



Treatment of Oily Wastewater Using Composite Flocculant of Polysilicate Ferro-Aluminum Sulfate – Rectorite

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ABSTRACT

In this study, a novel flocculant was prepared by an inorganic polymeric flocculant (IPF) - polysilicate ferro-aluminum sulfate (PSFA) and rectorite (REC). The structure of the PSFA-REC composite was characterized by Fourier transform infrared (FT-IR) spectroscopy and X-ray diffraction (XRD), in order to determine the optimal temperature. The flocculation test was made at 25°C, 45°C and 65°C, the results indicated that when the temperature was 65°C, the removal efficiency of the oil and COD was the best, which was 87.2% and 92.6% respectively. Then by comparisons among rectorite (REC), PSFA and the composite PSFA-REC at the temperature of 65°C and the optimal dosage of 11 mg/L, the composite PSFA-REC showed better flocculation performance than flocculant REC and PSFA alone.

KEYWORDS

Polysilicate Ferro-aluminum Sulfate, Rectorite, Flocculation, Oily Wastewater

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References

- [1] V. Rajakovic and D. Skala, "Separation of Oil-in-Water Emulsions by Freeze/Thaw Method and Microwave Radiation," *Separation and Purification Technology*, Vol. 49, No. 2, 2006, pp. 192-196. doi:10.1016/j.seppur.2005.09.012
- [2] P. Painmanakul, P. Sastaravet, S. Lersjintanakarn and S. Khaodhiar, "Effect of Bubble Hydrodynamic and Chemical Dosage on Treatment of Oily Wastewater by Induced Air Flotation (IAF) Process," *Chemical Engineering Research and Design*, Vol. 88, No. 5-6, 2010, pp. 693-702. doi:10.1016/j.cherd.2009.10.009
- [3] Y. B. Zhou, X. Y. Tang, X. M. Hu, S. Fritschi and J. Lu, "Emulsified Oily Wastewater Treatment Using a Hybrid-Modified Resin and Activated Carbon System," *Separation and Purification Technology*, Vol. 63, No. 2, 2008, pp. 400-406. doi:10.1016/j.seppur.2008.06.002
- [4] M. Perez, R. Rodriguez-Cano, L.I. Romero and D. Sales, "Performance of Anaerobic Thermophilic Fluidized Bed in the Treatment of Cutting-Oil Wastewater," *Bioresource Technology*, Vol. 98, No. 18, 2007, pp. 3456-3463. doi:10.1016/j.biortech.2006.11.005
- [5] M. Masuelli, J. Marchese and N. A. Ochoa, "SPC/PVDF Membranes for Emulsified Oily Wastewater Treatment," *Journal of Membrane Science*, Vol. 326, No. 2, 2009, pp. 688-693. doi:10.1016/j.memsci.2008.11.011
- [6] P. A. Moussas and A. I. Zouboulis, "A New Inorganic-Organic Composite Coagulant, Consisting of Polyferric Sulphate (PFS) and Polyacrylamide (PAA)," *Water Research*, Vol. 43, No. 14, 2009, pp. 3511-3524. doi:10.1016/j.watres.2009.05.015
- [7] S. Suarez, J. M. Lema and F. Omil, "Pre-Treatment of Hospital Wastewater by Coagulation-

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Flocculation and Flotation,” *Bioresource Technology*, Vol. 100, No. 7, 2009, pp. 2138-2146. doi:10.1016/j.biortech.2008.11.015

- [8] E. Gulbal and J. Roussy, “Coagulation and Flocculation Of Dye-Containing Solutions Using a Biopolymer (Chitosan), *React*,” *Reactive and Functional Polymers*, Vol. 67, No. 1, 2007, pp. 33-42. doi:10.1016/j.reactfunctpolym.2006.08.008
- [9] A. L. Ahmad and S. W. Puasa, “Reactive Dyes Decolourization Froman Aqueous Solution by Combined Coagulation /Micellar-Enhanced Ultrafiltration Process,” *Chemical Engineering Journal*, Vol. 132, No. 1-3, 2007, pp. 257-265. doi:10.1016/j.cej.2007.01.005
- [10] M. S. El-Geundi, “Colour Removal from Textile Effluents by Adsorption Techniques,” *Water Research*, Vol. 25, No. 3, 1991, pp. 271-1271.
- [11] O. Duman and E. Ayranci, “Adsorptive Removal of Cationic Surfactants from Aqueous Solutions onto High-Area Activated Carbon Cloth Monitored by in Situ UV Spectroscopy,” *Journal of Hazardous Materials*, Vol. 174, No. 1-3, 2010, pp. 359-367. doi:10.1016/j.jhazmat.2009.09.058
- [12] T. Shahwan, H. N. Erten and S. Unugur, “A Characterization Study of Some Aspects of the Adsorption of Aqueous Co^{2+} Ions on a Natural Bentonite Clay,” *Journal of Colloid and Interface Science*, Vol. 300, No. 2, 2006, pp. 447-452. doi:10.1016/j.jcis.2006.04.069
- [13] Z. M. Qiu, W. T. Jiang and Z. J. He, “Post-Treatment of Banknote Printing Wastewater Using Polysilicate Ferro-Alum-Inum Sulfate,” *Journal of Hazardous Materials*, Vol. 166, No. 2-3, 2009, pp. 740-745. doi:10.1016/j.jhazmat.2008.11.128
- [14] X. F. Zhao, L. X. Liu and Y. C. Wang, “Influences of Partially Hydrolyzed Polyacrylamide(HPAM) Residue on the Flocculation Behavior of Oily Wastewater Produced from Polymer Flooding,” *Separation and Purification Technology*, Vol. 62, No. 1, 2008, pp.199-204. doi:10.1016/j.seppur.2008.01.019
- [15] Z. H. Li, W. T. Jiang and H. L. Hong, “An FTIR Investigation of Hexadecyltrimethyl Ammonium Intercalation into Rectorite,” *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, Vol. 71, No. 4, 2008, pp. 1525-1534. doi:10.1016/j.saa.2008.05.015
- [16] F. Ayari, E. Srasra and M. Trabelsi-Ayadi, “Characterization of Bentonitic Clays and Their Use as Adsorbent,” *Desalination*, Vol. 185, No. 1-3, 2005, pp. 391-397. doi:10.1016/j.desal.2005.04.046
- [17] S. M. Yu, C. L. Chen, P. P. Chang, T. T. Wang, S. S. Lu and X. K. Wang, “Adsorption of Th (IV) onto Al-Pillared Rectorite: Effect of pH, Ionic Strength, Temperature, Soil Humic Acid and Fulvic Acid,” *Applied Clay Science*, Vol. 38, No. 3-4, 2008, pp. 219 -226. doi:10.1016/j.clay.2007.03.008
- [18] E. I. Unuabonah, B. I. Olu-Owolabi, K. O. Adebawale and A. E. Ofomaj, “Adsorption of Lead and Cadmium Ions from Aqueous Solutions by Tripolyphosphate- Impregnated Kaolinite Clay,” *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, Vol. 292, No. 2-3, 2007, pp. 202-211. doi:10.1016/j.colsurfa.2006.06.024
- [19] N. Kudo and Y. Kawashima, “Fish Oil-Feeding Prevents Perfluorooctanoic Acid Induced Fatty Liver in Mice,” *Toxicology and Applied Pharmacology*, Vol. 145, No. 2, 1997, pp. 285-293. doi:10.1006/taap.1997.8186