environmental epidemiology, toxicology.

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