

Novel Technique for Clean Diesel Fuel from Waste Oil

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Abstract

Novel technique for clean diesel fuel from waste oil was performed to get clean diesel fuel from waste lubricating oil. The waste lubricating oil was chosen from two sources; one of known source and the other was mixed from Regina Collection Center, Crown Shred Recycling. Main physical properties of both sources were measured and compared with virgin lubricating of the known source waste oil. It was found that the physical properties varied for both sources. Specific gravity was varied between 0.861 and 0.8745 for the known source and the mixed waste oil. Mixed oil is considered the primary feedstock for the reclamation process. Other properties of mixed source waste oil are as follow: carbon residue was 0.4936wt%, ash content was 0.5894wt %, sulfur content was 0.25wt%, and the asphaltene content as heptane insoluble was equal to 9.469 by wt%. This means that the waste oil has many undesirable components, which affect the properties of lubricating oil and definitely will affect the properties of diesel fuel. The known source shows higher values for carbon residue, ash content, and asphaltene content due to the long period of functioning inside the diesel engine. The properties of the virgin lubricating oil of the grade 10 W 30 which is the same grade of the known source of waste lubricating oil showed better properties which make it a unique lube oil for diesel engine at low environmental temperatures. The unique unit was designed and constructed at the University of Regina / Saskatchewan, Canada to treat the waste lube oil and convert it to an accepted diesel fuel boiling range. This unit consists of the following items; settlement for water and sediment, pyrolysis process, filtration, electromagnetic filtration, adsorptive and oxidative processes desulfurization processes to reduce the sulfur content of final diesel fuel-boiling-range product. The diesel fuel was analyzed for different physical properties such as specific gravity, kinematic viscosity, sulfur content, pour point, aniline point, diesel index and cetane number.

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