SETTING UP A BIODIESEL PROCESS CONTROL AND QUALITY LABORATORY

by: HARRISON LAU LIK NANG; PUAH CHIEW WEI; YUNG CHEE LIANG; CHOO YUEN MAY and MA AH NGAN

399

MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2007 MPOB TS No. 24

Strong demand for green and environment-friendly fuels in recent years has led to worldwide development of the biodiesel industry. The Malaysian Palm Oil Board (MPOB) has responded to the global need and emerged as one of the leading technology providers for the production of biodiesel from palm oil. Research on palm biodiesel in MPOB started way back in 1982, followed by the setting up of a 3000 t yr^{-1} palm biodiesel pilot plant (together with PETRONAS) in 1985. Basic understanding of the characteristics of indigenous minor components in palm oil and transesterification of palm oil is the key factor for the successful commercialization of the MPOB palm biodiesel technology in 2005.

Quality monitoring and control is an important element in a commercial biodiesel plant. To ensure that only good quality biodiesel is sold, the European Union and United States have established their own fatty acid methyl esters (FAME) specifications – EN 14214 and ASTM D6751-07a, respectively. Both the EN 14214 and ASTM D6751-07a standards for neat biodiesel are internationally recognized and cover almost every aspect of fuel quality which must be continuously maintained by the producer in order to sell his product.

The biodiesel specifications in EN 14214:2003 and ASTM D6751-07a are given in *Table 1*.

SCOPE OF CONSULTANCY

As technology provider for biodiesel production, MPOB also offers a consultancy service for setting up the biodiesel process control and quality laboratory. The scope of the service offered is:

- laboratory layout;
- hands-on training on biodiesel analysis;
- analytical methods and procedures; and
- instruments and equipment.

TRACK RECORD AND CURRENT PROJECTS

- Carotino Sdn Bhd, Pasir Gudang, Johor (completed) – *Figure 1*.
- Enertech Co. Ltd, Pyeongtaek, South Korea (completed).
- Golden Hope Biodiesel Sdn Bhd, Carey Island, Klang (completed) – *Figure 2*.
- Kumpulan Fima Bhd, North Port, Klang (ongoing).

CONSULTANCY FEES

- Chemicals*
- Training materials
- Man-hour charges

*Applicable only with training in MPOB laboratory.

PROCEDURE

Write in officially to Director-General, MPOB to indicate interest

↓

Meeting to discuss services required

↓

Consultancy Agreement signed by all parties involved

↓

Provision of service based on agreement by all parties

CONCLUSION

Priority for providing the service will be given to companies using MPOB's biodiesel production technology.

ISSN 1511-7871
9 771511 787001

Malaysian Palm Oil Board, Ministry of Plantation Industries and Commodities, Malaysia
P. O. Box 10620, 50720 Kuala Lumpur, Malaysia. *Tel:* 03-87694400 *Website:* http://mpob.gov.my *Telefax:* 03-89259446

MPOB

Figure 1. Biodiesel Quality Control Laboratory at Carotino Sdn Bhd, Pasir Gudang, Johor.

Figure 2. Biodiesel Quality Control Laboratory at Golden Hope Biodiesel Sdn Bhd, Carey Island, Klang.

TABLE 1. SPECIFICATIONS FOR BIODIESEL (B100) – EN 14214:2003 AND ASTM D6751-07a

Property	EN 14214:2003		ASTM D6751-07a		Unit
	Limits	Test Method	Limits	Test Method	
Ester content	96.5	EN 14103	-	-	% (m m^{-1})
Density at 15°C	860-900	EN ISO 3675 EN ISO 12185	-	-	kg m^{-3}
Viscosity at 40°C	3.50-5.00	EN ISO 3104	1.9-6.0	D 445	mm^{-2} s^{-1}
Flash point	120 min	prEN ISO 3679	130 min	D 93	°C
Sulphur content	10.0 max	prEN ISO 20846 prEN ISO 20884	-	-	mg kg^{-1}
Carbon residue	0.30 max (10% distillation residue)	EN ISO 10370	0.05 max (100% sample)	D 4530	% (m m^{-1})
Cetane number	51.0 min	EN ISO 5165	47.0 min	D 613	
Sulphated ash content	0.02 max	ISO 3987	0.02 max	D 874	% (m m^{-1})
Water content	500 max	EN ISO 12937	-	-	mg kg^{-1}
Total contamination	24 max	EN 12662	-	-	mg kg^{-1}
Copper strip content (3 hr at 50°C)	Class 1	EN ISO 2160	No. 3 max	D 130	rating
Oxidative stability, 110°C	6.0 min	EN 14112	3.0 min	EN 14112	hr
Acid value	0.50 max	EN 14104	0.50 max	D 664	mg KOH g^{-1}
Iodine value	120 max	EN 14111	-	-	g iodine/100 g
Linolenic acid methyl ester	12.0 max	EN 14103	-	-	% (m m^{-1})
Polyunsaturated (>=4 double bonds) methyl esters	1 max	-	-	-	% (m m^{-1})
Methanol content	0.20 max	EN 14110	-	-	% (m m^{-1})
Monoglycerides content	0.80 max	EN 14105	-	-	% (m m^{-1})
Diglyceride content	0.20 max	EN 14105	-	-	% (m m^{-1})
Triglyceride content	0.20 max	EN 14105	-	-	% (m m^{-1})
Free glycerol	0.02 max	EN 14105 EN 14106	0.020 max	D 6584	% (m m^{-1})
Total glycerol	0.25 max	EN 14105	0.240 max	D 6584	% (m m^{-1})
Metals					
Group I (Na + K)	5.0 max	EN14108/9	5.0 max	EN 14538	mg kg^{-1}
Group II (Ca + Mg)	5.0 max	prEN 14538	5.0 max	EN 14538	mg kg^{-1}
Phosphorus content	10.0 max	EN 14107	10.0 max	D 4951	mg kg^{-1}
Water and sediment	-	-	0.05 max	D 2709	% vol
Sulphur	-	-			
S 15 Grade			0.0015 max	D 5453	% mass
S 500 Grade			0.05 max	D 5453	% mass
Distillation, T90 AET	-	-	360 max	D 1160	°C
Workmanship	-	-	Free of undissolved water, sediment & suspended matter		

For more information kindly contact:

Director-General
MPOB
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.
Tel: 03-87694400
Website: http://mpob.gov.my
Telefax: 03-89259446