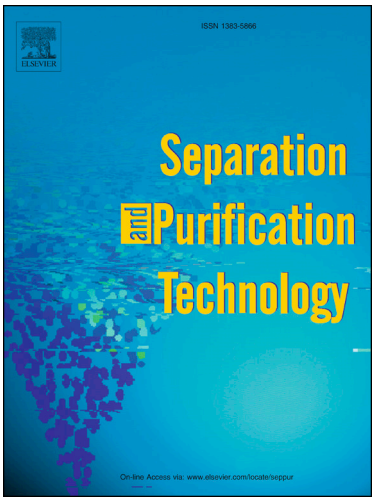

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Aiza Gay Corpuz, Priyabrata Pal, Fawzi Banat, Mohammad Abu Haija

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Enhanced removal of mixed metal ions from aqueous solutions using flotation by colloidal gas aphrons stabilized with sodium alginate

Aiza Gay Corpuz[a], Priyabrata Pal[a,]*, Fawzi Banat[a,]*, Mohammad Abu Haija[b]

[a]Department of Chemical Engineering, Khalifa University of Science and Technology, SAN Campus, Abu Dhabi, United Arab Emirates

[b]Department of Chemistry, Khalifa University of Science and Technology, SAN Campus, Abu Dhabi, United Arab Emirates

*Email of the corresponding authors: ppriyabrata@pi.ac.ae, fbanat@pi.ac.ae

Abstract

Anionic surfactant sodium dodecyl benzenesulfonate (SDBS) was used to prepare colloidal gas aphrons (CGAs). Bio-polymeric sodium alginate was added to enhance the removal efficiencies of mixed metal ions such as lead (Pb^{2+}) and copper (Cu^{2+}) from aqueous solutions via flotation. Stirring speed of 3000 rpm was maintained to produce CGAs containing 500 mL surfactant solutions. The effects of concentration of metal ions, volume of liquid in the flotation column, CGAs loading rate, and pH of solution on the removal of heavy metals were examined. CGAs loading rate of 6.1 cm/min (flow rate 120 cm^3/min) to the flotation column containing 2.0 mM of mixed metal ions (0.4 mM of Pb^{2+} and 1.5 mM of Cu^{2+} ions) at pH 5.35 gave the maximum removal of 96% for Pb^{2+} ions and 81% for Cu^{2+} ions. However, the net amount of copper ions removed was much higher than the lead ions. Addition of calcium chloride to the retentate solution further increased the removal to be 99% for Pb^{2+} and 92% for Cu^{2+} by producing alginate gel with metal ions that precipitated out from the solutions. Interestingly, sodium alginate stabilized CGAs improved significantly the removal of metal ions from aqueous solutions by flotation.