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## Green solvents: Replacing dirty & toxic with clean & green

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The purpose of this paper is to review new MIR & VOC regulations in various jurisdictions within the United States and how the use of green solvents will help manufacturers meet them. It also looks at what constitutes a Green Solvent, the differences between what are classed as Green Solvents, their safety and use in a variety of applications which range from formulation, surface preparation and cleaning. The paper will examine the short and long term effects of the new regulations, the effect of typical solvents on the health of the worker and the environment and how green solvents solve many issues for manufacturers. The uses of Green Solvents will also the company to reduce it regulatory burdens, improve regulatory compliance, improve its public relations and sales and improve productivity through reducing workplace exposure and injuries related to exposure to toxic solvents.

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## Biodiesel from fish waste

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Biodiesel is a greener alternative for petrodiesel. It is a mixture of monoalkyl esters of long chain fatty acids and normally produced by transesterification of plant/animal oils (60-65°C) with methanol using the catalyst NaOH. The major problem with biodiesel is its high production cost due to cost of feed stock. In Sri Lanka, about 42% of fish is discarded as waste having no economic value. Objective of the present work was to reduce the production cost by room temperature transesterification of fish oil from catla fish processing waste. Fish oil was separated from viscera of catla fish using microwave extraction and the yield was 35% (by weight). Free fatty acid content was 0.51%. Biodiesel was produced by transesterification of fish oil with methanol, NaOH as the catalyst and, acetone as the co-solvent. The co-solvent was used to increase the miscibility of oil with methanol. Out of the studied reaction conditions, best conditions were methanol to oil (12:1), NaOH (0.5%), Acetone:Oil (15% by weight), reaction period of 2 hours at room temperature. The yield was 94%; major fatty acid methyl esters were palmitic (21.48%), palmitolic (11.32%), stearic (5.37%), cervonic (4.37%) and myristic (3.51%). Density, kinematic viscosity, acid value, flash point, sulfur content, cloud point, ash content, cloud point, water content and pH agreed with the ASTM levels. This method is sustainable and economical because of the low-cost of feed stock and less energy required.

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