

Purification of Wastewater from Paper Factory by Superconducting HGMS System

D. W. Ha^a, T. H. Kim^a, M. H. Sohn^a, J. M. Kwon^a, S. K. Baik^a, S. S. Oh^a, K. C. Seong^a,
R. K. Ko^a, H. S. Ha^a, H. S. Kim^a, Y. H. Kim^b, T. W. Ha^c

^a *Korea Electrotechnology Research Institute, Changwon, Korea*

^b *Andong National University, Andong, Korea*

^c *Taegu Science College, Daegu, Korea*

Paper factories use a large amount of water and same amount of wastewater is generated. It is important to recycle the wastewater because of water shortages and water pollution. The existing water treatment facilities like precipitation process need large-scale equipment and wide space to purify the wastewater of paper factory. High gradient magnetic separation (HGMS) system has the merits to purify rapidly because of large voids at filter and to occupy small space.

In this paper, two types of superconducting magnets were used for HGMS systems. Cryo-cooled Bi-2223 superconducting magnet system with 70 mm room temperature bore and 200 mm of height was prepared. Cryo-cooled Nb-Ti superconducting magnet with 100 mm room temperature bore and 600 mm of height was used for magnetic separator. Magnetic filters at superconducting magnets were designed by the analysis of magnetic field distribution program. There are various organic substances in paper factory's wastewater, but magnetic materials are not included in it. So, we mixed a little ferromagnetic particles, magnetite with wastewater for magnetic coagulation reaction. The various magnetic seeding reactions were investigated to increase the reactivity of coagulation. The effects of magnetic separation of wastewater were investigated as variation of magnetic field strength and flow rate of wastewater.

The higher applied magnetic field of superconducting magnetic separator was shown the higher purification effect at wastewater after magnetic separation.

Keywords : Paper factory, Wastewater, HGMS, superconducting magnet, magnetic separation