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 meating 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

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