Table 3 – The results of sorption at a joint presence of metal ions

Metal ions	Removal, %	Adsorption capacity, mg/g
Cu (II)	25	2.5 10^{-4}
Pb (II)	30	11.4 10^{-4}
Cr (VI)	90	40.5 10^{-4}

Conclusion

In the present work, synthesis of a sorbent based on chitosan and unithiol for the first time was reported. Analysis of the sorption characteristics of the obtained composite showed a significant increasing of adsorption. The removal degrees of Cu (II), Pb (II), and Cr (VI) ions were equal to 98%, 99% and 99%, respectively. It was found that the Langmuir isotherm better describes the sorption of Cu (II) ions than the Freundlich isotherm, which indicates the formation of a monomolecular sorption layer. Freundlich isotherm displayed a better fitting model than Langmuir isotherm for adsorption of Pb (II) and Cr (VI). The kinetic process can be predicted by pseudo-first-order model and rate constants for Cu^{2+} and Cr^{6+} sorption were found to be 0.014 and 0.015 min^{-1}, respectively at 25°C. Adsorption of Pb^{2+} was followed second-order kinetics and rate constant were equal to 0.025 l mg^{-1} min^{-1}. The effect of sorbent on the joint presence of heavy metal ions showed high sorption properties respect to Cr (VI) ions. The removal degrees are Cr^{6+} – 90%, Pb^{2+}-30%, Cu^{2+}-25%. The obtained results show that this material is a highly effective composite for the removal of toxic metal ions.

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