Scientists have shown that you can use coffee grounds – what remains of the coffee powder after it is strained – to produce biodiesel. TBK BioDiesel 100% Renewable Fuel

Coffee Grounds Oil + Ethyl Acetate >> TBK BioDiesel BioFuel

Mano Misra, at the University of Nevada, Reno, stumbled across a discovery that coffee naturally contains oil as he looked into his leftover coffee cup.
Coffee grounds contain 10 to 15 percent oil by weight and Misra realized that it could be a likely candidate to provide a viable supply of biodiesel.
You can make biodiesel at a cost of only $1 per gallon if you reclaim coffee grounds. email misra@unr.edu

Spent coffee grounds contain about as much oil lipids by weight, 11-20%, as more traditional biodiesel feedstocks such as rapeseed, soybeans, jatropha, or palm oil. The lipid oil triglycerides that can be extracted and converted into biodiesel.

Coffee Bean

Jatropha Seeds

Soy Beans

Coffee beans and tea leaves are decaffeinated with Ethyl Acetate.

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Soxhlet Extraction -
Extract the Coffee Grounds Oil with Ethyl Acetate and reclaim the Ethyl Acetate.

TBK BioDiesel is so simple to produce!
The feed stock is Oil & Ethyl Acetate.
Just mix with a Sodium Methoxide catalyst (NaOMe) at Room Temperature.

TBK BioDiesel Fuel

There is NO GLYCERINE by Product.
Gives 10% more BioDiesel Fuel than FAME.
Lower Cost than making FAME B100 biofuel
Lower Emissions NOx, HC, Smoke

BioDiesel from Coffee Grounds

The biodiesel sample on the left is made from oil extracted from spent coffee grounds, which are pictured on the right.

Waste Coffee Grounds as Biodiesel Feedstock

Potential for 208M Gallons Per Year of Coffee Biodiesel

Spent coffee grounds contain between 11-20 wt.% oil.
The engineering students estimated that if the waste coffee grounds from all of Starbucks' market in the U.S. were collected and the oil converted to biodiesel, it would amount to 2.9 million gallons of biodiesel annually.
If waste grounds from all world coffee production were used, 208 million gallons of biodiesel could be produced annually.

Coffee beans and tea leaves are decaffeinated with Ethyl Acetate.

Coffee grounds Oil can be soxhlet extracted with Ethyl Acetate.

TBK BioDiesel is made from Oil and Ethyl Acetate Feedstock.

Ethyl Acetate is made from ethanol making this process 100% renewable.

The concept of making biodiesel from coffee is not new. For several years, Brazilians have been extracting oil from defective and surplus coffee beans to produce biodiesel. Waste coffee grounds can provide a cheap, abundant, & environmentally friendly source of biodiesel fuel.

Coffee Could Power Your Car, As Well As Wake You Up in the Morning

Researchers are reporting they have successfully made a high quality biodiesel from spent coffee grounds.
They estimate that the coffee ground biodiesel industry could generate as much as $8,000,000 in profits annually using waste from US Starbucks stores alone.

Synthesis of BioDiesel fatty acid methyl esters (FAME) via direct transesterification with methanol/carbon dioxide mixtures from spent coffee grounds feedstock.
Filipe Calixto, João Fernandes, Ricardo Couto, Elvis J. Hernández, Vesna Najdanovic-Visak and Pedro C. Simões, Green Chem., 2011, DOI: 10.1039/c1gc15101k

From coffee shop to biodiesel source in one step 04 Apr 2011 Ann Watson & Kathleen Too
Spent coffee grounds have been turned into biodiesel by researchers from Portugal and Spain, who combined two separate processes to produce the biodiesel in one step.

Spent coffee grounds contain up to 20 weight per cent lipids, most of which are triglycerides that can be extracted and converted by transesterification into the fatty acid methyl esters that make up biodiesel. Pedro Simões from the New University of Lisbon and colleagues produced the esters in a 93 per cent yield, combining the extraction and transesterification processes in one step.

The process combines extraction and transesterification in one step
Current commercial biodiesel production consists of an alkali-catalysed method to produce a mixture of fatty acid alkyl esters and glycerol. But, several purification processes are needed to remove the catalyst and by-products. Reactions in supercritical methanol without a catalyst have also been used – vegetable oils are more soluble in supercritical methanol than in normal methanol, leading to greater yields – but scientists need expensive equipment to produce the high temperatures and pressures required.

Simões' team performed the reaction in supercritical methanol at 603K and 30MPa to obtain a fatty acid methyl ester in a yield of 85 per cent. To increase the yield further, they had to increase the temperature and pressure. But then they found that adding carbon dioxide to the mixture gave a higher yield – 93 per cent – at a reduced temperature of 573K and pressure of 10MPa.

The researchers explain that CO2 may play a dual role in the reaction by increasing the extraction rate of oil from the spent coffee grounds and recovering the methyl esters from the reaction mixture.

This work should pave the way for developing methods for new ways of processing waste food rather than composting and anaerobic digestion, says **Rafael Luque**, an expert on biofuels from the University of Cordoba, Spain. He adds that 'there is a need to change the perception of waste as a problem – it should be perceived as a resource to produce valuable chemicals and biofuels.'

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MU researchers turn coffee to biodiesel fuel

Researchers at the biofuel lab have found a way to skip the drying step.

http://www.themaneater.com/stories/2010/4/27/mu-researchers-turn-coffee-biodiesel-fuel/

By Samantha Sunne Published April 27, 2010

Coffee isn't just a fuel for people anymore.

MU researchers have found a way to convert the coffee grounds commonly found in beverages into biodiesel fuel.

Most biodiesel fuel in the U.S. is made from soybean oil, but the researchers developed an efficient process for extracting oil from used coffee, biological engineering assistant professor Bulent Koc said.

"The extraction process is one of the most energy-intensive processes in biodiesel production," Koc said. "Once you have the oil, no matter where you get it, you can convert it into biodiesel."

Koc and his staff spent six months drying used coffee grounds, extracting oil from them and converting that oil into biodiesel. They used grounds from the faculty cafeteria and from Starbucks, he said.

Professor Leon Schumacher said coffee grounds are a better source of oil than soybeans because soybeans could be used for food instead.

"The goal here, then, is to take a product that we would otherwise simply throw away and actually capture the oil that remains in that product," Schumacher said. "The amount of oil that's in the coffee is very similar to the amount of oil that's in a soybean."

Ground coffee contains 10 to 18 percent oil by weight, said Mudhafar Abdullah, a post-doctorate fellow at MU's biofuel lab.

The process of turning coffee grounds into biodiesel fuel is not new, Abdullah said. But the MU team found a way to extract the oil without drying the grounds, which saves time and energy.

Wet coffee grounds contain 70 percent water and can take up to eight hours to dry, Koc said. The drying process also uses a lot of energy.

"In our system, we developed a method that would allow us to extract oil from materials like coffee grounds without drying," Koc said.

The system devised by the researchers should save money, as well as time.

"If you use soybeans, you have to pay for the raw materials," Koc said. "That is one of the reasons for high biodiesel costs. If we can recycle some of the materials that we are consuming on a day-to day basis, we might reduce the biodiesel production costs."

For the next few months, the team will test the biodiesel from coffee grounds, as well as other alternative fuels, on a small engine in the biofuel lab. Koc said they will determine how well the engine performs and how each fuel is different from regular diesel fuel.

Schumacher said anyone can start using the process at any time, but it will only be cost-efficient if they have a system in place to collect the coffee grounds.

"If you wanted to set the systems in place, you could use it, you know, tomorrow," Schumacher said. "(But) we have to first put a system in place that is efficient to collect this product."

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