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Re: Cetane Discussion Paper

Before discussing the various issues raised in the Discussion Paper I wish to pose a question which touches on the general quality of biodiesel as a fuel in compression ignition motors. The question is this:

Is it possible to produce a biodiesel which conforms to the specified standards of conversion and purity and which does not have burning characteristics in a diesel motor equal to or better than standard diesel fuel?

If the answer is "no" it would be logical for the community to save itself a lot of money and effort by simply removing the cetane specification from the standard.

Mandated Cetane Limit for Biodiesel

The forthcoming standard will limit the cetane number of biodiesel to a minimum of 51. Is there any reason to set it so much higher than the standard for petroleum diesel, 46? There is some uncertainty about the cetane values of biodiesel made from various oils. Oils with higher levels of unsaturation produce fuel of lower cetane.

Setting the minimum value to 51 raises some doubt as to whether the more unsaturated fuels produced in Australia would pass the standard. It is clear however that imported palm oil would produce a fuel which would easily pass the standard so there is some concern that this setting may unfairly impact Australian farmers. This would be a decidedly bizarre result and prove very unpopular. It is to be hoped that the figure 51 was chosen because recent more accurate studies have shown that even the most unsaturated biodiesel produced in Australia will pass the standard.

Measuring Cetane

There is appreciable variation in the published cetane values of biodiesel made from various oils. This suggests that measuring cetane may be an inexact science especially when applied to biodiesel. Far more accurate is gas chromatographic analysis which will be used to determine the purity and degree of conversion.

This technology can also determine the type of oil from which the fuel was made. In particular it is possible to accurately determine the degree of unsaturation of the oil. It will be possible to derive an equation for the purpose of calculating a biodiesel cetane index. Such an index would have the same advantages over a measured cetane as is found with the diesel cetane index.

I am not aware of any equipment available in Australia that may be used to test the Cetane Number by the standard method. This requires a variable compression motor. Some experiments have been done however using a normal small diesel motor in which the induction pressure was reduced, instead of varying the motor compression, to achieve a similar test of combustion performance.

It is reasonable to suppose that, if it was decided that measurement of cetane in Australia was essential, a small fraction of the \$500,000 cost of a variable compression motor would suffice to fund research to develop the alternative method.

Summary

1. The question of whether properly made biodiesel always has a satisfactory combustion performance relative to standard petroleum diesel must be asked. If found to be true the cetane limit should be regarded as irrelevant and removed from the standard.
2. If a measurement is required it should be based on gas chromatographic analysis and calculation of a biodiesel cetane index.
3. If a direct measurement of cetane is thought to be essential, an induction restriction method using a normal diesel motor should be developed.

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