



HOKKAIDO UNIVERSITY

Title	Droplet evaporation characteristics of hydrotreated vegetable oil (HVO) under high temperature and pressure conditions
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Supplementary data 1

Supplementary data 1-A: Constants used in Eq. (3.2).

θ	θ_1	θ_2	a	b	c	d	e	f
T_c	T_b	SG	10.6443	-5.1747 E-04	-0.54444	3.5995 E-04	0.81067	0.53691
T_c	MW	SG	554.4	-1.3478 E-04	-0.61641	0.0000	0.2998	1.0555
P_c	T_b	SG	6.162 E+06	-4.725 E-03	-4.8014	3.1939 E-03	-0.4844	4.0846
P_c	MW	SG	4.5203 E+04	-1.8078 E-03	-0.3084	0.0000	-0.8063	1.6015

T_c : critical temperature (°R); P_c : critical pressure (psia); and T_b : boiling point (°R), MW: Molecular weight (g/mol); SG: Specific gravity

Conversion factors: °R = 1.8 K; 1 psia = 6894.757 Pa

Supplementary data 1-B: Calculation of average MW, SG, and T_b of HVO mixtures using Eq. (3.3) and T_c and P_c using Raizi-Dubbert correlation, Eq. (3.2).

Species i (Alkanes)	MW (g/mol)	SG	T_b (K)	Mass fraction		
				HVO: C ₁₅ -C ₁₈	HVO: C ₁₅ - C ₁₈ /iso-octane	HVO: C ₁₅ -C ₁₈ /iso- dodecane (n- dodecane)
n-C15H32	212.42	0.770	543.83	13.00	13.13	9.30
n-C16H34	226.45	0.773	560.01	20.00	19.54	13.80
n-C17H36	240.47	0.777	575.30	39.00	37.70	26.50
n-C18H38	254.50	0.782	589.86	28.00	27.40	19.30
iso (n)- dodecane	170.34	0.740 (0.750)	450.80 (489.47)	0.00	0.00	31.10 (31.10)
iso-octane	114.23	0.692	372.20	0.00	2.23	0.00
MW (g/mol)				237.948	235.077	216.823 (216.823)
SG				0.77669	0.77477	0.76525 (0.76836)
T_b (K)				572.23	567.64	534.35 (546.38)
T_c (K)				730	726	701* (707)
P_c (bar)				12.90	13.05	14.45* (14.24)

*: Value calculated based on T_b and SG obtained from Eq. (3.3)

Supplementary data 1-C1: Variation of t_{95}/D_0^2 (s/mm²) with ambient temperature for diesel (Average values obtained from 5 tests with standard deviation < 1%).

Pressure (MPa)	Temperature (K)			
	573	673	773	873
0.1MPa	17.32495	9.105058	6.048061	4.720567
0.5MPa	21.80676	9.0855	5.764943	4.290421
1.0MPa	28.92107	9.656254	5.615728	3.893441
1.5MPa	37.16932	10.22433	5.432446	3.79824
2.0MPa	45.52242	10.84389	5.929435	3.718521

Supplementary data 1-C2: Variation of t_{95}/D_0^2 (s/mm²) with ambient temperature for HVO: C₁₅-C₁₈/iso-dodecane (Average values obtained from 5 tests with standard deviation < 1%).

Pressure (MPa)	Temperature (K)			
	573	673	773	873
0.1MPa	13.26787	7.316163	5.240958	4.121669
0.5MPa	14.98833	7.167041	4.878579	3.742722
1.0MPa	17.90706	7.338957	4.783847	3.403848
1.5MPa	21.2062	7.588614	4.497931	3.259503
2.0MPa	24.17039	7.732078	4.490637	3.19753