AMPHIPHILIC SIDEROPHORE MARINOBACTIN FOR FROTH FLOTATION PROCESS

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The consumption of metallic raw materials increased in the last years. The coverage of demand is getting more difficult, because both primary and secondary raw materials become more and more complex. To find a solution, some new ways have to go, like the combination of biotechnology with classic processes of processing methods.

The idea of this work is the biotechnological production of siderophores for the application in the classic froth flotation process. Siderophores are small organic molecules with a high affinity for binding Fe(III) and to form strong complexes also with other metals. They are produced by microorganisms (aerobic bacteria and fungi) and some plants to equalize the low bioavailability of iron in their environment. Especially the group of amphiphilic siderophores are very interesting. The hydrophilic part, carrying hydroxamate groups, is responsible for the binding of the metals. Flotation agents produced by the chemical industry with the same functional groups have already been applied successfully in this processing method. It can be suggested siderophores carrying the same functional groups, also work well as collectors. The fatty acid tail, that is representing the hydrophobic part, gets in contact with the bubble and spares additional chemicals and further working steps for making the target mineral particles hydrophobic.

This work includes on the one hand the biotechnological production of the marine siderophore marinobactin for the first time using a bioreactor and optimized conditions to make the production more efficient. On the other hand, the produced siderophore is tested in different froth flotation micro scale experiments like “Bubble-pick-up-test” and micro flotation in the Halimond Tube. These results show for the first time that amphiphilic siderophores are working in the froth flotation process and supply first concepts about the required concentration of siderophores in this processing process. In addition, the results also include interaction studies of different metals.

The application of amphiphilic siderophores as biochemicals in the froth flotation process can change the classic processing method in a more sustainable process – the bioflotation process. This will reduce the usage of other chemical agents and will make the process more purposeful and efficient.

Key words: Amphiphilic Siderophores, Marinobactin, Froth Flotation, Bioflotation