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Characterization of Landfill Leachate for Enhanced Metal Recovery

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Title: Characterization of Landfill Leachate for Enhanced Metal Recovery

Abstract: Landfills contain a trove of valuable materials, such as critical, precious, and rare earth metals, that are integral to the United State's economy and national security. The leachate that filters through landfills picks up these materials, which allows for the possibility of recovery. For this research, samples will be analyzed from landfills throughout the Midwestern United States to provide a baseline on water quality constituents, elements present, and microbial activity. Preliminary data for this study was acquired by analyzing samples of landfill leachate from a landfill in northern Indiana. pH readings indicate that the leachate is slightly basic. It also contains around 1-2% total solids. Inductively coupled plasma optical emission spectrometry (ICP-OES) was also used to identify elements present in the samples. Of the 66 elements considered in the analysis, 35 were detectable in quantifiable amounts. The most common elements present were sodium, potassium, magnesium, calcium, boron, and sulfur. Critical elements such as lithium and chromium were also found in the leachate. Future research will develop an integrated method applying microbial bioleaching, physico-chemical processes, and membrane filtration to recover critical elements from landfill leachate.