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KEY WORD: FERRITE / FERRITE PROCESS / COD WASTEWATER / HEAVY METAL IONS
SUREERAT THOMYASIRIGUL : REMOVAL OF HEAVY METAL IONS FROM COD
WASTEWATER BY THE FERRITE PROCESS. THESIS ADVISOR : ASST.PROF.
PETCHPORN CHAWAKITCHARON, Ph.D. 143 pp. ISBN 974-637-263-7.

This research investigated the optimum conditions for removal of mercury, chromium and iron in COD wastewater by the ferrite process. The experimentals were performed to determine the removal efficiencies of the heavy metal ions and the extraction tests of the ferrite sludge. In addition the magnetic property confirmation of the ferrite sludge were also carried out. The experiments were divided into two stages. The first stage was carried out to determine the optimum pH and temperature by varying pH of 9, 10, 11, 12 and temperature of 55°, 60°, 65°, 70°C. The amount of ferrous sulphate used was fix at 0.025 mole. The second stage was carried out in order to determine the optimum mole ratio by varying the amount ferrous sulphate of 0.0125, 0.025, 0.05, 0.1 mole by using the optimum pH and temperature from the first stage. The air rate was kept constant at 10 l/min throughout all experiments.

The results indicated that the optimum conditions for removal of mercury, chromium and iron in COD wastewater were at pH 9 and temperature of 65°C and the mole ratio of ferrous sulphate to metal ions in COD wastewater was 18.65. Under these conditions, the concentrations of mercury, chromium and iron in treated water were 0.097, 0.329 and 0.180 mg/l respectively. The removal efficiencies for mercury, chromium and iron were 99.86%, 97.87% and 99.53%, respectively. The residual contents of mercury were exceeded the effluent standard promulgated by the Ministry of Industry in Thailand while the residual contents of chromium were insignificantly low. The results on the leaching test showed that the concentration of mercury and chromium in the extracted solution were lower than the toxic substances standard promulgated by the Ministry of industry. The X-ray diffraction pattern of ferrite sludge revealed that the major component of the magnetic precipitate was magnetite. Addition of nitrogen gas in the process lead to the higher magnetic property of the ferrite sludge than without adding nitrogen gas, while the removal efficiencies of heavy metal ions was insignificantly different. The cost estimation of only chemicals used in the aforementioned ferrite process with adding nitrogen gas was about 10.62 baht per litre (10,620 baht per cubic metre or 3.18 baht per one COD sample). The process without adding nitrogen gas cost about 9.35 baht per litre (9,350 baht per cubic metre or 2.80 baht per one COD sample).

ภาควิชา.....วิศวกรรมสิ่งแวดล้อม.....

สาขาวิชา.....วิศวกรรมสิ่งแวดล้อม.....

ปีการศึกษา..... 2540.....

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ลายมือชื่ออาจารย์ที่ปรึกษารวม.....