



Application of bioremediation in reducing the content of hydrocarbons in soil polluted from fuel oil

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Introduction



A big percentage of soil and water pollution comes from accidental spillage during exploitation, transport, processing, storage, and extensive use of petroleum. One of the technologies that are increasingly used in the world for the remediation of polluted environments, primarily soil, is bioremediation (use of non-pathogenic microorganisms that use organic pollutants as a source of nutrients).

Characteristics of the study area



In this study, ex-situ bioremediation was performed on the soil from different areas in Serbia contaminated with waste oils from petroleum products. The ex-situ bioremediation process was performed at the BREM plant in Dobanovci (N 44°48'52.42" E 20°13'13.08"), Figure 1.



Figure 1. Geographical position of Dobanovci

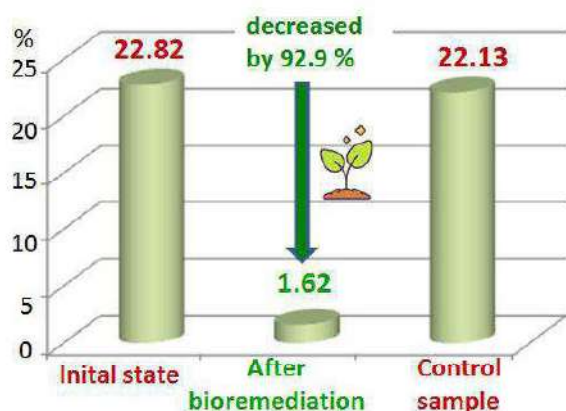


Figure 2. Content of total TPH of the examined soil

Conclusions



The applied bioremediation procedure has significantly reduced the TPH content, which indicates that the soil contaminated with fuel oil was successfully cleaned.

The aim



The main objective of this investigation was to answer whether it is possible in the applied conditions of bioremediation to successfully purify the soil contaminated with hydrocarbons from fuel oil?

Preparation of the bio-pile and analytical methods

Bio-pile for bioremediation was made on a waterproof asphalt surface. Sampling was performed from the bio-piles before/and after bioremediation and from control bio-piles (without added microorganisms) and total petroleum hydrocarbons (TPH) were gravimetrically determined according to *Beškoski et al. (2011)*. For the determination of petroleum hydrocarbons, gas chromatography (GC) was used ISO 16703.

Results



The content of TPH, obtained by the gravimetric method, for the sample before bioremediation and the control sample was around 22%, while TPH content for the soil sample after bioremediation was 1.62%. The TPH content decreased by 92.9 % in the bioremediation process, while in the control sample it decreased by only 3.02%. GC-analysis shows a significant decrease, the content of hydrocarbons with 17C and 18C atoms (pristane and phytane).

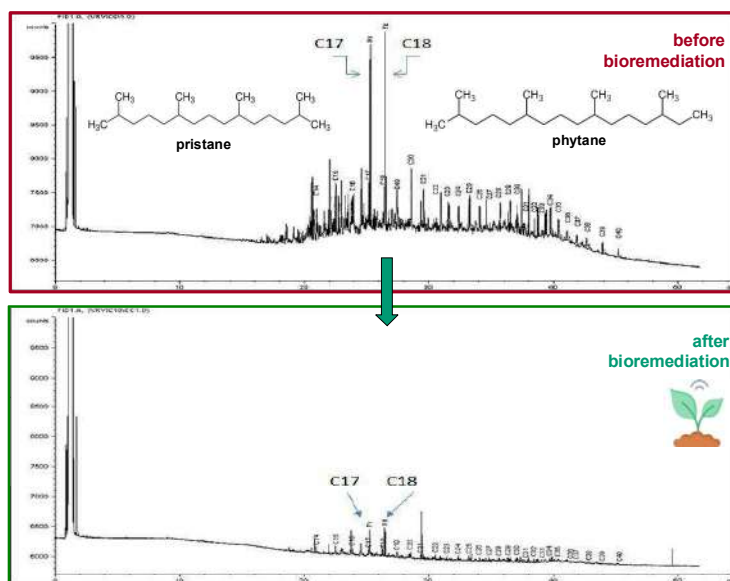


Figure 3. Comparative view of GC chromatograms before and after bioremediation

References

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ISO 16703 - ISO EN 16703 2018

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