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Heavy Metals Removal on Leachate for Use as Fertilizers

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Municipal landfill leachates typically contain high ammonium and organic concentration which could contribute to its use in agriculture, leading to the reduction of costs for the respective waste treatment plants. However, due to the nature of the leachates, they may contain phytotoxic substances. The landfill leachate samples differ by many factors such as the composition of the treated waste, elapsed time, geochemical and weather conditions [1–3]. Taking into account these considerations, leachate samples from a storage tank at the "Resíduos do Nordeste, EIM" mechanical and biological treatment plant, were collected in February 2019, and stored at 4°C. The leachate samples were processed using activated carbon adsorbents produced from the compost of the referred company, and H_2SO_4 activated clays obtained from a partnership with a Kazakhstan institution. The leachate samples were mixed with the adsorbents for 48 hours, centrifugated and the supernatant was reserved. TOC analysis in a Shimadzu TOC-L equipment and metals quantification by atomic absorption spectroscopy using a Varian SpectrAA 220 apparatus were carried out. Selected results are presented in Fig. 1.

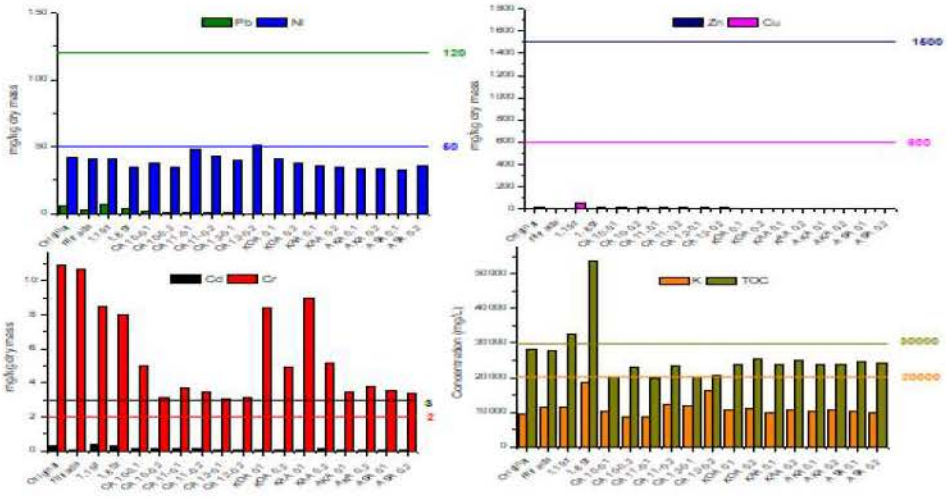

Fig. 1. Total Organic Carbon (TOC) and metals content.

The original leachate presents an organic carbon content closer to the requirements of the EU legislation for liquid organo-mineral fertilizers. The activated carbon promoted greater TOC removal in comparison with the activated clays. Both materials showed interaction with the heavy metals. However, Cr still remains present in higher contents and K presents lower values than the legislation requirements. Overall, the activated carbons presented a greater potential for heavy metals removal. However, ion-exchange resins will be tested for a more efficient heavy metals removal to minimize possible secondary elimination of components such as nutrients and organic carbon.

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