Evaluation of carbon nanotubes – oil dispersion stability

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According to literature, the introduction of nanotubes into liquid fuels can have a positive impact on: the processes of combustion, electrical conductivity, antiknock properties of gasoline [1], diesel fuel cetane number and octane number of gasoline [2]. However, the main problem is to obtain sufficiently stable dispersions of carbon nanotubes in liquid fuels [3].

This paper presents results of research on obtaining a stable dispersion of diesel fuel with multi-wall carbon nanotubes of different sizes, single-wall and modified multi-wall carbon nanotubes, which contain hydroxyl groups or carboxyl groups. The paper also evaluates the impact on the stability of dispersions of selected surfactants. Dispersions in the base diesel and commercial diesel were produced with the help of an ultrasonic disintegrator. The resulting samples were analyzed for the nature of the nanotubes, the type of dispersant and oil. The evaluation of the stability of the dispersion was performed by turbidimetry. In the case of multi-wall nanotubes, depending on their sizes, there was some difference in the ability to create dispersion in diesel fuel, although in any case, these dispersions are not stable enough. To obtain a dispersion, which stability exceeds 12 months it is necessary to use an appropriate dispersant. Stable dispersions with single wall nanotubes were not obtained. Both the base and commercial diesel fuel, regardless of dispersant used, the stability of the dispersion did not exceed several hours. Also modified multiwall nanotubes, containing hydroxyl groups or carboxyl groups, did not form stable dispersions in diesel. A little more stable dispersion of a few days old, was observed in the case of nanotubes dispersed in the commercial diesel fuel, which shows the stabilizing influence of various additives used during diesel production.