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**The influence of the solid bed structure on the kinetics and hydrodynamics
of black shale ore bioleaching.**

The main aim of the PhD thesis is to investigate the effective method of copper extraction from after flotation waste. The waste coming from ZWR Lubin, which was used in the research contains large amounts of black shale. Copper extraction was carried out by using *Acidithiobacillus ferrooxidans*. Determination of the hydrodynamics and kinetic conditions enables choosing the relevant bioleaching process parameters.

In the work, the optimal way removal carbonate from the bioleached materials and agglomeration of black shale ore was determined. The bioleaching process was carried out in a column reactor. The bed contains different amount of nonreactive supports such as polyethylene fittings, glass beads and reactive supports like carbon pyrite and sulfur. Various size of copper waste agglomerates were also used in the experiments. To describe the biooxidation of black shale ore plug flow model was used. During the study, the influence of the adhesion of microorganisms to the extraction of copper from black shale ore was investigated, and Langmuir and Freundlich parameters were indicated. The changes of specific surface area and grain size during bioleaching process were determined. Shrinking core model was applied for the description of bioleaching grains of ore.

The introduction of nonreactive and reactive materials and agglomerates of black shale ore to solid bed had on influence on the hydrodynamic parameters in the column reactor. It is visible in the change of Reynolds number and the flow of leaching solution through the bed. The introduction of supports contributes to an increased recovery of copper from waste. The greatest recovery of copper was obtained for bioleaching with polyethylene fittings; for 10 % of the polyethylene fittings the copper recovery reached 78%. The result is promising and shall be further investigated for the purpose of improving the recovery of copper from industrial waste.