Experimental liquid densities of red palm oil at pressures up to 150 MPa from (312 to 352) K and dynamic viscosities at 0.1 MPa from (293 to 353) K

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Table S1. Analysis of fatty acid composition for vegetable oils.

	Fatty acid content (%)													
Oils	$C_{8:0}$	$C_{10:0}$	$C_{12:0}$	$C_{14:0}$	$C_{16:0}$	$C_{16:1}$	$C_{18:0}$	$C_{18:1}$	$C_{18:2}$	$C_{18:3}$	$C_{20:0}$	$C_{22:0}$	$C_{24:0}$	Ref.
RPO	0.03	0.04	0.32	0.90	21.60	0.26	3.20	56.60	16.00	0.40	0.50	0.10	0.10	This work
Palm	-	-	0.10	0.90	45.60	0.40	3.80		10.50	0.10	-	-	-	[1]
Palm	-	0.03	0.20	0.60	42.50	0.10	4.00	41.90	9.80	0.10	0.40	0.10	0.20	[2]
Sunflower	-	-	-	-	5.83	-	3.24	26.28	62.97	0.38	0.21	0.59	0.19	[3]
Soybean	-	-	-	-	10.10	-	3.94	22.47	55.17	7.04	0.31	0.34	0.11	[3]
Corn	-	-	-	-	10.85	-	1.74	29.48	55.80	1.07	0.41	0.13	0.17	[3]
Olive oil	-	-	-	-	12.72	0.90	2.49	71.51	10.10	0.69	0.43	0.13	0.06	[4]

Triglyceride content of oils listed above: (90 to 99) % [5, 6].

$C_{8:0}$: Caprylic acid, $C_{10:0}$: Capric acid, $C_{12:0}$: Lauric acid, $C_{14:0}$: Myristic acid, $C_{16:0}$: Palmitic acid, $C_{16:1}$: *Palmitoleic acid*, $C_{18:0}$: Stearic acid, $C_{18:1}$: Oleic acid, $C_{18:2}$: Linoleic acid, $C_{18:3}$: Linolenic acid, $C_{20:0}$: Arachidic acid, $C_{22:0}$: Behenic acid, $C_{24:0}$: Lignoceric acid.

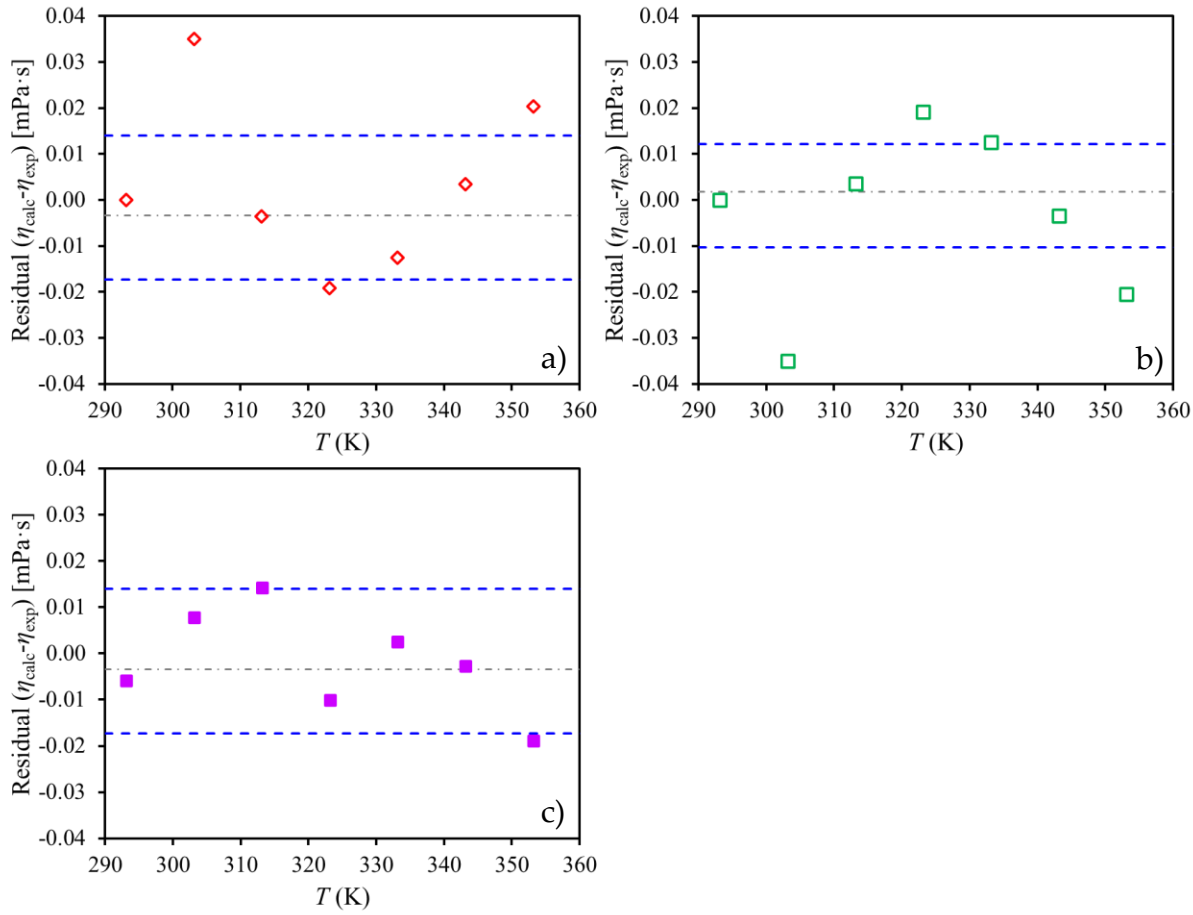


Figure S1. Residual deviation of (a) (◊) Rodenbush et al. [7] model; (b) (□) Vogel-Fulcher-Tammann (VFT) model; (c) (■) Doolittle free volume (FV) model. Lines: (- - -) 95 % confidence interval, (-·-) mean.

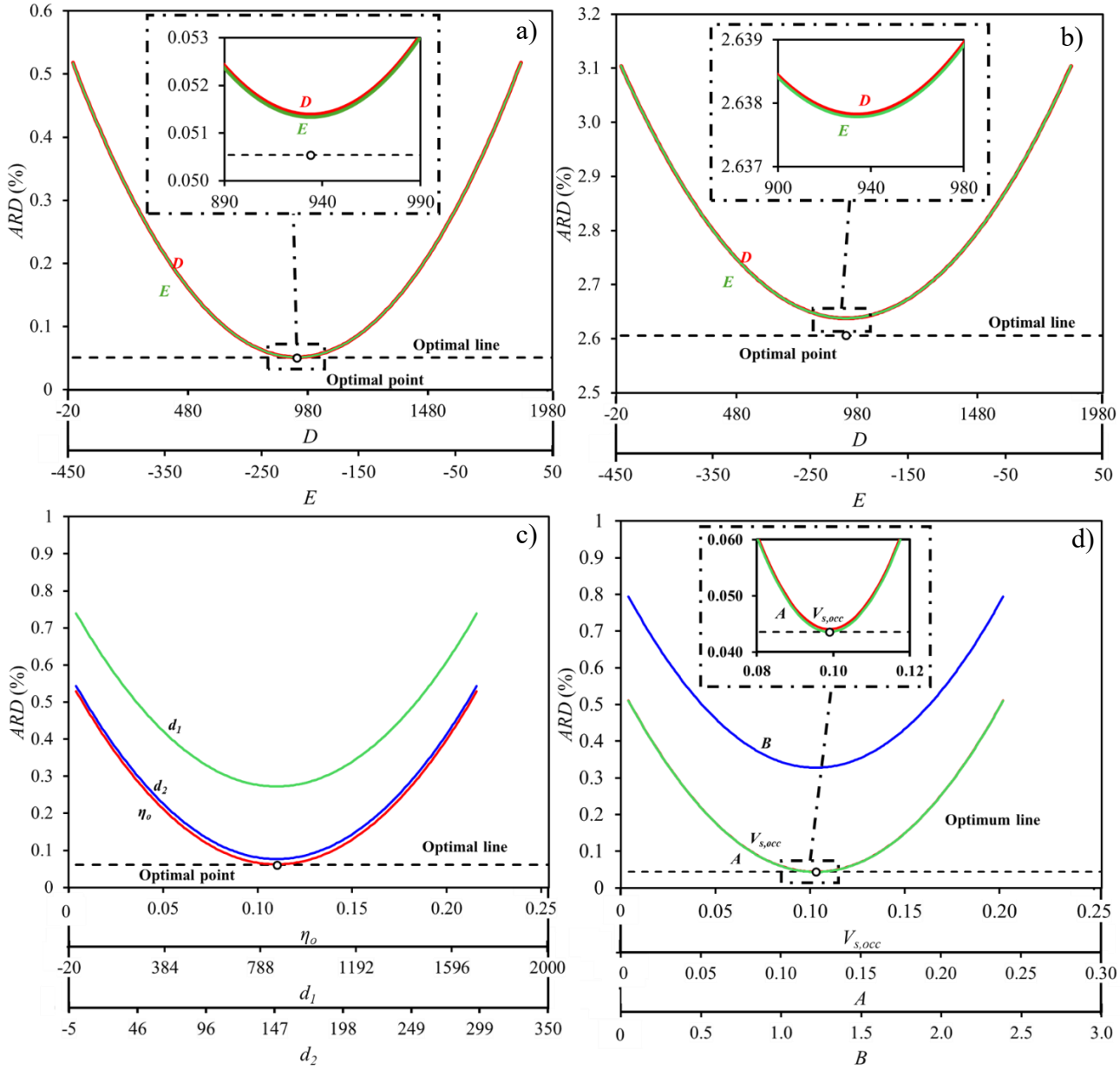


Figure S2. Optimal parameter analysis of Rodenbush et al. [7] model, Vogel-Fulcher-Tammann (VFT) model, and Doolittle free volume (FV) model for red palm oil. Correlation model (properties): (a) Rodenbush et al. [7] model (density); (b) Rodenbush et al. [7] model (viscosity); (c) VFT model (viscostiy) (d) FV model (viscosity). Optimal point and line: minimized deviation between experimental data and calculated data with a set of parameters.

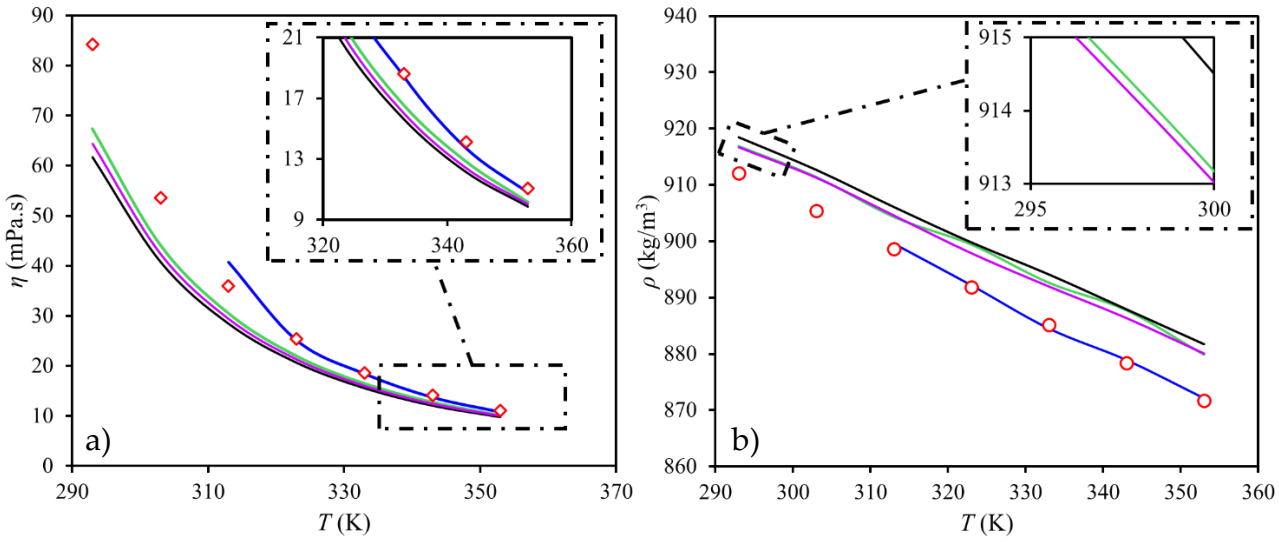


Figure S3. Experimental of (◊) dynamic viscosities (a) and (○) atmospheric densities (b) for red palm oil were compared with calculated oils at (293 to 353) K. Calculated oils [1]: (——) palm oil; (——) sunflower oil; (——) soybean oil; (——) corn oil.

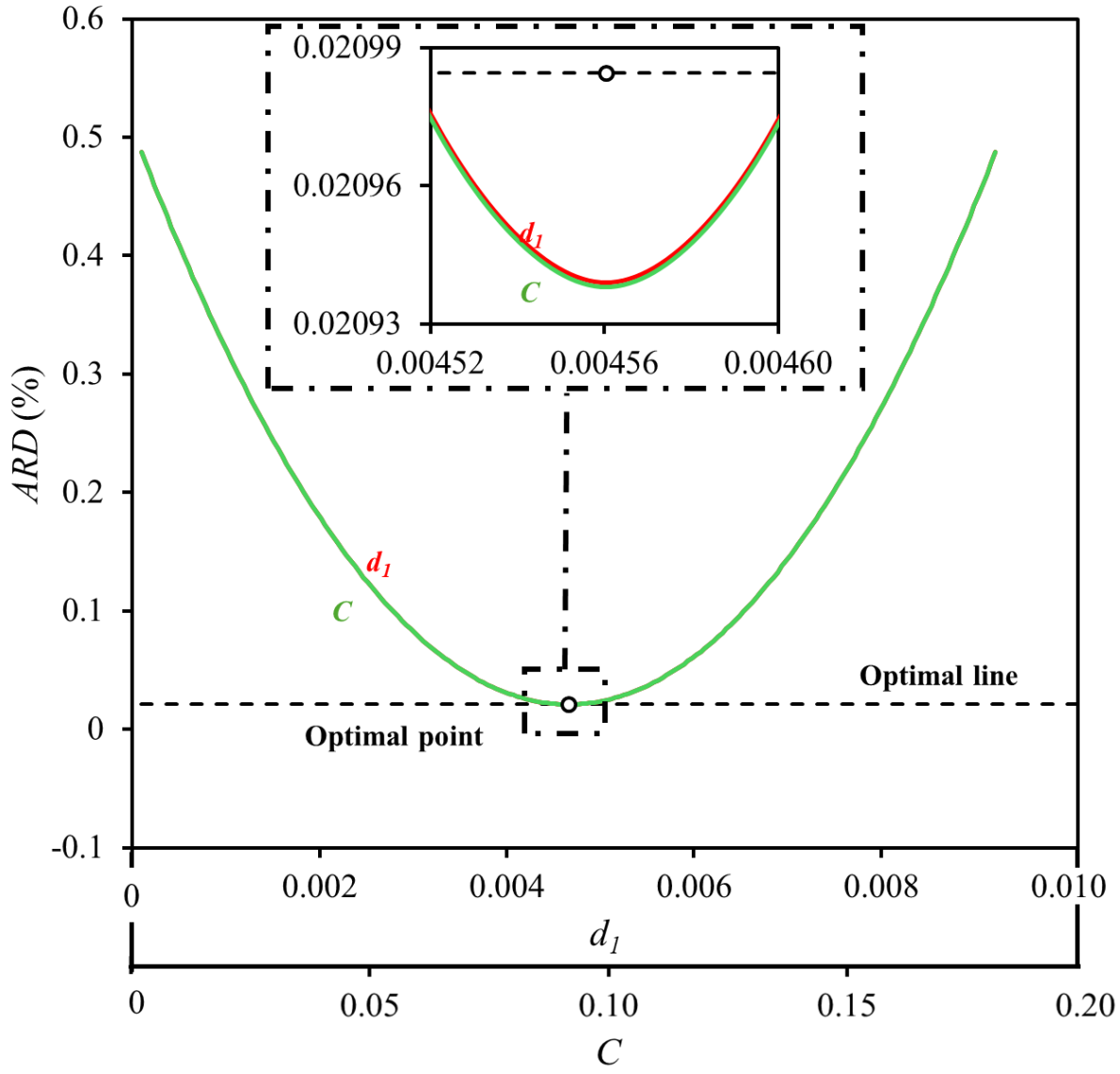


Figure S4. Optimal parameter analysis of Tait model for high-pressure density of red palm oil. Optimal point and line: minimized deviation between experimental data and calculated data with a set of parameters.

Table S2. Summary of Tait equation parameters and average relative deviation (ARD) for experimental liquid densities of oils at high pressure.

	$\rho(P_o, T)$			$D(T)$			
	a_0	a_1	a_2	b_0	b_1	C	ARD (%)
	(m^3 kg^{-1})	(m^3 kg^{-1} K^{-1})	(m^3 kg^{-1} K^{-2})	MPa	K^{-1}		
RPO	8.756E-04	6.951E-07	1.995E-10	6.484E+02	4.563E-03	9.514E-02	0.021
Palm oil	8.254E-04	9.443E-07	-1.071E-10	6.442E+02	4.870E-03	9.179E-02	0.011
Olive oil	9.384E-04	3.547E-07	6.056E-10	4.531E+02	2.397E-03	1.143E-01	0.105

Table S3. Molecular parameters for red palm oil, palm oil and olive oil determined by fitting high-pressure densities with the Perturbed-Chain Statistical Associating Fluid Theory (PC-SAFT) equation.

Oils	Mw (g mol^{-1})	m	σ (Å)	ε/k_B (K)	ARD (%)
RPO	821.7	34.003	3.400	277.35	0.143
Palm oil	806.7	34.662	3.344	264.90	0.084
Olive oil	831.8	35.977	3.368	291.72	0.285

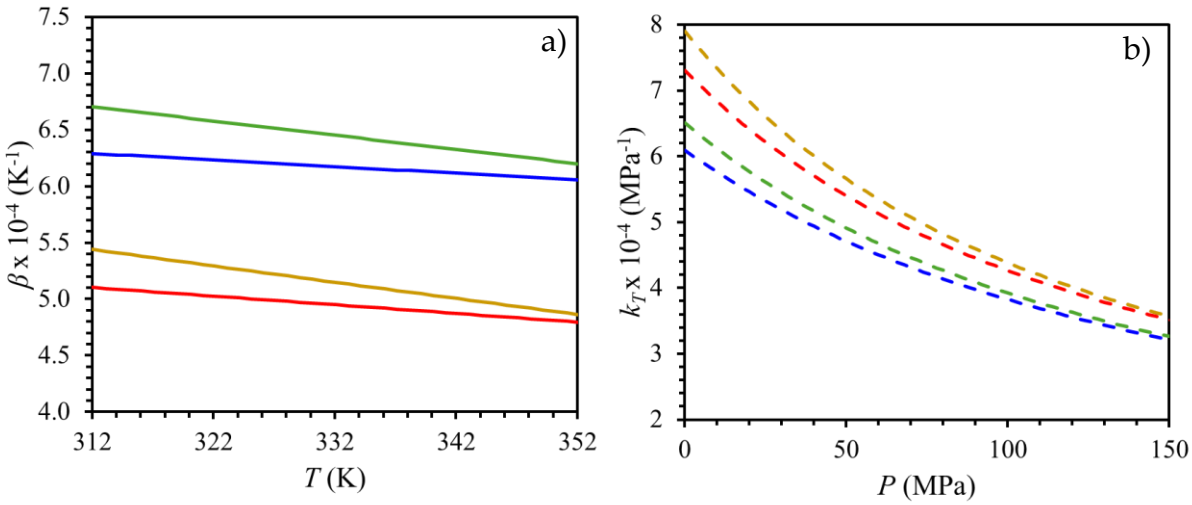


Figure S5. Calculation of volumetric behavior of vegetable oils with Tait model for (a) thermal expansion (β) at 50 MPa and 150 MPa at (312 to 352) K and (b) isothermal compressibility (κ_T) at (0.1 to 150) MPa at 312 K and 352 K. Red palm oil (This work): (——) 50 MPa; (——) 150 MPa; (- - -)312 K; (- - -) 352 K. Palm oil [2]: (——) 50 MPa; (——) 150 MPa; (- - -) 312 K; (- - -) 352 K.

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