



biofuels

international

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Taking matters into hand

The emergence of portable and handheld equipment is speeding up fuel quality analysis

**European biodiesel
and ethanol – market
statistics for 2009
inside**

**Includes
storage
supplement**

Regional focus: biofuels in Canada

The correct equipment to test for cloud point will ensure the wheels of the biodiesel industry keep on moving

The automatic standard of analysis

Who has not had a sink clogged by vegetable oil? The same refined product introduced into a vehicle's fuel system, a storage tank or pipeline if not properly tested can send profits down the drain. Instead of throwing the kitchen sink at it, biodiesel producers and users alike can count on an automatic analysis method and be assured of tested standards to combat the problem of fuel gelling.

Until the day global warming grows palm trees in the Arctic, when there is cold and when there is biodiesel there is a problem.

The cloud point of biodiesel is the temperature at which it begins to gel due to the formation of wax crystals. When the fuel gels it cannot get past the fuel filter in trucks or cars, rendering the vehicles stationary. And in storage tanks during cold weather when the fuel has not moved it has a tendency to gel due to long time exposure, necessitating costly heating services.

When this happens the fuel has to be warmed, which takes time and expense. To combat downtime, producers and users can insulate the system and so keep the fuel warm throughout its lifetime, while others mix in cold-flow additives. When users know a cold-snap is coming they mix in a different grade of petrodiesel with a lower cloud point.

Typical B100 biodiesel has a cloud point around 0°C (32°F) but can vary depending on the mix of feedstock used to produce the biodiesel.

Conventional diesel has a much lower cloud point of between -10 and -20°C. Blending the fuels together or combining with additives is necessary for the fuel to be stored, pumped and used in colder climates. Requirements change depending on geographic region and time of year.

Finding the optimum blend saves unnecessary and costly inclusion of No. 1 and No. 2 diesel fuel. With increasing government support of renewable fuels and mandates requiring use of biodiesel, producers and blenders rely on cloud point analysers that are efficient and economically sound.

Generally B100 is not used to power motor vehicles; it is blended with other fuels. In North America the blend of biodiesel in diesel generally ranges from the most common B2 to B5 and B10, with transport fuels mixed up to B20 in some cases. In Europe, the world's leading biodiesel continent, B100 is often found in heavy duty road vehicles, so analysis is not only required but regular.

Producers are willing to blend as much biodiesel in diesel as possible for trading purposes, but if there is too much the cloud point will get warmer, as biodiesel as a neat fuel has a warmer cloud point, meaning the fuel will gel at colder temperatures. Blending is not uniform and a certain cloud point target cannot be reached by a proportional volumetric mix of biodiesel and diesel.

Cloud point is one of the fundamental cold flow parameters, especially in the



Phase Technology's CPA-T30

US. It is a part of specifications and therefore everyone who manufactures and sells fuel has to test for its cloud point. With varying provincial and national mandates, cloud point analysis is vital in providing producers, pipeline operators, distributors and users with the assurance their fuel will remain usable.

Man or machine?

The biodiesel industry is no exception to the maxim that time is money, especially when it comes to testing and analysis. Other sectors of the fuels industry may test the cloud point once a week, whereas major biodiesel producers will test once a day, every few hours or every time a new batch is made to ensure its consistent properties and quality.

For those testing on an occasional basis, it may not be economical to invest in automatic analysis equipment. As the commercial market moves forward, and human resources costs get higher,

it appreciates the benefits of automation. At a biodiesel facility processing conditions can change and the producers need to recertify the fuel by testing cloud point and other properties such as viscosity, flash point and cold filter plugging point.

There are two main ways to test for cloud point. Historically, manual tests were performed on biodiesel samples. This is a labour- and time-intensive process, as an operator must be present at all times. The operator takes a sample of biodiesel and places it in a test tube with a thermometer, caps it, then deposits it into a chiller. At regular intervals the operator removes the test tube and observes for cloudiness or crystal formation. The operator continues this process of returning the sample to the chiller and watching for the appearance of crystals, while recording the observations until cloud point is reached.

An automatic analyser avoids this highly inconvenient process. With an automatic

test instrument, such as the CPA-T30 portable cloud point analyser from Canada-based Phase Technology, fuel is inserted into the apparatus and within three to five minutes the test is finished. The analyser is much faster than the manual test method, which takes from 60 to 90 minutes.

From lab to lap

As the biodiesel industry grows, so does the technology to support it, and this technology is coming out of the lab and seeing daylight. Shipping fuel back and forth to the lab, arranging a technician to analyse it and waiting for the results has slowed the pace of change.

These days, when people make biodiesel they want to test it there and then on site. A trip to the laboratory is counter-productive. A portable biodiesel analyser is a good alternative, as it does not require much

Up to standard

Today, mainstream producers need to ensure their fuel is certified and adheres to all standards. They can rarely find this in one go from one supplier.

ASTM D5773 and D7397, as used in Phase Technology 70X and CPA-T30 analysers, are the only current automatic methods for determining cloud point allowed in ASTM D6751, the specification used to control pure biodiesel (B100) quality prior to blending with conventional diesel type fuels.

ASTM D5773 and D7397 are included as methods for determining cloud point

in ASTM D7467, the specification that covers finished fuel blends of between 6 (B6) and 20 (B20) percent biodiesel for on- and off-road diesel engine use.

'We are the only manufacturer of a mini portable system which has an ASTM method with it,' Gordon Chiu, VP of Technology at Phase Technology, says. 'Other companies claim to have one or the other, not both, and not truly portable as their systems weigh 50-70lbs, while our device weighs 3lbs. And some may even not have received a standard – we are unique in the combination.'

upfront investment for purchase.

Phase Technology's CPA-T30 Portable Cloud Point Analyser introduced in 2007, evolved from the company's 70X series laboratory analyser for cold flow properties. It is an ideal quality control tool for fuel distributors, truck fleets, biodiesel producers and users, terminals, pipelines, military, educational and R&D labs.

The CPA-T30 marks the company's dedicated entrance into the biodiesel sector. Phase Technology engineers observed the trend in the biodiesel industry and saw it required something more cost effective and portable.

The CPA-T30 reduces fuel cost by ensuring a proper blending ratio of diesel and biodiesel to meet specific climate requirements. It prevents downtime as accurate cloud point information prevents possible fuel gelling.

Phase Technology's portable analyser also provides blending support – the on-screen 'blends' function calculates the approximate volume ratio of two fuels to mix together to obtain a target cloud point. The test instrument further optimises additives, enabling producers to add sufficient amounts without overdosing. And it monitors fuel quality – with an added checkpoint for quality control of product and suppliers.

Phase Technology's 70X lab analyser has been on the market for over 15 years and is mostly used in the petrodiesel and oil industry. The 70X is more robust and can go to lower temperatures with a bigger cooling system. The CPA-T30 is a miniaturised version which cannot cool as much but is more accurate in testing biodiesel. The T30 uses patented diffusive light scattering (DLS) technology. In simple terms it is a visual perception like the human eye. There are other methods to see crystals such

as light transmission. During Phase Technology's analysis light travelling in an optical fibre enters the fuel, and if it is cloudy light is scattered off the crystals and captured by a receiver.

The 70X can also be configured to test for pour point and freeze point – capabilities that are important in different sectors of the petroleum industry. Freeze point is primarily used to characterise aviation jet fuels while pour point is relevant to pumpability for both diesels and lubricants.

Phase Technology's CPA-T30 is about a quarter of the cost of a 70X. As such, it is an economical alternative for the biofuels market.

In the pipeline

Aside from fuel distributors and biodiesel facility operators, one major pipeline company has invested heavily in the portable CPA-T30, having bought tens of them rather than having expensive lab instruments. The pipelines are connected to various terminals in the US where the fuel is sampled before it is sent further down the pipeline to ensure it meets specification and is not contaminated or degraded.

A branch of the US military also uses the CPA-T30 for mobile testing of trucks and vehicles around different places in the world. A portable system is convenient and it makes sure fuel is fit for purpose. ●

For more information:
www.phase-technology.com



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