Certified Reference Standards

BioFuels

FAME Mixtures

FAEE Mixtures

Sulfur Standards

Physical Standards

Wear Metals

ASTM & EN Method Standards

Custom Formulations

ASTM D6584 & EN 14105 Free and Total Glycerin in Biodiesel by GC

COMPOUND	QTY./CONC.		MATRIX	CAT. NO.	UNIT
Glycerin	0.5	mg/mL	Pyridine	BF-D-6584-01	2 mL
Monoolein	5	mg/mL	Pyridine	BF-D-6584-02	2 mL
1,3-Diolein	5	mg/mL	Pyridine	BF-D-6584-03	2 mL
Triolein	5	mg/mL	Pyridine	BF-D-6584-04	2 mL
(S)-(-)-1,2,4-Butanetriol	1	mg/mL	Pyridine	BF-D-6584-05-IS	5 mL
Tricaprin	8	mg/mL	Pyridine	BF-D-6584-06	5 mL
MSTFA	5	mL	Neat	BF-D-6584-07N	5 mL
SET of 7 above compounds				**BF-D-6584-SET**	**7 units**
Mix of above compounds, on right (MSTFA separate)					
Biofuel 20	0.5	mg/mL	CH_2Cl_2	BF-FU-030-D	2 mL
Biofuel 20	20	mg/mL	CH_2Cl_2	BF-FU-030-D-40X	2 mL
Biofuel 100 Consumer grade	0.5	mg/mL	CH_2Cl_2	BF-FU-029-D	2 mL
Biofuel 100 Consumer grade	20	mg/mL	CH_2Cl_2	BF-FU-029-40X	2 mL
Biofuel 100	0.5	mg/mL	CH_2Cl_2	BF-FU-032-D	2 mL
Biofuel 100	20	mg/mL	CH_2Cl_2	BF-FU-032-D-40X	2 mL

ASTM D6584 Mixture

BF-D-6584-MIX	**1 mL**
At stated conc. in Pyridine	6 comps.
Glycerol	0.5 mg/mL
Monoolein	5 mg/mL
1,3-Diolein	5 mg/mL
Trioctadecenoin (Olein)	5 mg/mL
(S)-(-)-1,2,4-Butanetriol	1 mg/mL
Tricaprin	8 mg/mL

Note: MSTFA (BF-D-6584-07N) can be ordered separately.

EN 14103 Fatty Acid Methyl Esters (FAMEs)

The methyl esters in the mixture are those derived from typical glycerides present in biomass sources. A comprehensive list of Fatty Acid Methyl Esters (FAMEs) can be found at www.accustandard.com under catalog prefix “UFA” and “SFA”.

Soy & Corn

BF-SOY-ME	**100 mg**
16:0 Palmitate	6% Wt.
18:0 Stearate	3% Wt.
20:0 Arachidate	3% Wt.
18:1 Oleate	35% Wt.
18:2 Linoleate	50% Wt.
18:3 Linolenate	3% Wt.

Rapeseed Oil

BF-RAP-ME	**100 mg**
14:0 Myristate	1% Wt.
16:0 Palmitate	4% Wt.
18:0 Stearate	3% Wt.
20:0 Arachidate	3% Wt.
22:0 Behenate	3% Wt.
24:0 Lignocerate	3% Wt.
18:1 Oleate	45% Wt.
22:1 Erucate	20% Wt.
18:2 Linoleate	15% Wt.
18:3 Linolenate	3% Wt.

Palm Kernel

BF-PALM-ME	**100 mg**
8:0 Caprylate	7% Wt.
10:0 Caprate	5% Wt.
12:0 Laurate	48% Wt.
14:0 Myristate	15% Wt.
16:0 Palmitate	7% Wt.
18:0 Stearate	3% Wt.
18:1 Oleate	12% Wt.
18:2 Linoleate	3% Wt.

Beef Tallow & Palm Oil

BF-BT-ME	**100 mg**
14:0 Myristate	2% Wt.
16:0 Palmitate	30% Wt.
16:1 Palmitoleate	3% Wt.
18:0 Stearate	14% Wt.
18:1 Oleate	41% Wt.
18:2 Linoleate	7% Wt.
18:3 Linolenate	3% Wt.

Fat and oil derivatives (FAME) Determination of MeOH Content.

Percent Methanol Calibration Standard Set

BF-MEOH-SET	**5 x 1 mL**
BF-MEOH-1X	100 µg/g
BF-MEOH-5X	500 µg/g
BF-MEOH-10X	1000 µg/g
BF-MEOH-25X	2500 µg/g
BF-MEOH-50X	5000 µg/g

Methanol *in Water*

Individual Mixes packaged under Nitrogen for stability

Fatty Acid Ethyl Esters (FAEEs)

Ethyl Esters in Soy & Corn

BF-SOY-EE	**100 mg**
16:0 Ethyl palmitate	6% Wt.
18:0 Ethyl stearate	3% Wt.
20:0 Ethyl arachidate	3% Wt.
18:1 Ethyl oleate	35% Wt.
18:2 Ethyl linoleate	50% Wt.
18:3 Ethyl linolenate	3% Wt.

Ethyl Esters in Rapeseed Oil

BF-RAP-EE	**100 mg**
14:0 Ethyl myristate	1% Wt.
16:0 Ethyl palmitate	4% Wt.
18:0 Ethyl stearate	3% Wt.
20:0 Ethyl arachidate	3% Wt.
22:0 Ethyl behenate	3% Wt.
24:0 Ethyl lignocerate	3% Wt.
18:1 Ethyl oleate	45% Wt.
22:1 Ethyl erucate	20% Wt.
18:2 Ethyl linoleate	15% Wt.
18:3 Ethyl linolenate	3% Wt.

Ethyl Esters in Palm Kernel Oil

BF-PALM-EE	**100 mg**
8:0 Ethyl caprylate	7% Wt.
10:0 Ethyl caprate	5% Wt.
12:0 Ethyl laurate	48% Wt.
14:0 Ethyl myristate	15% Wt.
16:0 Ethyl palmitate	7% Wt.
18:0 Ethyl stearate	3% Wt.
18:1 Ethyl oleate	12% Wt.
18:2 Ethyl linoleate	3% Wt.

Ethyl Esters in Beef Tallow

BF-BT-EE	**100 mg**
14:0 Ethyl myristate	2% Wt.
16:0 Ethyl palmitate	30% Wt.
16:1 Ethyl palmitoleate	3% Wt.
18:0 Ethyl stearate	14% Wt.
18:1 Ethyl oleate	41% Wt.
18:2 Ethyl linoleate	7% Wt.
18:3 Ethyl linolenate	3% Wt.

All neats are 100 mg. All solutions are 1 mL of 10 mg/mL concentration in Hexane as a solvent.

COMPOUND	NEATS	SOLUTIONS
Ethyl palmitate (16:0)	FAEE-006N	FAEE-006S
Ethyl stearate (18:0)	FAEE-007N	FAEE-007S
Ethyl arachidate (20:0)	FAEE-008N	FAEE-008S
Ethyl oleate (18:1)	FAEE-014N	FAEE-014S
Ethyl linoleate (18:2)	FAEE-012N	FAEE-012S
Ethyl linolenate (18:3)	FAEE-016N	FAEE-016S
Ethyl myristate (14:0)	FAEE-005N	FAEE-005S
Ethyl behenate (22:0)	FAEE-009N	FAEE-009S
Ethyl lignocerate (24:0)	FAEE-010N	FAEE-010S

COMPOUND	NEATS	SOLUTIONS
Ethyl erucate (22:1)	FAEE-011N	FAEE-011S
Ethyl caprylate (8:0)	FAEE-002N	FAEE-002S
Ethyl caprate (10:0)	FAEE-003N	FAEE-003S
Ethyl laurate (12:0)	FAEE-004N	FAEE-004S
Ethyl palmitoleate (16:1)	FAEE-001N	FAEE-001S
Ethyl nervonate (24:1)	FAEE-013N	FAEE-013S
Ethyl heptadecanoate (17:0)	FAEE-015N	FAEE-015S
Ethyl linolenate (gamma) (18:3)	FAEE-020N	FAEE-020S

ASTM D6751-06 & ASTM D5453 Sulfur as Di-n-butyl sulfide in Biodiesel

Note: 10,000 ppm = 1% Wt.

Each is in a 4 oz. bottle.

COMPOUND	ppm (µg/gL)	% WT.	MATRIX	CAT. NO.
Sulfur in B5	0	0	B5	BF-5453-B5-BL
Sulfur in B5	5	0.0005	B5	BF-5453-B5-5X-SET
Sulfur in B5	10	0.001	B5	BF-5453-B5-10X-SET
Sulfur in B5	15	0.0015	B5	BF-5453-B5-15X-SET
Sulfur in B5	30	0.003	B5	BF-5453-B5-30X
Sulfur in B5	50	0.005	B5	BF-5453-B5-50X
Sulfur in B5	70	0.007	B5	BF-5453-B5-75X
Sulfur in B5	100	0.01	B5	BF-5453-B5-100X
Sulfur in B5	200	0.02	B5	BF-5453-B5-200X
Sulfur in B5	500	0.05	B5	BF-5453-B5-500X
Sulfur in B20	0	0	B20	BF-5453-B20-BL
Sulfur in B20	5	0.0005	B20	BF-5453-B20-5X-SET
Sulfur in B20	10	0.001	B20	BF-5453-B20-10X-SET
Sulfur in B20	15	0.0015	B20	BF-5453-B20-15X-SET
Sulfur in B20	30	0.003	B20	BF-5453-B20-30X
Sulfur in B20	50	0.005	B20	BF-5453-B20-50X
Sulfur in B20	70	0.007	B20	BF-5453-B20-75X
Sulfur in B20	100	0.01	B20	BF-5453-B20-100X
Sulfur in B20	200	0.02	B20	BF-5453-B20-200X
Sulfur in B20	500	0.05	B20	BF-5453-B20-500X
Sulfur in B100	0	0	B100	BF-5453-B100-BL
Sulfur in B100	5	0.0005	B100	BF-5453-B100-5X-SET
Sulfur in B100	10	0.001	B100	BF-5453-B100-10X-SET
Sulfur in B100	15	0.0015	B100	BF-5453-B100-15X-SET
Sulfur in B100	30	0.003	B100	BF-5453-B100-30X
Sulfur in B100	50	0.005	B100	BF-5453-B100-50X
Sulfur in B100	70	0.007	B100	BF-5453-B100-75X
Sulfur in B100	100	0.01	B100	BF-5453-B100-100X
Sulfur in B100	200	0.02	B100	BF-5453-B100-200X
Sulfur in B100	500	0.05	B100	BF-5453-B100-500X

Technical Note

The 5, 10 and 15 ppm sulfurs are supplied as a set including a blank.

AccuStandard suggests using the blank for analysis to compensate for matrix interferences, such as low levels of native sulfur.

The Future

Algae, as a biofuel feedstock, yields energy balances higher than even soybeans. (source: "Widescale Biodiesel Production from Algae", Briggs, Michael, University of New Hampshire Biodiesel Group, UNH (revised August 2004) page 8.

Full Circle

"Liquid biofuels have been used since the early days of the car industry. Nikolaus August Otto, the German inventor of the combustion engine, conceived his invention to run on ethanol. Rudolf Diesel, the German inventor of the Diesel engine, designed it to run on peanut oil. Henry Ford originally designed the Ford Model T, a car produced from 1903 to 1926, to run completely on ethanol." (source: http://en.wikipedia.org/wiki/Biofuel Retrieved 8/31/2007).

Physical Standards

COMPOUND	CONC.		MATRIX	CAT. NO.	UNIT
ASTM D2500					
Cloud Point	TBD *	°C	B5	BF-D-2500-B5	8 oz.
Cloud Point	TBD *	°C	B20	BF-D-2500-B20	8 oz.
Cloud Point	TBD *	°C	B100	BF-D-2500-B100	8 oz.
ASTM D93					
Flash Point	60	°C		BF-D-93-60C	8 oz.
Flash Point	65	°C		BF-D-93-65C	8 oz.
Flash Point	140	°C		BF-D-93-140C	8 oz.
ASTM D4951					
Phosphorus Content	0.001	% Wt.	B5	BF-D-4951-B5	50 g
Phosphorus Content	0.001	% Wt.	B20	BF-D-4951-B20	50 g
Phosphorus Content	0.001	% Wt.	B100	BF-D-4951-B100	50 g
EN ISO 12937 & ASTM D6304					
(KF) Water Content	60	µg/g		BF-KF-0.6X-5ML-VAP	10 x 5 mL
(KF) Water Content	100	µg/g		BF-KF-1X-5ML-VAP	10 x 5 mL
(KF) Water Content	1000	µg/g		BF-KF-10X-5ML-VAP	10 x 5 mL
(KF) Water Content	5000	µg/g		BF-KF-50X-5ML-VAP	10 x 5 mL
ASTM D6751 & UOP 391 & EN 14108 & EN 14109					
Sodium / Potassium	100	ppm	B5	BF-UOP-391-B5	50 g
Sodium / Potassium	100	ppm	B20	BF-UOP-391-B20	50 g
Sodium / Potassium	100	ppm	B100	BF-UOP-391-B100	50 g
EN 14538					
Calcium / Magnesium	100	ppm	B5	BF-14538-B5	50 g
Calcium / Magnesium	100	ppm	B20	BF-14538-B20	50 g
Calcium / Magnesium	100	ppm	B100	BF-14538-B100	50 g

* TBD - These values will be certified on the individual lots and may vary between lots.

Note: All products are Refinery grade stock, unless specifically marked Consumer grade.

EN 14214 Wear Metals

Each is 50 grams at 1000 μg/g concentration.

COMPOUND	MATRIX	CAT. NO.
Aluminum in B5	B5	BF-WM-B5-01
Aluminum in B20	B20	BF-WM-B20-01
Aluminum in B100	B100	BF-WM-B100-01
Chromium in B5	B5	BF-WM-B5-13
Chromium in B20	B20	BF-WM-B20-13
Chromium in B100	B100	BF-WM-B100-13
Copper in B5	B5	BF-WM-B5-15
Copper in B20	B20	BF-WM-B20-15
Copper in B100	B100	BF-WM-B100-15
Iron in B5	B5	BF-WM-B5-27
Iron in B20	B20	BF-WM-B20-27
Iron in B100	B100	BF-WM-B100-27
Lead in B5	B5	BF-WM-B5-29
Lead in B20	B20	BF-WM-B20-29
Lead in B100	B100	BF-WM-B100-29
Silicon in B5	B5	BF-WM-B5-52
Silicon in B20	B20	BF-WM-B20-52
Silicon in B100	B100	BF-WM-B100-52

Formulations for EN 12916, other methods and custom formulations are available.

Discussions

As important as alternative fuels are, their development is not a panacea. A balance among all the conflicting concerns will be reached in the future, sometimes with the assistance of chemical analysis using certified reference standards.

- "Food-or-fuel" is the subject of current discussions. Since corn and soy are used as both food sources and as biofuel stocks, high biofuel demand raises food prices throughout the grocery store.
- Biofuel production is not completely carbon neutral today, since fossil fuels are consumed to grow, process and transport the biomass crops. However, the Life Cycle Analysis (LCA) for biofuels has shown that current biofuels save up to 60% of carbon emissions as compared to using petroleum fuels[1].
- The emergence of biofuels has stimulated other controversies as well. Pesticides are usually used to grow the more common biomasses. In many areas of the world, the run-off of pesticides from farmlands is a great concern for aquatic ecosystems.
- Genetically Engineered (GE) biofuel crops may require less pesticide, but the proliferation of GE crops, whether for food or for fuel, is another entire controversy in some countries.
- There is a concern that growers may destroy ecological treasures in their zeal to meet the burgeoning demand for the biomasses. Cutting down parts of the Amazon Rain Forest to plant soy or deforesting the Malaysian rain forest and draining peat bogs in Indonesia to establish new palm oil plantations are current concerns. The concerns go beyond the aesthetic. When a forest is converted to farmland, animal habitat and biodiversity is lost, and when peat bogs are drained, large amounts of CO_2 are released to the atmosphere.
- The world's infrastructure is not ready today to completely replace petroleum, or to fully implement the potentials of biofuel. The biofuel production plants are barely more than pilot plants today, certainly not on the scale of the mega refineries for petroleum. Few engines are currently designed to accept 100% biofuel. Biofuel stations are not readily available in most parts of the world.
- A further concern is that when habitable land is converted to farmland, indigenous people may be dispossessed.
- The technology of biofuel is in the development stage. The biomasses named in the current press are categorized as first generation biofuels. Second generation biofuels use biomass to liquid technology, and include technologies such as:

  a. Bio generated hydrogen
  b. Bio generated di-methyl ether (DME)
  c. Bio generated methanol
  d. Bio generated DMF
  e. HTU diesel, diesel produced from wet bio-mass
  f. Diesel produced by Fischer-Tropsch technology
  g. Methanol processed from syngas

The LCA studies for these second generation biofuels show that biofuels can save up to 1/3 more carbon emissions than first generation biofuels as compared to LCA of petroleum based fuels[2].

Footnotes:
1. Concawe European WTW study (http://ies.jrc.ec.eu.int/wtw.html) Section 5.
2. "Life Cycle Inventory of Biodiesel and Petroleum Diesel for use in an Urban Bus," Final Report, Sheeham, John, et al. Prepared for U.S. Department of Energy. Pages 220-222.

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