

A Novel Process for Safe and Sustainable Recovering of Used Hydraulic and Engine Oils

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Waste lubricant oils are considered toxic residues that require strict management or are better innovatively recycled. This work investigated and proposed a novel process to recover used hydraulic and engine oils safely and effectively, reclaiming base lubricant oil and minimizing environmental pollution. Used lubricant oil was put into a centrifuge to remove kinematic compounds before removing water by heating at 120°C under constant stirring at the speed of 600 revolutions per minute. For used engine oil, petrol solvent (20% v/v) was added at 60°C to enhance the coagulation effect. The effects of temperature and the concentrations of added chemicals including NaOH, Na₃PO₄, colophony and bentonite were investigated. 800C was chosen as the optimal temperature for any sections using the listed chemicals, with their contents being 40% NaOH (5% v/v), 5% Na₃PO₄ (3% v/v), colophony (2% w/w) and bentonite (10% w/w). The deposition was optimal after 10 hours at 60°C. This technology recovered base lubricant oil of which the kinematic viscosity at 100°C reaches 11.28-14.2 (cSt), the flash point temperature measured by open-cup method rises to 197-276°C, the standard number color scale is 2-2.5; nearly meeting SN500 (for hydraulic oil) and SN650 (for engine oil) standards (API Group I). The maximum overall yield of oil was approximately 70-75% after 14 hours. The residue in solid form was mixed with coke to become furnace fuel and the generated gas while the residue in liquid form were treated with Ca(OH)₂ solution and bentonite, respectively. Keywords: waste lubricant oil, waste hydraulic oil, waste engine oil, recovery, coagulation, colophony