



Feasibility of field portable near infrared (NIR) spectroscopy to determine cyanide concentrations in soil

Magdalena Sut, Thomas Fischer, Frank Repmann, and Thomas Raab
Brandenburg University of Technology, Cottbus, Germany (sutmagda@tu-cottbus.de)

In Germany, at more than 1000 sites, soil is polluted with an anthropogenic contaminant in form of iron-cyanide complexes. These contaminations are caused by former Manufactured Gas Plants (MGPs), where electricity for lighting was produced in the process of coal gasification. The production of manufactured gas was restrained in 1950, which caused cessation of MGPs. Our study describes the application of Polychromix Handheld Field Portable Near-Infrared (NIR) Analyzer to predict the cyanide concentrations in soil. In recent times, when the soil remediation is of major importance, there is a need to develop rapid and non-destructive methods for contaminant determination in the field. In situ analysis enables determination of 'hot spots', is cheap and time saving in comparison to laboratory methods. This paper presents a novel usage of NIR spectroscopy, where a calibration model was developed, using multivariate calibration algorithms, in order to determine NIR spectral response to the cyanide concentration in soil samples. As a control, the contaminant concentration was determined using conventional Flow Injection Analysis (FIA). The experiments revealed that portable near-infrared spectrometers could be a reliable device for identification of contamination 'hot spots', where cyanide concentration are higher than 2400 mg kg⁻¹ in the field and >1750 mg kg⁻¹ after sample preparation in the laboratory, but cannot replace traditional laboratory analyses due to high limits of detection.