

Thermal Method for Testing Small Chemisorbent Samples on the Base of Potassium Superoxide

Authors : Pavel V. Balabanov, Daria A. Liubimova, Aleksandr P. Savenkov

Abstract : The increase of technogenic and natural accidents, accompanied by air pollution, for example, by combustion products, leads to the necessity of respiratory protection. This work is devoted to the development of a calorimetric method and a device which allow investigating quickly the kinetics of carbon dioxide sorption by chemo-sorbents on the base of potassium superoxide in order to assess the protective properties of respiratory protective closed-circuit apparatus. The features of the traditional approach for determining the sorption properties in a thin layer of chemo-sorbent are described, as well as methods and devices, which can be used for the sorption kinetics study. The authors of the paper developed an approach (as opposed to the traditional approach) based on the power measurement of internal heat sources in the chemo-sorbent layer. The emergence of the heat sources is a result of the exothermic reaction of carbon dioxide sorption. This approach eliminates the necessity of chemical analysis of samples and can significantly reduce the time and material expenses during chemo-sorbents testing. The error of determining the volume fraction of adsorbed carbon dioxide by the developed method does not exceed 12%. Taking into account the efficiency of the method, we consider that it is a good alternative to traditional methods of chemical analysis under the assessment of the protection sorbents quality.

Keywords : carbon dioxide chemisorption, exothermic reaction, internal heat sources, respiratory protective apparatus

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