

NOVEL WASHING AGENTS

for EFFICIENT SEDIMENT REMEDIATION;

Selection, comparison and optimization study



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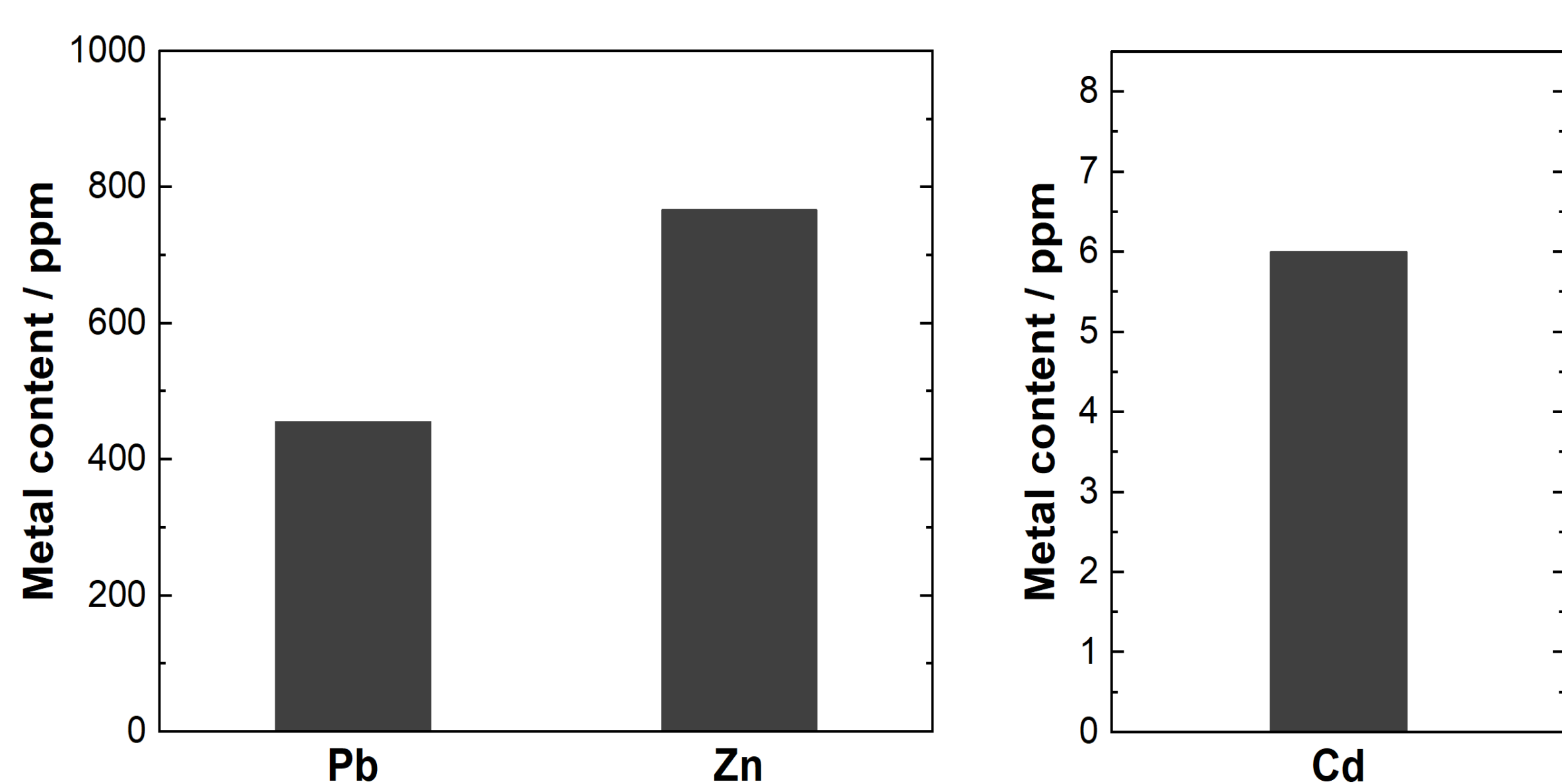
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Various washing reagents were evaluated for their ability to extract Pb, Zn, and Cd from sediments of the Drava River. The study shows that surfactants are not very efficient, but various carboxylic acids can reach or even exceed extraction levels achieved with EDTA.

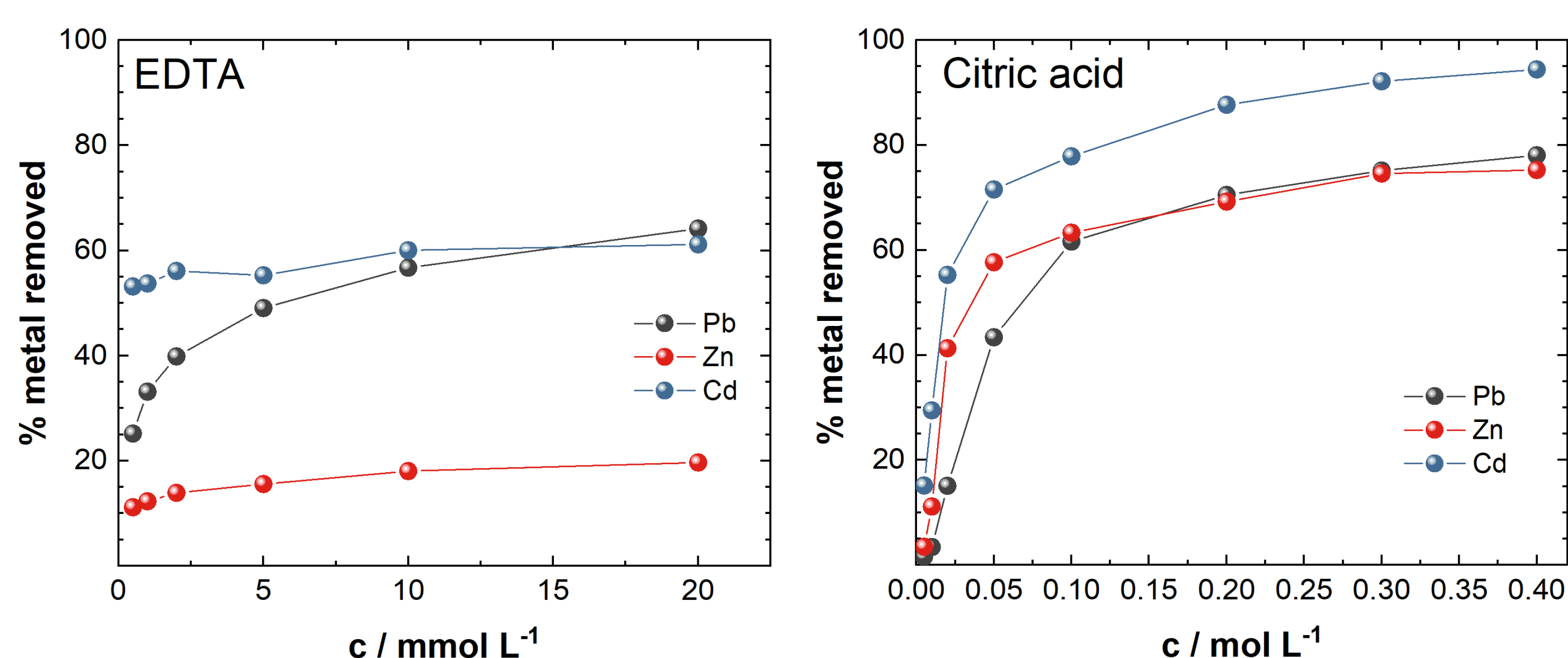
Determination of metal content

We have determined the starting levels of Pb, Zn and Cd in different sediments alongside the Drava River by acid digestion and AAS analysis. The levels of said metals varied between samples (RSD for Cd was 0.30, Zn 0.19 and Pb 0.34 respectively, although no recognizable patterns were observed. Presented are averaged values between different samples.



All samples showed increased levels of these three heavy metals, therefore some remediation actions would be needed before further use of sediments.

Optimization of reagent concentration



- We have observed only moderate influence of EDTA concentration on the efficiency of metal removal.

- Only the extraction of Pb was improved to some extent at higher concentrations of EDTA.

- The effect of concentration on the ability of citric acid to remove the heavy metals from the sediment was much more pronounced.

- At higher concentrations, citric acid was able to extract near 100% of Cd and almost 80% of Zn and Pb, which exceeds the ability of EDTA to achieve the same.

Comparison of different washing agents

AIM

Evaluate biodegradable and environmentally friendly agents regarding their ability to extract Pb, Zn and Cd, as alternatives to EDTA.

- EDTA was surprisingly unsuccessful with the Zn removal. Some carboxylic acids were much better, achieving more than 60% removal.

- Cd removal efficiencies were relatively high for almost all carboxylic acids.

- EDTA and citric acid were similarly effective with Pb removal. Other washing agents performed worse.

- We were not able to significantly decrease the metal levels in sediments with surfactants as washing agents for our sediment samples.

- Surfactants often formed gels that were difficult to separate from the sediment.

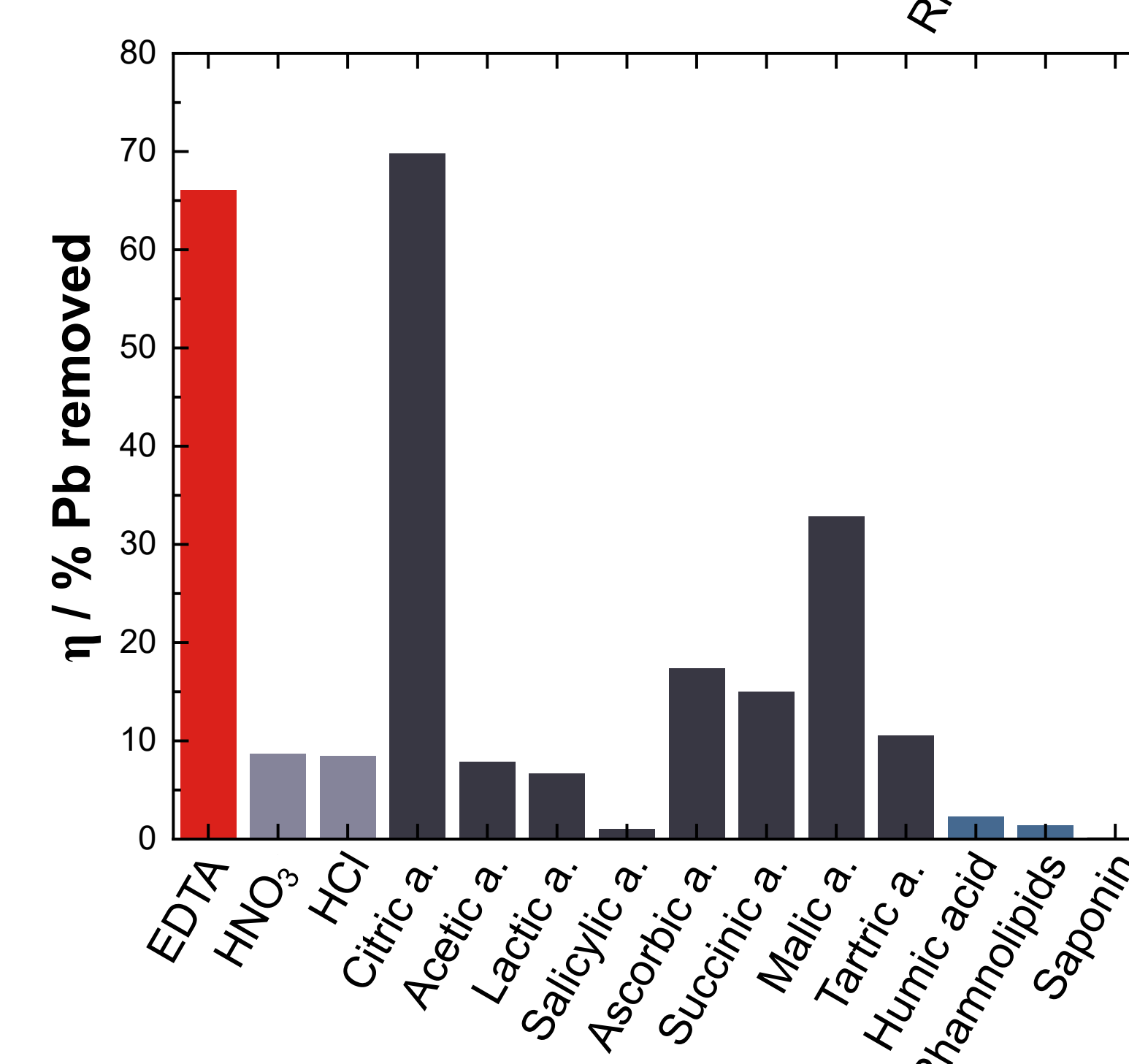
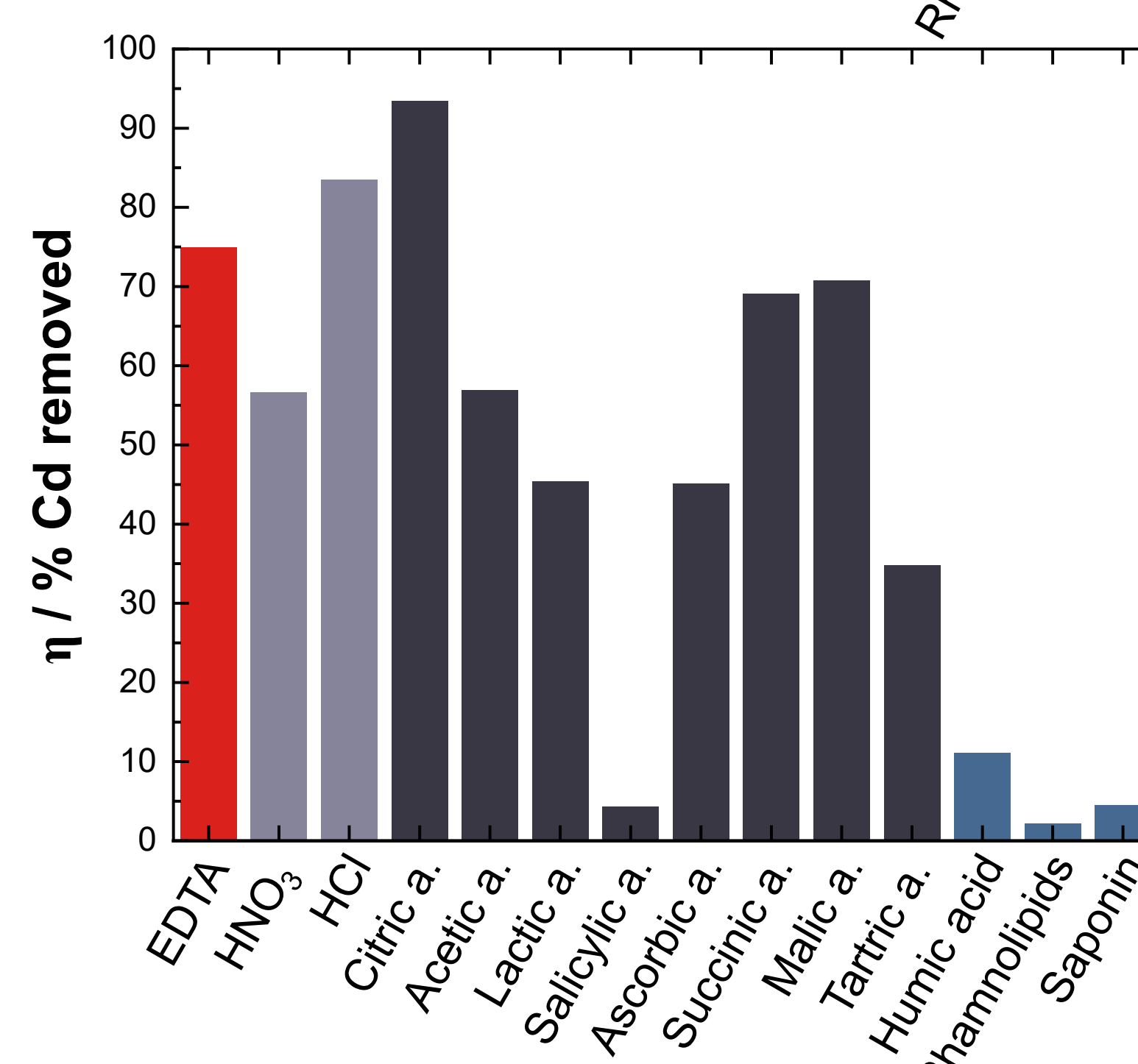
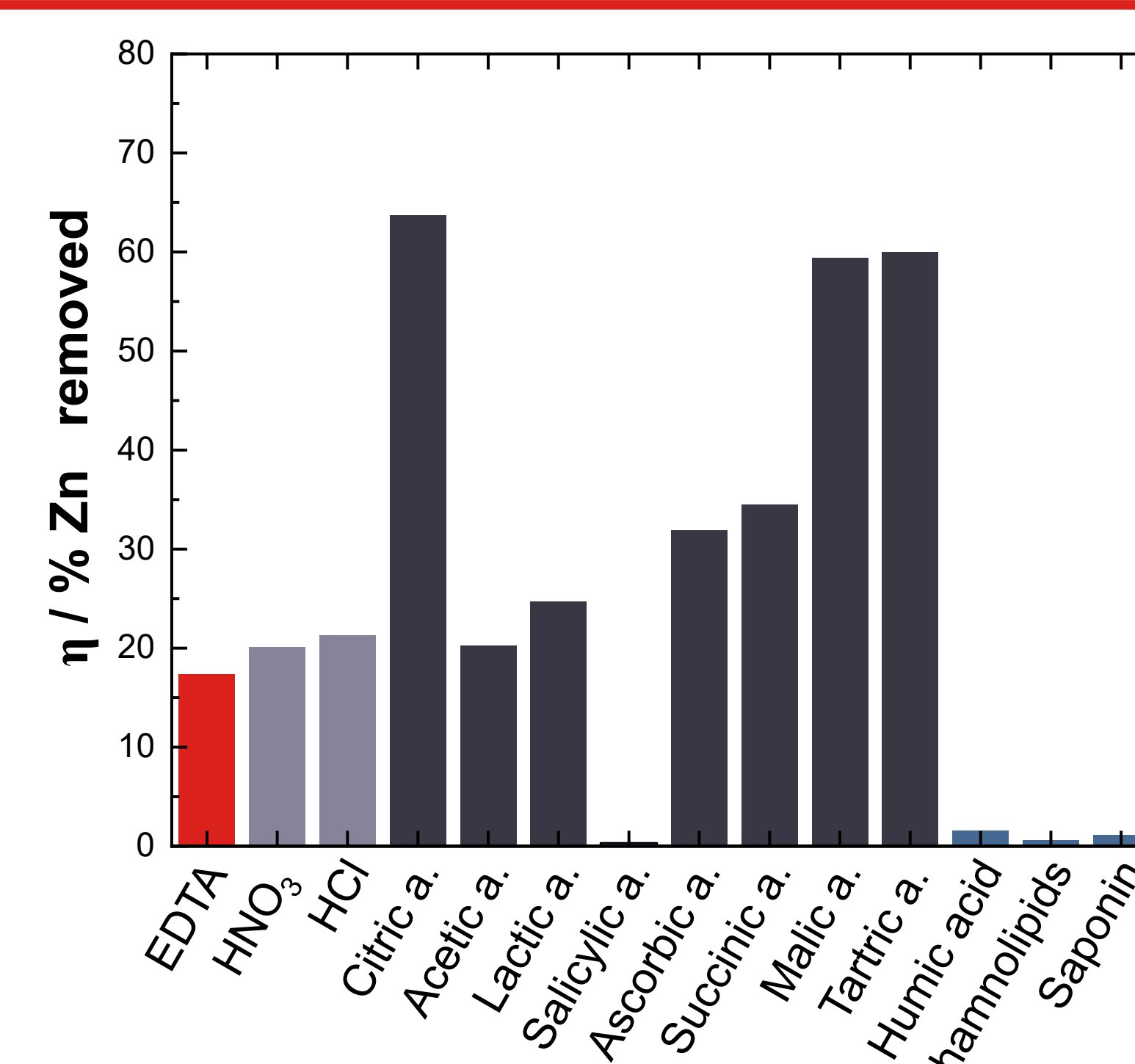
FUTURE WORK

- Optimization of solid/reagent ratio

- Optimization of washing time

- Sequential washing and combinations of reagents

- Testing of some other potential washing agents



ACKNOWLEDGMENTS

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