Neutralization and chemical precipitation of wastewater from Copper Smelters

Problem
120 m³/day of wastewaters flows from the electrolysis plant, “Copper Smelting” (RTB-Bor) flows to river Timok and Danube (production on full capacity). Loss of copper up to 200 t/year.

Participants
TMF-Belgrade/IME- Aachen: Experiments with synthetic wastewaters
RTB-Bor: Testing of the optimized process with real wastewaters

Target
• Removing the heavy metals from wastewater
• Development of cascade line of three reactors each of 10 l for the continuous precipitation, capacity of 1 kg/h solid residue
• Verification of lab test parameters in the cascade line (temperature, concentration of neutralization agent, pH solution)

Parameters in cascade line
• System for feeding wastewaters
• System for injection of neutralization agents
• System for pH measurement and control
• Removal the process gases

Main features of cascade line
• System for feeding wastewaters
• System for injection of neutralization agents
• System for pH measurement and control
• Removal of the process gases

The chemical composition of the Serbian wastewaters
1. Saraka stream (mg/l) with 2.65 g/l H₂SO₄, 88.3 Cu, 7.87 Zn, 13.1 Mn, 0.31 Ni, 21.5 Fe
2. Industrial wastewater (g/l) 6.0 Cu, 0.6 Ni, 0.003 Pb, 0.15 Fe, 0.02 Zn, 0.51 As, 0.01 Sb, 0.04 Bi, 0.03 Al, 83 H₂SO₄

Parameters in the laboratory test
• temperature: 25 - 60°C
• pH- values: 0.9 – 8.9
• concentration of NaOH: 1.0 – 3.0 mol/l
• stirring rate: 300 - 500 rpm

Conclusions
• Temperature had no influence on the neutralization process.
• Increase of concentration of NaOH decreases time for neutralization

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