

Sliwka, E., Kolwzan, B., Kolodziej, K. Application of ^1H NMR Spectroscopy in Assessment of the Course of Hydrocarbon Contaminant Biodegradation. *Ochrona Srodowiska* 2015, Vol. 37, No. 2, pp. 55–60.

Abstract: Suitability of ^1H NMR spectroscopy for evaluation of changes in chemical structure of petroleum substances (diesel and crude oils) and coal tar waste upon their biodegradation was assessed. Biodegradation was carried out for 14 days using bacterial strains isolated from petroleum-contaminated soil. Biodegradation effectiveness varied, amounting to 89% for diesel oil, 45% for crude oil and 26% for coal tar. ^1H NMR spectra analysis demonstrated major differences in the distribution of aliphatic and aromatic protons between petroleum samples and coal tar. The aromaticity factor of petroleum substrates was about 3 times lower ($f_A=0.12$ and 0.14) and it increased in the biodegradation products. This confirms presence of aliphatic components, readily biodegradable, in petroleum substances. Major differences in the f_A parameter values indicate that it can be used to differentiate between the sources of hydrocarbon contamination in environmental samples. An additional advantage of the ^1H NMR technique is a small amount of analyte required for analysis and the non-destructive character of the technique.

Keywords: Nuclear magnetic resonance, petroleum substances, coal tar, biological degradation, soil treatment.