The oxidization leaching experiment from the sulfide ore using H2O2

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In order to understand the leaching of heavy metals and change in pH in solution during oxidation of sulfide ores under natural hydrogeological environment, oxidative dissolution experiment of sulfide ores was carried out by using hydrogen peroxide [1].

In the oxidative dissolution experiment, powdered sulfide ore was sealed in the polypropylene bottle with solution containing hydrogen peroxide as oxidizing agent, and left for about 50 days at room temperature and pressure. Four types of the sulfide ores with limestone for neutralization were used: black ore mainly of sphalerite and galena from the Toya-Takarada Kuroko deposit, yellow ore composed mainly of chalcopyrite from the Shakanai Kuroko deposit, pyrite ore from the Yanahara Kieslager deposit, pyritic manganese ore mainly of rhodochrosite and pyrite from the Oe epithermal vein-type deposit, and limestone of calcite and dolomite from Hiiragiyama. For each ore and their composite (1:3), series of experiments were carried out with changing the concentration of hydrogen peroxide from 0 to 1.5×10-2 mol/l. After filtering the run products through 0.20 μm membrane filters, pH and concentration of heavy metals of solution were analyzed.

The pH of the solutions are: 2.6-3.8 for pyrite ore, 3.7-5.2 for yellow ore, 5.6-6.3 for black ore, 6.7-7.1 for pyretic manganese ore and 8.4-9.4 for limestone. The solutions are also acidic for the composites mainly of pyritic Kieslager ore and yellow ore, and basic for those of pyretic manganese ore and limestone. Strong acidification with the increase of amount of hydrogen peroxide is found in the results for the series of pyrite ore and yellow ore.

The concentrations of the main constituent metals such as Fe, Cu, Pb and Zn in solutions increase with the increase of amount of hydrogen peroxide. The concentrations are high in lower pH conditions and are low in higher pH conditions, threshold pH values of which are: 4 for Fe and Pb, and 6 for Cu and Zn. The neutralization of these acids by mixing of limestone is also conspicuously successful in reducing the concentrations of the main metals in the solutions, and is proved to be one of the most important controlling factors for metal leaching.

References

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