

ASTM Update

Richard Nelson

National Biodiesel Board

rnelson@ksu.edu



Biodiesel Defined

Biodiesel, n. -- a fuel comprised of **mono-alkyl esters of long chain fatty acids** derived from vegetable oils or animal fats, **meeting ASTM D 6751**, designated B100.

- ◆ **This definition should be included in all state statutes, rules and regulations.**



<u>Property</u>	<u>Test Method</u>	<u>Limits</u>	<u>Units</u>
(Visual Appearance)	D 4176	Free of un-dissolved water, sediment and suspended matter	
Calcium & Magnesium	EN 14538	5 max	ppm (ug/g)
Flash Point	D 93	130 min.	degrees C
Water & Sediment	D 2709 (4176)	0.05 max.	% volume
Kin. Viscosity, 40C	D 445	1.9 - 6.0	mm ² /sec.
Sulfated Ash	D 874	0.02 max.	% mass
Sulfur S500	D 5453	0.05 max (500)	% mass (ppm)
S15	D 5453	0.0015 max (15)	% mass (ppm)
Copper Corrosion	D 130	No. 3 max.	
Cetane number	D 613	47 min.	
Cloud Point	D 2500	Report	degrees C
Carbon Residue	D 4530	0.05 max.	% mass
Acid Number	D 664	0.50 max.	mg KOH/g
Free Glycerin	D 6854	0.020	% mass
Total Glycerin	D 6854	0.240	% mass
Phosphorous content	D 4951	0.001 max	% mass
Distillation, T90 AET	D 1160	360 max	degrees C
Na/K, combined	EN 14538	5 max	ppm (ug/g)
Oxidation Stability	EN 14112	3 minimum	hours

BOLD = BQ-9000 Producer Critical Specification Testing Once Production Process Under Control





BIODIESEL B100 meeting D 6751: Critical

- If B100 meets D 6751, then most blends of B20 or lower will meet D 975 parameters
- B100 must be measured prior to blending for accurate compliance with D 6751
- Its impossible to tell if B100 met spec once it is in blended form, so testing must occur at B100 level
- Almost all problems in the field are from B100 that didn't meet D 6751
 - Minnesota issues: out of spec fuel
- OEM's have accepted B5 and are becoming increasingly comfortable with B20



B5 in D 975 Status

- B5 in D 975 passed subcommittee E in December 2006! { Expect B5 D975 full ASTM in 12/2007 }
- ***First biodiesel blended fuel ballot to pass Subcommittee E***
- Potential issue with precipitates above the cloud point with B100 has been identified
 - Does this translate to blends?
 - Additional specifications on cold flow properties that characterize biodiesel -→ may lead to a #1 BD
- Task force formed as part of passing Subcommittee E ballot



- 6.3 Blended Fuels and Alternative Fuels -The detailed requirements for blended fuels and alternative fuels from non-petroleum sources shall be as follows:
 - 6.3.1 Biodiesel for Blending-- If biodiesel is a component of any diesel fuel, the biodiesel shall meet the requirements of D 6751.
 - 6.3.1.1 Biodiesel Blends -- Diesel fuel oil containing up to 5 vol% biodiesel must meet the requirements for the appropriate Grade No. 1-D or No. 2-D fuel as listed in Table 1.
 - 6.3.1.2 Test Method EN 14078 shall be used for determination of the vol % biodiesel in a biodiesel blend.
 - 6.3.1.3 Diesel fuels containing more than 5 vol% biodiesel component are not included in this specification.
 - 6.3.1.4 Biodiesel blends with No. 4-D fuel are not covered by this specification.



B6 to B20 Ballot: Dec 06

TM by the National Biodiesel Board

- ASTM has determined B6 to B20 will be a new ASTM standard number for now
 - In order to get something through ASTM
- D 975 may cover up to B20 in the future
 - Would have to meet all limits in Table 1 of D975, so some blends with diesel fuel close to upper limits will still need different spec, which is OK—just won't fall within D 975.
- Ballot failed, address negatives and re-ballot in February 2007 at Subcommittee E



Other 'Renewable Diesels' are coming.....

- Don't meet definition/properties in D 6751, (i.e. mono-alkyl esters of fats and oils)
- These are **NOT** biodiesel:
 - Thermal Depolymerization of turkey guts
 - Oils/fats with crude oil to petroleum refinery
 - Oils/fats through hydrotreater
 - Gasification to synthesis gas to Fisher Tropsch
 - Raw oil fats, water emulsified diesel, ethanol emulsified diesel
- OEMs and engine companies require the strict definition of what biodiesel is (and isn't).
 - Must have specifications and testing to make sure new fuels do not cause problems and hurt all renewable fuels



- BQ 9000 Accredited Producers
 - Required to generate COA
- COA required for governmental compliance
 - EPA, IRS (blend credit)
- Full Spec Testing ~\$1,200 - \$1,700
- Critical Spec Testing ~\$535 (not including EN 14112)
 - Once BQ 9000 production process under control



- A TON of new plants coming on-line, sooooo . . .
- Aggressively enforce D 6751 at the B100 level
 - ◆ Biodiesel Plants
 - ◆ Pipeline Terminals
 - ◆ Bulk Distributors
 - Take samples before problems happen
 - Not necessary for NCWM departments to do full ASTM D 6751 testing
 - Utilize B100 BQ 9000 Certified Marketer Surveillance Program



Marketer Surveillance Program

- B100 w/COA is received from BQ 9000 Accredited Producer
- Five B100 Properties tested same as BQ 9000 Certified Marketer
 - Visual Appearance, Flash Point, Acid Number, Free Glycerin & Total Glycerin
- **Cost ~\$375 (outsource lab)**
- Recommended for NCWM Quality Monitoring Program





NBB Quality Monitoring Request of NCWM

- Adopt D 6751 as a matter of state law
- Encourage Valid Certificates of Analysis and the adoption of the BQ-9000 program
- Establish capability to enforce B100 to D 6751 standard upstream of retail outlets

