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Monitoring Toxic Gases and its Safety for the Environment

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Annotation: A new approach to the problem of preparing absorbents for fluoride gases in industrial production is proposed and scientifically substantiated, based on the rational use of mechanochemical methods of influencing the molding system and making it possible to obtain cheap, highly active sorbents for the sanitary purification of waste gases.

Key words: Nanomaterial, titanium oxide, cadmium oxide, template synthesis, gas-sensitive material, semiconductor sensor, carbon monoxide.

The effectiveness of measures to protect the air environment from pollution by technogenic impurities is determined by the reliability of environmental monitoring tools. The nature of society's interaction with the environment has recently caused concern among the general public. The human environment is becoming increasingly polluted, and its ability to self-regulate is falling catastrophically. Diseases that were previously either not observed at all or were local in nature are spreading widely. They are called “diseases of civilization.” Both the natural and social environments need to be protected and improved. A person experiences a feeling of discomfort and falls ill both from a violation of the ecological balance in nature and from contamination of the social environment [1].

The ecological state of the Republic of Uzbekistan is extremely worrying. The soil, air and water are polluted. The extraction of minerals is carried out irrationally, and nature is becoming scarce. Nature also suffers from the intensive collection of fodder, medicinal, edible herbs and shrubs[2-3]. Intensive collection of raw materials, unregulated grazing, and recreational pressure on landscapes lead to a reduction in the country's biomass reserves. Hydrogen fluoride is a class 1 toxicant. Many branches of the chemical industry require accurate and reliable determination of fluoride levels in air.

Continuous monitoring of the concentration of hydrogen fluoride in the air is possible using sufficiently sensitive semi-automatic and automatic gas analyzers.

It should be noted that there are no methods for determining fluorides that would fully satisfy modern requirements for analytical control. This requires the development of sensitive methods and instruments for monitoring hydrogen fluoride in the air.

Currently, semiconductor methods have become widespread in the analysis of flammable components of air, in particular hydrogen fluoride [4-5]. In this regard, the task of creating a new generation of selective semiconductor sensors (SSS) and automatic gas analyzers that provide selective determination of hydrogen fluoride is an urgent problem of modern analytical chemistry.

The effectiveness of measures to protect the air environment from pollution by technogenic impurities, including hydrogen halides, is determined by the reliability of environmental monitoring tools[6]. The sensors used in them must have speed, sensitivity and selectivity for the component being determined.

Up to 80% of the world fleet of air monitoring equipment is based on the use of electrochemical, thermocatalytic and semiconductor sensors, which have high reliability, accuracy, ease of

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maintenance, low power consumption and availability[3]. However, such hydrogen halide sensors with the required parameters have not yet been created and their development seems to be an urgent task.

The purpose of this work is to optimize conditions, develop, create, test and implement highly selective semiconductor methods for the determination of hydrogen fluoride in a wide range of its concentrations. In this work, a selective semiconductor hydrogen fluoride sensor has been manufactured, which includes two sensitive elements (working and compensation) and two constant resistors connected in a bridge circuit. During the experiments, the optimal values of the sensor supply voltage were selected, the dynamic, calibration characteristics and stability of the sensor were studied. Five or more semiconductor sensors were tested.

Thus, it can be concluded that a highly efficient semiconductor sensor for monitoring hydrogen fluoride has been developed. The developed sensor is quite suitable for continuous automatic monitoring of hydrogen fluoride content in gaseous media.

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