

Abstract

The combustion of solid fuels in low-power boilers significant impact on atmospheric pollution. The problem is particularly acute in the winter months in areas densely populated with individual solutions. Air pollution resulting from low emissions can cause a variety of respiratory and circulatory. For this reason society should support low emission reduction programs (PONE), apply appropriate quality fuel and low-emission boilers. At the moment not much is known about the ecological and commercial implications of the use of fuel additives designed for low-power boilers.

In Poland, there are available several commercial fuel additives. According to manufacturers, their use reduces the fuel consumption and reduce harmful emissions into the environment. In addition to information manufacturers, which may be a marketing lacks scientific information on the risks associated with the use of certain fuel additives.

On account indicated by the fact that many fuel additives contain copper compounds, sulfur and chlorine, which can cause adverse environmental effects and cause operating problems.

In this study we analyzed the chemical composition of commercially available fuel additives and fuel additive composition prepared using the simplex plan of the experiment. Developed the new fuel additive, which showed high efficacy in reducing soot formation and soot formed to contain less toxic compounds from the group of polycyclic aromatic hydrocarbons. When comparing the change in the chemical composition of carbon black as a result of the use of fuel additives used principal component analysis (PCA).

A comparative study was performed of the new fuel additive and selected fuel additives available on the Polish market. It was found that soot was formed after the application of the new additive does not exhibit toxicity to soil bacteria tested. Studies in plant species *Arabidopsis thaliana* show that soot obtained involving developed additive has the property fertilizer and does not cause oxidative stress in plants. It not found to be a new addition exhibit a corrosive effect with respect to materials of construction of the boiler or the ceramic heating.