Review Paper

Progress in Development of Russian National Measurement Standards in the Field of Mass Concentration Measurement of Suspended Particles

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Abstract

Aerodisperse system (ambient aerosol) is a dynamic system, thus its physical and chemical properties change continuously in the atmosphere. In addition to the changing characteristic of atmospheric aerosols, their accurate and precise measurements are a challenging task because these measurements depend on several parameters for which the traceable standards/calibration are essentially required. In Russia, the traceability for these measurements is provided in accordance with the recommendations of the Russian national regulatory standard “State hierarchy scheme for the instruments deployed for the measurements of the disperse parameters of aerosols, suspensions and powdered materials.” The State primary standard for the units of disperse parameters of aerosols, suspensions and powdered materials (GET-163) and the State primary special standard for the unit of mass concentration of particles in aerodispersed media (GET-164) are placed at the top of the hierarchy scheme. This paper describes the State primary special standard GET-164 and the specificity of ensuring the traceability in disseminating the unit realized by this primary special standard to working measurement instruments. Methods used to generate aerodispersed media with desired properties are validated and the problem for achieving the highest accuracy in the measurements related to the primary special standard GET-164 is discussed. The SI unit of mass concentration of particulate matter is disseminated from the State primary special standard GET-164 to the working instruments through a set of working standards. The methods, which are used to generate aerodispersed media in disseminating the unit of mass concentration, provided for carrying out investigations and calibration of measurement instruments over a wide range of the mass concentration of suspended particles.
of different disperse composition. The main ways of improving the standard facilities in the field of measurements of the mass concentration of suspended particles are (i) related to the improvement of the method used to measure concentrations by means of a beta-ray analyzer-comparator (included in the composition of the State primary special standard GET-164) by reducing the uncertainty of the approximation of the conversion characteristics and (ii) due to implementation of methods providing for accurately controlled dilution of aerosols to extend the ranges in which the mass concentration values of suspended particles are reproduced. In order to develop a procedure for international comparisons of such standards, the corresponding investigations of the State primary special standard GET-164 were carried out.

**Keywords**
Aerosol – Mass concentration – Measurement standards – Metrological traceability