Study of Organic Carbon-Containing Additives to Water Used in Fire Fighting, in Terms of Their Environmental Friendliness

Published: 15 July 2024

Volume 60, pages 3739–3765 (2024) Cite this article

Fire Technology

Aims and scope →

Submit manuscript →

Oleksii Shcherbak, Valentyna Loboichenko ✉, Taras Skorobahatko, Roman Shevchenko, Aleksander Levterov, Andrii Pruskyi, Valerii Khrystych, Anastasiia Khmyrova, Valentyna Fedorchuk-Moroz & Serhiy Bondarenko

Abstract

In the article, a state analysis of the organic carbon-containing additives use in fire fighting has been carried out. Negative environmental effects when using fluorine-containing short- and long-chain surfactants, which can act as both a fire extinguishing agent and its decomposition product, have been noted. As an important direction for further evolution in the field of fire extinguishing agents, the use of oxysilanes and gel systems based on liquid glass as environmentally friendly compounds has been noted. The prospects and environmental friendliness of the use of acoustic effects in extinguishing fires have been noted. The addition of small amounts of inorganic and organic compounds is regarded as an inexpensive and effective method to increase the fire fighting properties of water. In this work, the ecological characteristics of a number of organic compounds used in fire fighting as thickeners of aqueous solutions and the reduction of their surface tension were studied. Alginic acid has been shown to be the most environmentally friendly water additive among the investigated organic carbon-containing compounds used in fire fighting.