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The possibility of using a portable analyzer of the soil pH in the fieldwork

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In environmental protection and in petroleum prospecting, apart from the commonly applied geophysical methods, geochemical methods are becoming more common. They include gas methods (the most popular consists in the "free gas method") as well as bacteriological, bitumen luminesce, hydrogeochemical, geobotanical methods and redox methods which are based on pH and Eh analyses.

Geochemical research supported by geophysical research constitutes a very accurate tool in locating deep hydrocarbon deposits and in research conducted in relation to natural gas storage facilities. The geochemical research takes into account qualitative and quantitative measurement of parameters characterising the soil environment which includes the acidity and alkalinity of soil pH. The application of the method based on soil pH analysis in terms of exploring deep hydrocarbon pools became an area of interest for the Gas Chromatography Methods and Surface Geochemical AGH. Until now, the method based on soil pH analysis was not used in Poland in terms of exploring deep hydrocarbon pools. Such research was conducted only in the US (Reid 1992, Klusman 1993, Tedesco 1995) but this was done in varying environments and thus the results varied.

Soil pH measurement may be performed in compliance with the Polish Standard (PN-ISO 10390:1997) by creating a soil solution however according to the manufacturer, the measurement tool in possession of the Laboratory is suited for taking measurement of solid substances such as cream or soil.

Due to the fact that preparation of a soil solution is relatively time-consuming, the author of the work makes an effort of analysing the differences between the standard measurements taken on the solution and in situ measurements taken on the soil using the same device, the latter being a lot faster. Measurements were taken using 56 samples drawn in the area of one of the natural gas deposits in the Carpathian Foredeep Basin. Research has shown that the average values from taking in situ measurements and the collection of soil solution measurements are very similar and amount to 4.65 and 4.93 respectively. The graphical representation of the statistical parameters of both collections (box plot) shows that their distribution is similar. For both collections, the modal class on the performed histograms is between 4.5 and 5.0. Taking into account the variability of the soil centre and the impact of surface and weather conditions on the soil, the collections of values were normalized and filtered. Then, such data was subjected to directional correlation. It showed 85% of corresponding directions of changes. Furthermore, the correlations of measured values performed using the Cartesian coordinate system where the R2 coordinate equals to 0.64, show a relatively high correspondence.

The conducted analyses and comparative correlations have shown that in order to characterise the researched area, an in situ test of samples using a mobile analyser may be sufficient to identify the variability of soil acidity in the researched area,

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thus allowing to save the valuable time and labour consumption to a large extent.

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