Property	Unit	Model equations	Input parameters	*ARD* (%) [c]		References
				Reported	This study	
Cetane number (*CN*)	-					
Model 1		Global FAMEs mixture correlation : [a] $CN=61.1+0.088\cdot w_{14:0}+0.133\cdot w_{16:0}+0.152\cdot w_{18:0}-0.101\cdot w_{16:1}-0.039\cdot w_{18:1}-0.243\cdot w_{18:2}-0.395\cdot w_{18:3}$ **(1.1)** $R^2=0.88$ Performs better at: [b] $w_{18:1}>17.82$; $w_{16:0}\leq 25$ and $w_{18:0}\leq 16$	w_i, weight prop. of the C14:0, C16:0, C16:1, C18:0, C18:1, C18:2, and C18:3 FAMEs.	3.18 (1.98-4.02); *N*=19	11.75, *N*=274/ 9.91, *N*=6	(Bamgboye and Hansen, 2008; Tong et al., 2011)
Model 2		*CNs* of individual FAMEs (cetane number of the i^{th} FAME in the mixture) : [e] $\varphi_i=-52.974+(13.767-1.202\cdot ndb_i+0.152\cdot ndb_i^2)\cdot nc_i-0.351\cdot nc_i^2$ **(1.2)** $R^2=0.946$ To obtain the global *CN* for FAMEs mixture, Linear mixing rule (Modified Grunberg–Nissan model) is applied as follows : $CN=\sum_i^n w_i\cdot\varphi_i$ **(1.3)**	ndb_i, numb. of double bonds of the i^{th} FAME; nc_i, numb. of carbon atoms of the i^{th} FAME; w_i, weight prop. of the i^{th} FAME.	6.5 (1.5-25.1); *N*=11	11.78, *N*=274/ 5.34, *N*=6	(Lapuerta et al., 2009; Tong et al., 2011)
Model 3		*CNs* of individual FAMEs (cetane number of the i^{th} FAME in the mixture) : $\varphi_i=58.1+2.8\cdot(\frac{nc_i-9}{2})-15.9\cdot ndb_i$ **(1.4)** Linear mixing rule : *cf.* **(1.3)** Performs better at: $14<w_{18:2}\leq 29$ and $w_{20:0}>1$	ndb_i, numb. of double bonds of the i^{th} FAME; nc_i, numb. of carbon atoms of the i^{th} FAME; w_i, weight prop. of the i^{th} FAME.	5.55; *N*=35	11, *N*=274/ 11.39, *N*=6	(Klopfenstein, 1985; Su et al., 2011)
Model 4		CNs of individual FAMEs (cetane number of the i^{th} FAME in the mixture) :	nc_i, numb. of carbon atoms of the i^{th} FAME; w_i, weight prop. of the i^{th} FAME.	0.96 (0.02-2.98); *N*=19	11.26, *N*=274/ 5.14, *N*=6	(Tong et al., 2011)

		$\varphi_i(\mathrm{Cn}:0) = -107.71 + 31.126 \cdot nc_i - 2.042 \cdot nc_i^2 + 0.0499 \cdot nc_i^3$ $R^2 = 0.9835$ **(1.5)** $\varphi_i(\mathrm{Cn}:1,2,3) = 109 - 9.292 \cdot nc_i + 0.354 \cdot nc_i^2$ $R^2 = 0.9058$ Linear mixing rule : $CN = 1.068 \cdot \sum_i^n (w_i \cdot \varphi_i) - 6.747$ **(1.6)** Performs better at: $w_{18:1} > 18$ and $w_{18:0} \leq 6$				
Model 5		CNs of individual FAMEs (cetane number of the *i*th FAME in the mixture) : $\varphi_i = -7.8 + 0.302 \cdot M_i - 20 \cdot ndb_i$ **(1.7)** Linear mixing rule : $CN = \sum_i^n x_i \cdot \varphi_i$, where: $x_i = \frac{\frac{w_i}{M_i}}{\sum_i^n \left(\frac{w_i}{M_i}\right)}$ **(1.8)** Performs better at: $x_{18:1} > 0.3$ and $x_{20:0} \leq 0.03$	ndb_i, numb. of double bonds of the ith FAME; w_i, weight prop. of the ith FAME; x_i, mol. mass fraction of the *i*th FAME; M_i, mol. weight of the *i*th FAME.	3.24 (2.4-5.85); *N*=5	11.43, *N*=274/ 5.2, *N*=6	(Ramírez-Verduzco, 2012)
Cold Filter Plugging Point (*CFPP*)	°C					
Model 1		Global FAMEs mixture correlation : $CFPP = 0.511 \cdot w_{16:0} - 7.823$, with $0 < w_{16:0} < 45$ **(2.1)**	$w_{16:0}$, weight prop. of the C16:0.	0.88	3.9, *N=20*/ 2.99, *N=6*	(Sarin et al., 2009)
Model 2		Global FAMEs mixture correlation : $CFPP = 18.019 \cdot \overline{nc} - 0.804 \cdot w_{n:1,2,3}$ **(2.2)** Where $\overline{nc} = \frac{\sum_i^n x_i \cdot nc_i}{\sum_i^n x_i}$ **(2.3)**, with x_i as defined in equation **(1.8)**	$w_{n:1,2,3}$, weight prop. of the unsaturated FAMEs; $\overline{nc}$, weighted avg. no. of carbon atoms.	0.83	4.6, *N=20*/ 5.26, *N=6*	(Su et al., 2011)
Model 3		Global FAMEs mixture correlation : $CFPP = (3.1417 \cdot LCSF) - 16.477$ **(2.4)**	w_i, weight prop. of the saturated	*n.d.*	8.41, *N=20/*	(Ramos et al.,

		Where the long-chain saturated factor (LCSF) of the mixture is defined as: $LCSF = 0.1 \cdot w_{16:0} + 0.5 \cdot w_{18:0} + 1 \cdot w_{20:0} + 1.5 \cdot w_{22:0} + 2 \cdot w_{24:0}$ **(2.5)**	FAMEs.		5.91, *N*=6	2009)
Cloud point (*CP*)	°C					
Model 1		Global FAMEs mixture correlation : $CP = 0.526 \cdot w_{16:0} - 4.992$, $R^2 = 0.963$, with $0 < w_{16:0} < 45$ **(3.1)**	$w_{16:0}$, weight prop. of the C16:0.	*n.d.*		(Sarin et al., 2009)
Model 2		Global FAMEs mixture correlation : $CP = 18.134 \cdot \overline{nc} - 0.79 \cdot w_{n:1,2,3}$ **(3.2)**, with $\overline{nc}$ as defined in equation **(2.3)**	$w_{n:1,2,3}$, weight prop. of the unsaturated FAMEs; $\overline{nc}$, weighted avg. no. of carbon atoms.	*n.d.*		(Su et al., 2011)
Density (ρ), 20°C	g/cm^3					
Model 1		ρs of individual FAMEs (density of the i^{th} FAME in the mixture) : $\rho_i = 851.4714 + \frac{250.718 \cdot ndb_i + 280.899}{1.214 + nc_i}$ **(4.1)** $R^2 = 0.969$ Linear mixing rule : $\rho = \sum_i^n w_i \cdot \rho_i$ **(4.2)**	ndb_i, numb. of double bonds of the i^{th} FAME; nc_i, numb. of carbon atoms of the i^{th} FAME; w_i, weight prop. of the i^{th} FAME.	0.66 (0.02-5.31); *N*=32	1.16, *N*=79/ 0.65, *N*=6	(García et al., 2013; Lapuerta et al., 2009)
Model 2		ρs of individual FAMEs (density of the i^{th} FAME in the mixture) : $\rho_i = 0.8463 + \frac{4.9}{M_i} + 0.0118 \cdot ndb_i$ **(4.3)** Linear mixing rule : $\rho = \sum_i^n x_i \cdot \rho_i$ **(4.4)**	ndb_i, numb. of double bonds of the i^{th} FAME; x_i, mol. mass fraction of the i^{th} FAME; M_i, mol. weight of the i^{th} FAME;	0.47 (0.24-0.67); *N*=5	1.4, *N*=79/ 1, *N*=6	(Ramírez-Verduzco, 2012)
Flash point (*FP*)	°C					
Model 1		Global FAMEs mixture correlation : $FP = 23.362 \cdot \overline{nc} + 4.854 \cdot \overline{ndb}$ **(5.1)**	$\overline{nc}$, weighted avg. no. of carbon atoms; $\overline{ndb}$, weighted avg. no. of double bonds;	1.81	14.47, *N*=45/ 22.49, *N*=6	(Su et al., 2011)

		Where $\overline{ndb}=\frac{\sum_i^n x_i \cdot ndb_i}{\sum_i^n x_i}$ **(5.2)**, and $\overline{nc}$ as defined in equation **(2.3)** Performs better at: $\overline{nc}$ > 17.6 and $FP \leq 170$ °C	x_i, mol. mass fraction of the i^th FAME;			
Model 2		*FPs* of individual FAMEs (flash point of the *i*^th FAME in the mixture) *:* $\theta_i=(0.3544 \cdot T_{b_i}^{1.14711} \cdot nc_i^{-0.07677})-273.15$ **(5.2)** Linear mixing rule : $FP=\sum_i^n w_i \cdot \theta_i$ **(5.3)**	nc_i, numb. of carbon atoms of the *i*^th FAME; T_{bi}, normal ebullition point of the *i*^th FAME. w_i, weight prop. of the *i*^th FAME.	*n.d.*	18, *N*=49/ 12.4, *N*=6	(Catoire, 2006)
Higher heating value (*HHV*)	MJ/kg					
Model 1		*HHVs* of individual FAMEs (higher heating value of the *i*^th FAME in the mixture) *:* $\delta_i=46.19-\frac{1794}{M_i}-0.21\,nc_i$ **(6.1)** Linear mixing rule : $HHV=\sum_i^n x_i\,\delta_i$ **(6.2)**	x_i, mol. mass fraction of the *i*^th FAME; M_i, mol. weight of the *i*^th FAME.	1.92	0.87, *N*=38/ 0.49, *N*=6	(Ramírez-Verduzco, 2012)
Iodine value (*IV*)	g I_2/100 g					
Model 1		Global FAMEs mixture correlation (slightly tuned in this study) : $$\begin{aligned} IV=89.79-1.11 \cdot w_{10:0}-0.85 \cdot w_{12:0}-0.97 \cdot w_{14:0}-0.43 \cdot w_{16:0} \\ -0.59 \cdot w_{16:1}-0.81 \cdot w_{18:0}-0.11 \cdot w_{18:1} \\ +0.77 \cdot w_{18:2}+1.49 \cdot w_{18:3}-0.8 \cdot w_{20:0} \\ R^2=0.898 \end{aligned} \quad \textbf{(7.1)}$$ Performs better at: $w_{14:0} \leq 17$; $w_{12:0} \leq 44$; $w_{18:0} \leq 18$; $w_{16:0} \leq 26$; and $w_{18:0} > 10$	w_i, weight prop. of the C10-20:0, C16:1 and C18:1-3 FAMEs.	1.79 (-0.26, 3.37); *N*=10	11.08, *N*=158/ 3.75, *N*=5*	(Gopinath et al., 2009)
Model 2		Global FAMEs mixture correlation : $IV=\sum_i^n 100\left(\frac{253.81 \cdot w_i \cdot ndb_i}{M_i}\right)$ **(7.2)**	ndb_i, numb. of double bonds of the i^th FAME; w_i, weight prop. of the i^th FAME;	*n.d.*	8.29, *N*=158/ 2.96, *N*=5*	(Knothe, 2002)

			x_i, mol. mass fraction of the i^{th} FAME; M_i, mol. weight of the i^{th} FAME.			
Model 3		Global FAMEs mixture correlation (slightly tuned in this study) : $IV = w_{n:1} + 1.5 \cdot w_{n:2} + 2.51 \cdot w_{n:3}$ **(7.3)**	$w_{n:1}$, weight prop. of the monounsaturated FAMEs; $w_{n:2}$, $w_{n:3}$, weight prop. of the ployunsaturated FAMEs.	10.6 (5.5, 12.24); *N*=10	10, *N*=158/ 7.44, *N*=5*	(Kyriakidis and Katsiloulis, 2000)
Induction period (*IP*)	h					
Model 1		$IP = 6.1924 + 0.85242 \cdot w_{8:0} - 1.31462 \cdot w_{10:0} + 0.24307 \cdot w_{12:0} + 0.23174 \cdot w_{14:0} + 0.15171 \cdot w_{16:0} - 0.13884 \cdot w_{18:0} + 0.01139 \cdot w_{18:1} - 0.07447 \cdot w_{18:2} - 0.06931 \cdot w_{18:3} - 0.67224 \cdot w_{20:0} - 0.05735 \cdot w_{20:1} - 0.07329 \cdot w_{22:1}$	w_i, weight prop. of the C8-20:0, C18:1-3, C20:1 and C22:1 FAMEs.	*n.d.*	22, *N*=55/ 13.9, *N*=6	(Barradas Filho et al., 2015)
Model 2		Global FAMEs mixture correlation : $IP = \frac{117.9295}{(w_{18:2} + w_{18:3})} + 2.5905$ **(8.1)** Conditions: $0 < (w_{18:2} + w_{18:3}) < 100$	w_i, weight prop. of the C18:2, and C18:3 FAMEs.	*n.d.*	28, *N*=50/-	(Park et al., 2008)
Model 3		Global FAMEs mixture correlation : $OS = 0.27 \cdot w_{n:0} + 0.31 \cdot w_{n:1} - 0.09 \cdot w_{n:2,3}$ **(8.2)** $R^2 = 0.88$ Conditions: $7.2 \le w_{n:0} \le 92.9$; $5.9 \le w_{n:1} \le 83.1$; and $1.2 \le w_{n:2,3} \le 61.3$ Global FAMEs mixture correlation : $OS = 49.0 \cdot w_{n:2,3}^{-0.50}$ **(8.3)** $R^2 = 0.91$ Conditions: $1.2 \le w_{n:2,3} \le 61.3$	$w_{n:0}$, weight prop. of the saturated FAMEs; $w_{n:1}$, weight prop. of the monounsaturated FAMEs; $w_{n:2,3}$, weight prop. of the ployunsaturated FAMEs.	5.29-24; *N*=10	42.6, *N*=24/ 60, *N*=6	(Serrano et al., 2014)

Model 4		Global FAMEs mixture correlation : $OS = -0.0384 \cdot DU + 7.770$ $R^2 = 0.6421$ **(8.4)** Where the degree of unsaturation (*DU*) is defined as: $DU = 1 \cdot w_{n:1} + 2 \cdot w_{n:2} + 3 \cdot w_{n:3}$ **(8.5)**	$w_{n:1}$, weight prop. of the monounsaturated FAMEs; $w_{n:2}$, $w_{n:3}$, weight prop. of the ployunsaturated FAMEs.	*n.d.*	20.5, *N*=50/-	(Wang et al., 2012)
Pour point (*PP*)	°C					
Model 1		Global FAMEs mixture correlation : $PP = 0.571 \cdot w_{16:0} - 12.24$ $R^2 = 0.863$ **(9.1)**, with 0 <$w_{16:0}$<45	$w_{16:0}$, weight prop. of the C16:0.			(Sarin et al., 2009)
Model 2		Global FAMEs mixture correlation : $PP = 18.880 \cdot \overline{nc} - w_{n:1,2,3}$ **(9.2)**	$\overline{nc}$, weighted avg. no. of carbon atoms; $w_{n:1,2,3}$, weight prop. of the unsaturated FAMEs.			(Su et al., 2011)
Saponification value (*SV*)	g KOH/100g					
Model 1		Global FAMEs mixture correlation (slightly tuned in this study) : $241.85 + 0.08 \cdot w_{10.0} + 0.38 \cdot w_{12.0} + 0.02 \cdot w_{14.0} - 0.17 \cdot w_{16.0} - 1.67 \cdot w_{16.1} - 0.47 \cdot w_{18.0} - 0.45 \cdot w_{18.1} - 0.42 \cdot w_{18.2} - 0.41 \cdot w_{18.3} - 0.46 \cdot w_{20.0}$ $R^2 = 0.715$ **(10.1)**	w_i, weight prop. of the C10-20:0, C16:1 and C18:1-3 FAMEs.	1.13 (0.19-2.29); *N*=10	2.25, *N*=125/ 4.68, *N*=6	(Gopinath et al., 2009)
Model 2		Global FAMEs mixture correlation : $SV = \sum_i^n \left(\frac{561.06 \cdot w_i}{M_i} \right)$ **(10.2)**	w_i, weight prop. of the i^th FAME; M_i, mol. weight of the *i*^th FAME.	*n.d.*	5.2, *N*=125/ 0.52, *N*=5	(Knothe, 2002)
Kinematic viscosity (*η*), 40°C	mm²/s					
Model 1		*η*s *of* individual FAMEs (kinematic viscosity of of the *i*^th FAME in the mixture) : $\mathrm{Ln}(\eta_i)_{Cn:0} = a \cdot nc_i^b + \frac{c \cdot nc_i^d}{e \cdot \mathrm{Ln}(nc_i) + f + T}$ **(11.1)**	ndb_i, numb. of double bonds of the *i*^th FAME;	1.33; *N*=247	5.33, *N*=183/ 6.73, *N*=5	(Chavarria-Hernand

		Individual monounsaturated FAMEs : $\mathrm{Ln}(\eta_i)_{\mathrm{C}\,n:1} = g\cdot nc_i^h + \frac{i\cdot nc_i^j}{k+T}$ **(11.2)** Individual polyunsaturated FAMEs : $\mathrm{Ln}(\eta_i)_{\mathrm{C}\,n:2,3} = g\cdot(nc_i - ndb_i^l)^h + \frac{i\cdot(nc_i - ndb_i^l)^j}{k+T}$ **(11.3)** with T = 313.15 K Linear mixing rule : $\mathrm{Ln}(\eta) = \sum_i^n x_i \cdot \mathrm{Ln}(\eta_i)$ **(11.4)**	nc_i, numb. of carbon atoms of the i^{th} FAME; w_i, weight prop. of the i^{th} FAME; Values of parameters *a* - *l* given by the reference; x_i, mol. mass fraction of the i^{th} FAME.			ez and Pacheco - Catalán, 2014)
Model 2		ηs *of* individual FAMEs (kinematic viscosity of of the i^{th} FAME in the mixture) : $\mathrm{Ln}(\eta_i) = -12.503 + 2.496\cdot \mathrm{Ln}(M_i) - 0.178\cdot ndb_i$ **(11.5)** Linear mixing rule : *cf.* **(11.4)**	ndb_i, numb. of double bonds of the i^{th} FAME; M_i, mol. weight of the i^{th} FAME.	1.68	5.37, *N*=183/ 6.81, *N*=6	(Ramírez Verduzco, 2013)
Model 3		Global FAMEs mixture correlation : $\eta = A\cdot\overline{nc} + B\cdot\overline{ndb} + C$ (11.6) Performs better at: $\eta \leq 4.77$ mm²/s	$\overline{nc}$, weighted avg. no. of carbon atoms; $\overline{ndb}$, weighted avg. no. of double bonds;	5.45	11.37, *N*=176/ 10.82, *N*=6	(Su et al., 2011)

* Coconut oil value out of range

φ_i, cetane number of the i^{th} FAME; M_i, molecular weight of the i^{th} FAME; ndb_i, number of double bonds of the i^{th} FAME; nc_i, number of carbon atoms of the i^{th} FAME; w_i, weight proportion of the i^{th} FAME; x_i, molar mass fraction of the i^{th} FAME; $w_{14:0}$, weight proportion of C14:0 methyl-ester; $w_{16:0}$, weight proportion of C16:0 methyl-ester; $w_{18:0}$, weight proportion of C18:0 methyl-ester; $w_{16:1}$, weight proportion of C16:1 methyl-ester; $w_{18:1}$, weight proportion of C18:1 methyl-ester; $w_{18:2}$, weight proportion of C18:2 methyl-ester; $w_{18:3}$, weight proportion of C18:3 methyl-ester; n: total number of FAMEs

ρ_i, density of the i^{th} FAME;

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