

Electronic Supplementary Information

Predicting the Density and Viscosity of Hydrophobic Eutectic Solvents: Towards the Development of Sustainable Solvents

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Table S.1: Experimental density and viscosity data points of all the HESs used in this work with their corresponding uncertainties and references. All data points were measured at $P = 1.01$ bar.

T (K)	ρ (gcm ⁻³)	T (K)	η (mPas)
HES1- Decanoic Acid : Tetrabutylammonium Chloride (2:1) ¹			
288.20 $\pm$ 0.02	0.9232 $\pm$ 0.0005	288.20 $\pm$ 0.02	526.39 $\pm$ 1.84
293.20 $\pm$ 0.02	0.9199 $\pm$ 0.0005	293.20 $\pm$ 0.02	368.54 $\pm$ 1.29
298.20 $\pm$ 0.02	0.9168 $\pm$ 0.0005	298.20 $\pm$ 0.02	265.26 $\pm$ 0.93
303.20 $\pm$ 0.02	0.9136 $\pm$ 0.0005	303.20 $\pm$ 0.02	195.05 $\pm$ 0.68
308.20 $\pm$ 0.02	0.9104 $\pm$ 0.0005	308.20 $\pm$ 0.02	146.16 $\pm$ 0.51
313.20 $\pm$ 0.02	0.9073 $\pm$ 0.0005	313.20 $\pm$ 0.02	111.52 $\pm$ 0.39
318.20 $\pm$ 0.02	0.9042 $\pm$ 0.0005	318.20 $\pm$ 0.02	86.53 $\pm$ 0.30
323.20 $\pm$ 0.02	0.9010 $\pm$ 0.0005	323.20 $\pm$ 0.02	68.27 $\pm$ 0.24
HES2- Decanoic Acid : Tetraheptylammonium Chloride (2:1) ¹			
288.20 $\pm$ 0.02	0.8972 $\pm$ 0.0005	288.20 $\pm$ 0.02	307.09 $\pm$ 1.07
293.20 $\pm$ 0.02	0.8939 $\pm$ 0.0005	293.20 $\pm$ 0.02	227.96 $\pm$ 0.80
298.20 $\pm$ 0.02	0.8907 $\pm$ 0.0005	298.20 $\pm$ 0.02	172.87 $\pm$ 0.61
303.20 $\pm$ 0.02	0.8875 $\pm$ 0.0005	303.20 $\pm$ 0.02	133.19 $\pm$ 0.47
308.20 $\pm$ 0.02	0.8843 $\pm$ 0.0005	308.20 $\pm$ 0.02	104.19 $\pm$ 0.36
313.20 $\pm$ 0.02	0.8811 $\pm$ 0.0005	313.20 $\pm$ 0.02	82.73 $\pm$ 0.29
318.20 $\pm$ 0.02	0.8779 $\pm$ 0.0005	318.20 $\pm$ 0.02	66.61 $\pm$ 0.23
323.20 $\pm$ 0.02	0.8747 $\pm$ 0.0005	323.20 $\pm$ 0.02	54.32 $\pm$ 0.19
HES3- Decanoic Acid : Methyltrioctylammonium Bromide (2:1) ¹			
288.20 $\pm$ 0.02	0.9489 $\pm$ 0.0005	288.20 $\pm$ 0.02	1186.97 $\pm$ 4.15
293.20 $\pm$ 0.02	0.9456 $\pm$ 0.0005	293.20 $\pm$ 0.02	814.53 $\pm$ 2.85
298.20 $\pm$ 0.02	0.9422 $\pm$ 0.0005	298.20 $\pm$ 0.02	576.53 $\pm$ 2.02
303.20 $\pm$ 0.02	0.9388 $\pm$ 0.0005	303.20 $\pm$ 0.02	416.93 $\pm$ 1.46
308.20 $\pm$ 0.02	0.9356 $\pm$ 0.0005	308.20 $\pm$ 0.02	307.25 $\pm$ 1.08
313.20 $\pm$ 0.02	0.9323 $\pm$ 0.0005	313.20 $\pm$ 0.02	230.39 $\pm$ 0.81
318.20 $\pm$ 0.02	0.9290 $\pm$ 0.0005	318.20 $\pm$ 0.02	175.72 $\pm$ 0.62
323.20 $\pm$ 0.02	0.9258 $\pm$ 0.0005	323.20 $\pm$ 0.02	136.15 $\pm$ 0.48
HES4- Decanoic Acid : Methyltrioctylammonium Chloride (2:1) ¹			
288.20 $\pm$ 0.02	0.9027 $\pm$ 0.0005	288.20 $\pm$ 0.02	1706.23 $\pm$ 5.97
293.20 $\pm$ 0.02	0.8996 $\pm$ 0.0005	293.20 $\pm$ 0.02	1138.73 $\pm$ 3.99
298.20 $\pm$ 0.02	0.8964 $\pm$ 0.0005	298.20 $\pm$ 0.02	783.41 $\pm$ 2.74
303.20 $\pm$ 0.02	0.8932 $\pm$ 0.0005	303.20 $\pm$ 0.02	552.32 $\pm$ 1.93
308.20 $\pm$ 0.02	0.8900 $\pm$ 0.0005	308.20 $\pm$ 0.02	398.23 $\pm$ 1.39
313.20 $\pm$ 0.02	0.8869 $\pm$ 0.0005	313.20 $\pm$ 0.02	293.12 $\pm$ 1.03
318.20 $\pm$ 0.02	0.8838 $\pm$ 0.0005	318.20 $\pm$ 0.02	219.87 $\pm$ 0.77
323.20 $\pm$ 0.02	0.8807 $\pm$ 0.0005	323.20 $\pm$ 0.02	190.56 $\pm$ 0.67

HES5- Decanoic Acid : Tetraoctylammonium Bromide (2:1) ¹			
288.20 ± 0.02	0.9364 ± 0.0005	288.20 ± 0.02	1273.07 ± 4.46
293.20 ± 0.02	0.9331 ± 0.0005	293.20 ± 0.02	889.57 ± 3.11
298.20 ± 0.02	0.9298 ± 0.0005	298.20 ± 0.02	636.36 ± 2.23
303.20 ± 0.02	0.9265 ± 0.0005	303.20 ± 0.02	464.04 ± 1.62
308.20 ± 0.02	0.9232 ± 0.0005	308.20 ± 0.02	344.61 ± 1.21
313.20 ± 0.02	0.9200 ± 0.0005	313.20 ± 0.02	260.41 ± 0.91
318.20 ± 0.02	0.9168 ± 0.0005	318.20 ± 0.02	199.89 ± 0.70
323.20 ± 0.02	0.9136 ± 0.0005	323.20 ± 0.02	155.69 ± 0.54
HES6- Decanoic Acid : Tetraoctylammonium Chloride (2:1) ¹			
288.20 ± 0.02	0.8953 ± 0.0005	288.20 ± 0.02	929.18 ± 3.25
293.20 ± 0.02	0.8921 ± 0.0005	293.20 ± 0.02	654.18 ± 2.29
298.20 ± 0.02	0.8889 ± 0.0005	298.20 ± 0.02	472.58 ± 1.65
303.20 ± 0.02	0.8857 ± 0.0005	303.20 ± 0.02	348.61 ± 1.22
308.20 ± 0.02	0.8825 ± 0.0005	308.20 ± 0.02	261.97 ± 0.92
313.20 ± 0.02	0.8794 ± 0.0005	313.20 ± 0.02	200.26 ± 0.70
318.20 ± 0.02	0.8763 ± 0.0005	318.20 ± 0.02	155.52 ± 0.54
323.20 ± 0.02	0.8732 ± 0.0005	323.20 ± 0.02	122.61 ± 0.43
HES7- Decanoic Acid : Tetraoctylammonium Chloride (1.5:1) ²			
288.20 ± 0.02	0.8944 ± 0.0005	Not reported	
293.20 ± 0.02	0.8912 ± 0.0005		
298.20 ± 0.02	0.8881 ± 0.0005		
303.20 ± 0.02	0.8849 ± 0.0005		
308.20 ± 0.02	0.8818 ± 0.0005		
313.20 ± 0.02	0.8787 ± 0.0005		
318.20 ± 0.02	0.8756 ± 0.0005		
323.20 ± 0.02	0.8725 ± 0.0005		
HES8- Decanoic Acid : Lidocaine (2:1) ^{3,4}			
293.20 ± 0.02	0.9624 ± 0.0005	293.20 ± 0.02	352.50 ± 5.00
298.20 ± 0.02	0.9583 ± 0.0005	298.20 ± 0.02	237.50 ± 5.00
303.20 ± 0.02	0.9540 ± 0.0005	303.20 ± 0.02	160.00 ± 5.00
308.20 ± 0.02	0.9497 ± 0.0005	308.20 ± 0.02	111.00 ± 5.00
313.20 ± 0.02	0.9455 ± 0.0005	313.20 ± 0.02	78.60 ± 5.00
318.20 ± 0.02	0.9412 ± 0.0005	318.20 ± 0.02	57.15 ± 5.00
323.20 ± 0.02	0.9370 ± 0.0005	323.20 ± 0.02	42.45 ± 5.00
HES9- Decanoic Acid : Lidocaine (3:1) ^{3,4}			
293.20 ± 0.02	0.9540 ± 0.0005	293.20 ± 0.03	302.00 ± 5.00
298.20 ± 0.02	0.9497 ± 0.0005	298.20 ± 0.03	208.50 ± 5.00
303.20 ± 0.02	0.9454 ± 0.0005	303.20 ± 0.03	141.50 ± 5.00
308.20 ± 0.02	0.9411 ± 0.0005	308.20 ± 0.03	98.45 ± 5.00
313.20 ± 0.02	0.9368 ± 0.0005	313.20 ± 0.03	70.20 ± 5.00
318.20 ± 0.02	0.9325 ± 0.0005	318.20 ± 0.03	51.10 ± 5.00
323.20 ± 0.02	0.9282 ± 0.0005	323.20 ± 0.03	38.05 ± 5.00

HES10- Decanoic Acid : Lidocaine (4:1)^{3,4}			
293.20 ± 0.02	0.9461 ± 0.0005	293.20 ± 0.03	197.50 ± 5.00
298.20 ± 0.02	0.9419 ± 0.0005	298.20 ± 0.03	142.00 ± 5.00
303.20 ± 0.02	0.9377 ± 0.0005	303.20 ± 0.03	100.30 ± 5.00
308.20 ± 0.02	0.9335 ± 0.0005	308.20 ± 0.03	71.95 ± 5.00
313.20 ± 0.02	0.9293 ± 0.0005	313.20 ± 0.03	52.70 ± 5.00
318.20 ± 0.02	0.9251 ± 0.0005	318.20 ± 0.03	39.35 ± 5.00
323.20 ± 0.02	0.9208 ± 0.0005	323.20 ± 0.03	29.95 ± 5.00
HES11- Decanoic Acid : Sodium Dodecanoate (4:1)⁵			
293.20 ± 0.01	0.9280 ± 0.0005	293.20 ± 0.01	76.59 ± 0.19
298.20 ± 0.01	0.9240 ± 0.0005	298.20 ± 0.01	60.48 ± 0.15
303.20 ± 0.01	0.9210 ± 0.0005	303.20 ± 0.01	48.43 ± 0.21
308.20 ± 0.01	0.9170 ± 0.0005	308.20 ± 0.01	39.29 ± 0.10
313.20 ± 0.01	0.9130 ± 0.0005	313.20 ± 0.01	32.27 ± 0.08
318.20 ± 0.01	0.9100 ± 0.0005	318.20 ± 0.01	26.79 ± 0.07
323.20 ± 0.01	0.9060 ± 0.0005	323.20 ± 0.01	22.48 ± 0.06
328.20 ± 0.01	0.9020 ± 0.0005	328.20 ± 0.01	19.04 ± 0.05
333.20 ± 0.01	0.8990 ± 0.0005	333.20 ± 0.01	16.27 ± 0.04
338.20 ± 0.01	0.8950 ± 0.0005	338.20 ± 0.01	14.02 ± 0.04
343.20 ± 0.01	0.8920 ± 0.0005	343.20 ± 0.01	12.16 ± 0.03
348.20 ± 0.01	0.8880 ± 0.0005	348.20 ± 0.01	10.63 ± 0.03
353.20 ± 0.01	0.8840 ± 0.0005	353.20 ± 0.01	9.35 ± 0.02
HES12- Dodecanoic Acid : Octanoic Acid (1:3)⁶			
293.20 ± 0.01	0.9040 ± 0.0005	293.20 ± 0.01	8.22 ± 0.02
298.20 ± 0.01	0.9010 ± 0.0005	298.20 ± 0.01	7.09 ± 0.02
303.20 ± 0.01	0.8970 ± 0.0005	303.20 ± 0.01	6.16 ± 0.02
308.20 ± 0.01	0.8930 ± 0.0005	308.20 ± 0.01	5.39 ± 0.01
313.20 ± 0.01	0.8890 ± 0.0005	313.20 ± 0.01	4.76 ± 0.01
318.20 ± 0.01	0.8850 ± 0.0005	318.20 ± 0.01	4.23 ± 0.01
323.20 ± 0.01	0.8810 ± 0.0005	323.20 ± 0.01	3.78 ± 0.01
328.20 ± 0.01	0.8770 ± 0.0005	328.20 ± 0.01	3.39 ± 0.01
333.20 ± 0.01	0.8730 ± 0.0005	333.20 ± 0.01	3.06 ± 0.01
338.20 ± 0.01	0.8690 ± 0.0005	338.20 ± 0.01	2.78 ± 0.01
343.20 ± 0.01	0.8650 ± 0.0005	343.20 ± 0.01	2.53 ± 0.01
348.20 ± 0.01	0.8610 ± 0.0005	348.20 ± 0.01	2.31 ± 0.01
353.20 ± 0.01	0.8580 ± 0.0005	353.20 ± 0.01	2.12 ± 0.01

HES13- Dodecanoic Acid : Nonanoic Acid (1:3)⁶			
293.20 ± 0.01	0.9010 ± 0.0005	293.20 ± 0.01	10.12 ± 0.03
298.20 ± 0.01	0.8970 ± 0.0005	298.20 ± 0.01	8.64 ± 0.02
303.20 ± 0.01	0.8930 ± 0.0005	303.20 ± 0.01	7.44 ± 0.02
308.20 ± 0.01	0.8900 ± 0.0005	308.20 ± 0.01	6.47 ± 0.02
313.20 ± 0.01	0.8860 ± 0.0005	313.20 ± 0.01	5.67 ± 0.01
318.20 ± 0.01	0.8820 ± 0.0005	318.20 ± 0.01	5.00 ± 0.01
323.20 ± 0.01	0.8780 ± 0.0005	323.20 ± 0.01	4.44 ± 0.01
328.20 ± 0.01	0.8740 ± 0.0005	328.20 ± 0.01	3.97 ± 0.01
333.20 ± 0.01	0.8700 ± 0.0005	333.20 ± 0.01	3.57 ± 0.01
338.20 ± 0.01	0.8660 ± 0.0005	338.20 ± 0.01	3.22 ± 0.01
343.20 ± 0.01	0.8630 ± 0.0005	343.20 ± 0.01	2.92 ± 0.01
348.20 ± 0.01	0.8590 ± 0.0005	348.20 ± 0.01	2.66 ± 0.01
353.20 ± 0.01	0.8550 ± 0.0005	353.20 ± 0.01	2.43 ± 0.01
HES14- Dodecanoic Acid : Decanoic Acid (1:2)⁶			
293.20 ± 0.01	0.8980 ± 0.0005	293.20 ± 0.01	12.89 ± 0.03
298.20 ± 0.01	0.8940 ± 0.0005	298.20 ± 0.01	10.76 ± 0.03
303.20 ± 0.01	0.8890 ± 0.0005	303.20 ± 0.01	9.20 ± 0.02
308.20 ± 0.01	0.8860 ± 0.0005	308.20 ± 0.01	7.94 ± 0.02
313.20 ± 0.01	0.8820 ± 0.0005	313.20 ± 0.01	6.91 ± 0.02
318.20 ± 0.01	0.8790 ± 0.0005	318.20 ± 0.01	6.06 ± 0.02
323.20 ± 0.01	0.8750 ± 0.0005	323.20 ± 0.01	5.35 ± 0.01
328.20 ± 0.01	0.8710 ± 0.0005	328.20 ± 0.01	4.75 ± 0.01
333.20 ± 0.01	0.8670 ± 0.0005	333.20 ± 0.01	4.25 ± 0.01
338.20 ± 0.01	0.8640 ± 0.0005	338.20 ± 0.01	3.82 ± 0.01
343.20 ± 0.01	0.8600 ± 0.0005	343.20 ± 0.01	3.44 ± 0.01
348.20 ± 0.01	0.8560 ± 0.0005	348.20 ± 0.01	3.12 ± 0.01
353.20 ± 0.01	0.8520 ± 0.0005	353.20 ± 0.01	2.84 ± 0.01
HES15- Ethylparaben : Methyltriocetylammmonium Chloride (2:1)⁷			
298.20 ± 0.02	0.9950 ± 0.0005		
303.20 ± 0.02	0.9916 ± 0.0005	298.20 ± 0.02	957.50 ± 3.35
308.20 ± 0.02	0.9882 ± 0.0005	303.20 ± 0.02	599.80 ± 2.09
313.20 ± 0.02	0.9848 ± 0.0005	313.20 ± 0.02	300.50 ± 1.05
318.20 ± 0.02	0.9814 ± 0.0005	323.20 ± 0.02	180.30 ± 0.63
323.20 ± 0.02	0.9780 ± 0.0005		
HES16- Ibuprofen : Tetraheptylammonium Chloride (3:7)⁸			
298.20 ± 0.01	0.8920 ± 0.0090	298.20 ± 0.01	1029.00 ± 0.10
313.20 ± 0.01	0.8820 ± 0.0090	313.20 ± 0.01	400.10 ± 0.40
328.20 ± 0.01	0.8730 ± 0.0090	328.20 ± 0.01	181.70 ± 0.30
343.20 ± 0.01	0.8630 ± 0.0090	343.20 ± 0.01	96.67 ± 0.11

HES17- DL-Menthol : Acetic Acid (1:1)⁹			
293.20 ± 0.02	0.9350 ± 0.0005	293.20 ± 0.02	11.30 ± 0.04
298.20 ± 0.02	0.9310 ± 0.0005	298.20 ± 0.02	8.69 ± 0.03
303.20 ± 0.02	0.9270 ± 0.0005	303.20 ± 0.02	6.90 ± 0.02
308.20 ± 0.02	0.9230 ± 0.0005	308.20 ± 0.02	5.59 ± 0.02
313.20 ± 0.02	0.9190 ± 0.0005	313.20 ± 0.02	4.56 ± 0.06
318.20 ± 0.02	0.9150 ± 0.0005	318.20 ± 0.02	3.84 ± 0.01
323.20 ± 0.02	0.9110 ± 0.0005	323.20 ± 0.02	3.25 ± 0.01
328.20 ± 0.02	0.9060 ± 0.0005	328.20 ± 0.02	2.78 ± 0.01
333.20 ± 0.02	0.9020 ± 0.0005	333.20 ± 0.02	2.39 ± 0.01
338.20 ± 0.02	0.8980 ± 0.0005	338.20 ± 0.02	2.09 ± 0.01
343.20 ± 0.02	0.8940 ± 0.0005	343.20 ± 0.02	1.84 ± 0.01
348.20 ± 0.02	0.8890 ± 0.0005	348.20 ± 0.02	1.63 ± 0.01
353.20 ± 0.02	0.8840 ± 0.0005	353.20 ± 0.02	1.46 ± 0.01
HES18- DL-Menthol : Lactic Acid (1:2)⁹			
293.20 ± 0.02	1.0380 ± 0.0005	293.20 ± 0.02	370.86 ± 1.30
298.20 ± 0.02	1.0330 ± 0.0005	298.20 ± 0.02	218.93 ± 0.77
303.20 ± 0.02	1.0290 ± 0.0005	303.20 ± 0.02	134.25 ± 0.47
308.20 ± 0.02	1.0250 ± 0.0005	308.20 ± 0.02	86.53 ± 0.30
313.20 ± 0.02	1.0210 ± 0.0005	313.20 ± 0.02	58.84 ± 0.21
318.20 ± 0.02	1.0170 ± 0.0005	318.20 ± 0.02	40.71 ± 0.14
323.20 ± 0.02	1.0130 ± 0.0005	323.20 ± 0.02	29.47 ± 0.10
328.20 ± 0.02	1.0090 ± 0.0005	328.20 ± 0.02	21.95 ± 0.08
333.20 ± 0.02	1.0050 ± 0.0005	333.20 ± 0.02	16.95 ± 0.06
338.20 ± 0.02	1.0010 ± 0.0005	338.20 ± 0.02	13.12 ± 0.05
343.20 ± 0.02	0.9970 ± 0.0005	343.20 ± 0.02	10.46 ± 0.04
348.20 ± 0.02	0.9920 ± 0.0005	348.20 ± 0.02	8.49 ± 0.03
353.20 ± 0.02	0.9880 ± 0.0005	353.20 ± 0.02	7.01 ± 0.02
HES19- DL-Menthol : Pyruvic Acid (1:2)⁹			
293.20 ± 0.02	0.9990 ± 0.0005	293.20 ± 0.02	44.64 ± 0.16
298.20 ± 0.02	0.9950 ± 0.0005	298.20 ± 0.02	29.95 ± 0.10
303.20 ± 0.02	0.9910 ± 0.0005	303.20 ± 0.02	21.24 ± 0.07
308.20 ± 0.02	0.9870 ± 0.0005	308.20 ± 0.02	15.67 ± 0.05
313.20 ± 0.02	0.9830 ± 0.0005	313.20 ± 0.02	11.88 ± 0.04
318.20 ± 0.02	0.9780 ± 0.0005	318.20 ± 0.02	9.36 ± 0.03
323.20 ± 0.02	0.9740 ± 0.0005	323.20 ± 0.02	7.51 ± 0.03
328.20 ± 0.02	0.9700 ± 0.0005	328.20 ± 0.02	6.14 ± 0.02
333.20 ± 0.02	0.9660 ± 0.0005	333.20 ± 0.02	5.03 ± 0.02
338.20 ± 0.02	0.9620 ± 0.0005	338.20 ± 0.02	4.32 ± 0.02
343.20 ± 0.02	0.9580 ± 0.0005	343.20 ± 0.02	3.70 ± 0.01
348.20 ± 0.02	0.9530 ± 0.0005	348.20 ± 0.02	3.20 ± 0.01
353.20 ± 0.02	0.9480 ± 0.0005	353.20 ± 0.02	2.74 ± 0.01

HES20- DL-Menthol : Dodecanoic Acid (2:1) ^{9,10}			
293.20 ± 0.02	0.8970 ± 0.0005	293.20 ± 0.02	33.06 ± 0.12
298.20 ± 0.02	0.8940 ± 0.0005	298.20 ± 0.02	24.42 ± 0.09
303.20 ± 0.02	0.8900 ± 0.0005	303.20 ± 0.02	18.63 ± 0.07
308.20 ± 0.02	0.8860 ± 0.0005	308.20 ± 0.02	14.51 ± 0.06
313.20 ± 0.02	0.8830 ± 0.0005	313.20 ± 0.02	11.45 ± 0.04
318.20 ± 0.02	0.8790 ± 0.0005	318.20 ± 0.02	9.29 ± 0.03
323.20 ± 0.02	0.8760 ± 0.0005	323.20 ± 0.02	7.61 ± 0.03
328.20 ± 0.02	0.8720 ± 0.0005	328.20 ± 0.02	6.32 ± 0.02
333.20 ± 0.02	0.8680 ± 0.0005	333.20 ± 0.02	5.23 ± 0.02
338.20 ± 0.02	0.8650 ± 0.0005	338.20 ± 0.02	4.51 ± 0.02
343.20 ± 0.02	0.8610 ± 0.0005	343.20 ± 0.02	3.86 ± 0.01
348.20 ± 0.02	0.8570 ± 0.0005	348.20 ± 0.02	3.34 ± 0.01
353.20 ± 0.02	0.8530 ± 0.0005	353.20 ± 0.02	2.86 ± 0.01
HES21- DL-Menthol : Hexadecanoic Acid (12:1) ¹¹			
293.20 ± 0.02	0.8938 ± 0.0005	Not reported	
298.20 ± 0.02	0.8900 ± 0.0005		
303.20 ± 0.02	0.8863 ± 0.0005		
308.20 ± 0.02	0.8826 ± 0.0005		
313.20 ± 0.02	0.8788 ± 0.0005		
318.20 ± 0.02	0.8751 ± 0.0005		
323.20 ± 0.02	0.8714 ± 0.0005		
328.20 ± 0.02	0.8677 ± 0.0005		
333.20 ± 0.02	0.8639 ± 0.0005		
338.20 ± 0.02	0.8602 ± 0.0005		
343.20 ± 0.02	0.8565 ± 0.0005		
348.20 ± 0.02	0.8528 ± 0.0005		
353.20 ± 0.02	0.8490 ± 0.0005		
358.20 ± 0.02	0.8453± 0.0005		
HES22- DL-Menthol : 3-Hydroxy Benzoic Acid (7:1) ¹²			
298.20 ± 0.02	0.9197 ± 0.0001	Not reported	
303.20 ± 0.02	0.9157 ± 0.0001		
313.20 ± 0.02	0.9077 ± 0.0001		
323.20 ± 0.02	0.8997 ± 0.0001		
333.20 ± 0.02	0.8917 ± 0.0001		
343.20 ± 0.02	0.8837 ± 0.0001		
353.20 ± 0.02	0.8757 ± 0.0001		
HES23- DL-Menthol : 2-Methyl-2,4-pentanediol (2:1) ¹³			
293.20 ± 0.02	0.9040 ± 0.0002	Not reported	
298.20 ± 0.02	0.9010 ± 0.0002		
303.20 ± 0.02	0.8970 ± 0.0002		
308.20 ± 0.02	0.8930 ± 0.0002		
313.20 ± 0.02	0.8900 ± 0.0002		
323.20 ± 0.02	0.8820 ± 0.0002		
333.20 ± 0.02	0.8750 ± 0.0002		
343.20 ± 0.02	0.8670 ± 0.0002		
353.20 ± 0.02	0.8590 ± 0.0002		

HES24- DL-Menthol : 1-Decanol (2:1) ¹³			
293.20 ± 0.02	0.8740 ± 0.00002	Not reported	
298.20 ± 0.02	0.8700 ± 0.00002		
303.20 ± 0.02	0.8670 ± 0.00002		
308.20± 0.02	0.8630 ± 0.00002		
313.20 ± 0.02	0.8590 ± 0.00002		
323.20 ± 0.02	0.8520 ± 0.00002		
333.20 ± 0.02	0.8440 ± 0.00002		
343.20 ± 0.02	0.8370 ± 0.00002		
353.20 ± 0.02	0.8290 ± 0.00002		
HES25- DL-Menthol : Sesamol (1:1) ¹²			
298.20 ± 0.02	1.0716 ± 0.0001	Not reported	
303.20 ± 0.02	1.0676 ± 0.0001		
313.20 ± 0.02	1.0596 ± 0.0001		
323.20 ± 0.02	1.0516 ± 0.0001		
333.20 ± 0.02	1.0436 ± 0.0001		
343.20 ± 0.02	1.0356 ± 0.0001		
353.20 ± 0.02	1.0276 ± 0.0001		
HES26- DL-Menthol : Thymol (1:1) ¹²			
298.20 ± 0.02	0.9287 ± 0.0001	Not reported	
303.20 ± 0.02	0.9247 ± 0.0001		
313.20 ± 0.02	0.9167 ± 0.0001		
323.20 ± 0.02	0.9087 ± 0.0001		
333.20 ± 0.02	0.9007 ± 0.0001		
343.20 ± 0.02	0.8927 ± 0.0001		
353.20 ± 0.02	0.8847 ± 0.0001		
HES27- L-Menthol : Octanoic Acid (1.5:1) ¹⁴			
278.20 ± 0.02	0.9148 ± 0.0005	278.20 ± 0.02	50.64 ± 0.18
283.20 ± 0.02	0.9110 ± 0.0005	283.20 ± 0.02	35.97 ± 0.13
288.20 ± 0.02	0.9073 ± 0.0005	288.20 ± 0.02	26.38 ± 0.09
293.20 ± 0.02	0.9036 ± 0.0005	293.20 ± 0.02	19.83 ± 0.07
298.20 ± 0.02	0.8998 ± 0.0005	298.20 ± 0.02	15.29 ± 0.05
303.20 ± 0.02	0.8961 ± 0.0005	303.20 ± 0.02	12.01 ± 0.04
308.20 ± 0.02	0.8924 ± 0.0005	308.20 ± 0.02	9.58 ± 0.03
313.20 ± 0.02	0.8887 ± 0.0005	313.20 ± 0.02	7.80 ± 0.03
318.20 ± 0.02	0.8849 ± 0.0005	318.20 ± 0.02	6.43 ± 0.02
323.20 ± 0.02	0.8811 ± 0.0005	323.20 ± 0.02	5.37 ± 0.02
328.20 ± 0.02	0.8773 ± 0.0005	328.20 ± 0.02	4.54 ± 0.02
333.20 ± 0.02	0.8735 ± 0.0005	333.20 ± 0.02	3.88 ± 0.01
338.20 ± 0.02	0.8697 ± 0.0005	338.20 ± 0.02	3.34 ± 0.01
343.20 ± 0.02	0.8658 ± 0.0005	343.20 ± 0.02	2.91 ± 0.01
348.20 ± 0.02	0.8619 ± 0.0005	348.20 ± 0.02	2.55 ± 0.01
353.20 ± 0.02	0.8580 ± 0.0005	353.20 ± 0.02	2.25 ± 0.01
358.20 ± 0.02	0.8541± 0.0005	358.20 ± 0.02	2.00 ± 0.01
363.20 ± 0.02	0.8502 ± 0.0005	363.20 ± 0.02	1.79 ± 0.01
368.20 ± 0.02	0.8462 ± 0.0005	368.20 ± 0.02	1.61 ± 0.01
373.20 ± 0.02	0.8422 ± 0.0005	373.20 ± 0.02	1.45 ± 0.01

HES28- L-Menthol : Decanoic Acid (1.5:1)¹⁴			
283.20 ± 0.02	0.9075 ± 0.0005	283.20 ± 0.02	45.50 ± 0.16
288.20 ± 0.02	0.9039 ± 0.0005	288.20 ± 0.02	33.05 ± 0.12
293.20 ± 0.02	0.9002 ± 0.0005	293.20 ± 0.02	24.68 ± 0.09
298.20 ± 0.02	0.8965 ± 0.0005	298.20 ± 0.02	18.85 ± 0.07
303.20 ± 0.02	0.8929 ± 0.0005	303.20 ± 0.02	14.70 ± 0.05
308.20 ± 0.02	0.8892 ± 0.0005	308.20 ± 0.02	11.68 ± 0.04
313.20 ± 0.02	0.8855 ± 0.0005	313.20 ± 0.02	9.43 ± 0.03
318.20 ± 0.02	0.8818 ± 0.0005	318.20 ± 0.02	7.73 ± 0.03
323.20 ± 0.02	0.8780 ± 0.0005	323.20 ± 0.02	6.42 ± 0.02
328.20 ± 0.02	0.8743 ± 0.0005	328.20 ± 0.02	5.39 ± 0.02
333.20 ± 0.02	0.8705 ± 0.0005	333.20 ± 0.02	4.58 ± 0.02
338.20 ± 0.02	0.8667 ± 0.0005	338.20 ± 0.02	3.92 ± 0.01
343.20 ± 0.02	0.8629 ± 0.0005	343.20 ± 0.02	3.40 ± 0.01
348.20 ± 0.02	0.8591 ± 0.0005	348.20 ± 0.02	2.97 ± 0.01
353.20 ± 0.02	0.8553 ± 0.0005	353.20 ± 0.02	2.61 ± 0.01
358.20 ± 0.02	0.8514 ± 0.0005	358.20 ± 0.02	2.31 ± 0.01
363.20 ± 0.02	0.8476 ± 0.0005	363.20 ± 0.02	2.06 ± 0.01
368.20 ± 0.02	0.8437 ± 0.0005	368.20 ± 0.02	1.84 ± 0.01
373.20 ± 0.02	0.8397 ± 0.0005	373.20 ± 0.02	1.66 ± 0.01
HES29- L-Menthol : Decanoic Acid (1:1)⁴			
Not reported		293.20 ± 0.03	28.00 ± 5.00
		298.20 ± 0.03	22.00 ± 5.00
		303.20 ± 0.03	17.00 ± 5.00
		308.20 ± 0.03	14.00 ± 5.00
		313.20 ± 0.03	11.00 ± 5.00
		318.20 ± 0.03	9.00 ± 5.00
		323.20 ± 0.03	7.00 ± 5.00
		328.20 ± 0.03	6.00 ± 5.00
HES30- L-Menthol : Dodecanoic Acid (3:1)¹⁴			
298.20 ± 0.02	0.8930 ± 0.0005	298.20 ± 0.02	28.10 ± 0.10
303.20 ± 0.02	0.8894 ± 0.0005	303.20 ± 0.02	20.91 ± 0.07
308.20 ± 0.02	0.8859 ± 0.0005	308.20 ± 0.02	15.93 ± 0.06
313.20 ± 0.02	0.8823 ± 0.0005	313.20 ± 0.02	12.40 ± 0.04
318.20 ± 0.02	0.8787 ± 0.0005	318.20 ± 0.02	9.84 ± 0.03
323.20 ± 0.02	0.8751 ± 0.0005	323.20 ± 0.02	7.94 ± 0.03
328.20 ± 0.02	0.8714 ± 0.0005	328.20 ± 0.02	6.50 ± 0.02
333.20 ± 0.02	0.8677 ± 0.0005	333.20 ± 0.02	5.40 ± 0.02
338.20 ± 0.02	0.8639 ± 0.0005	338.20 ± 0.02	4.54 ± 0.02
343.20 ± 0.02	0.8601 ± 0.0005	343.20 ± 0.02	3.86 ± 0.01
348.20 ± 0.02	0.8562 ± 0.0005	348.20 ± 0.02	3.32 ± 0.01
353.20 ± 0.02	0.8523 ± 0.0005	353.20 ± 0.02	2.87 ± 0.01
358.20 ± 0.02	0.8485 ± 0.0005	358.20 ± 0.02	2.51 ± 0.01
363.20 ± 0.02	0.8447 ± 0.0005	363.20 ± 0.02	2.21 ± 0.01
368.20 ± 0.02	0.8410 ± 0.0005	368.20 ± 0.02	1.96 ± 0.01
373.20 ± 0.02	0.8372 ± 0.0005	373.20 ± 0.02	1.75 ± 0.01

HES31- L-Menthol : Tetradecanoic Acid (4:1)¹⁴			
298.20 ± 0.02	0.8921 ± 0.0005	298.20 ± 0.02	33.99 ± 0.12
303.20 ± 0.02	0.8884 ± 0.0005	303.20 ± 0.02	24.78 ± 0.09
308.20 ± 0.02	0.8848 ± 0.0005	308.20 ± 0.02	18.54 ± 0.06
313.20 ± 0.02	0.8812 ± 0.0005	313.20 ± 0.02	14.21 ± 0.05
318.20 ± 0.02	0.8776 ± 0.0005	318.20 ± 0.02	11.11 ± 0.04
323.20 ± 0.02	0.8739 ± 0.0005	323.20 ± 0.02	8.85 ± 0.03
328.20 ± 0.02	0.8702 ± 0.0005	328.20 ± 0.02	7.17 ± 0.03
333.20 ± 0.02	0.8665 ± 0.0005	333.20 ± 0.02	5.89 ± 0.02
338.20 ± 0.02	0.8628 ± 0.0005	338.20 ± 0.02	4.91 ± 0.02
343.20 ± 0.02	0.8590 ± 0.0005	343.20 ± 0.02	4.14 ± 0.01
348.20 ± 0.02	0.8553 ± 0.0005	348.20 ± 0.02	3.53 ± 0.01
353.20 ± 0.02	0.8515 ± 0.0005	353.20 ± 0.02	3.04 ± 0.01
358.20 ± 0.02	0.8476 ± 0.0005	358.20 ± 0.02	2.65 ± 0.01
363.20 ± 0.02	0.8438 ± 0.0005	363.20 ± 0.02	2.32 ± 0.01
368.20 ± 0.02	0.8398 ± 0.0005	368.20 ± 0.02	2.05 ± 0.01
373.20 ± 0.02	0.8359 ± 0.0005	373.20 ± 0.02	1.82 ± 0.01
HES32- L-Menthol : Hexadecanoic Acid (5.67:1)¹⁴			
313.20 ± 0.02	0.8814 ± 0.0005	313.20 ± 0.02	15.25 ± 0.05
318.20 ± 0.02	0.8777 ± 0.0005	318.20 ± 0.02	11.78 ± 0.04
323.20 ± 0.02	0.8741 ± 0.0005	323.20 ± 0.02	9.29 ± 0.03
328.20 ± 0.02	0.8703 ± 0.0005	328.20 ± 0.02	7.46 ± 0.03
333.20 ± 0.02	0.8666 ± 0.0005	333.20 ± 0.02	6.09 ± 0.02
338.20 ± 0.02	0.8629 ± 0.0005	338.20 ± 0.02	5.04 ± 0.02
343.20 ± 0.02	0.8591 ± 0.0005	343.20 ± 0.02	4.21 ± 0.01
348.20 ± 0.02	0.8553 ± 0.0005	348.20 ± 0.02	3.57 ± 0.01
353.20 ± 0.02	0.8513 ± 0.0005	353.20 ± 0.02	3.06 ± 0.01
358.20 ± 0.02	0.8475 ± 0.0005	358.20 ± 0.02	2.65 ± 0.01
363.20 ± 0.02	0.8436 ± 0.0005	363.20 ± 0.02	2.32 ± 0.01
368.20 ± 0.02	0.8396 ± 0.0005	368.20 ± 0.02	2.04 ± 0.01
373.20 ± 0.02	0.8355 ± 0.0005	373.20 ± 0.02	1.81 ± 0.01
HES33- L-Menthol : Octadecanoic Acid (9:1)¹⁴			
313.20 ± 0.02	0.8810 ± 0.0005	313.20 ± 0.02	16.61 ± 0.06
318.20 ± 0.02	0.8774 ± 0.0005	318.20 ± 0.02	12.62 ± 0.04
323.20 ± 0.02	0.8737 ± 0.0005	323.20 ± 0.02	9.81 ± 0.03
328.20 ± 0.02	0.8700 ± 0.0005	328.20 ± 0.02	7.77 ± 0.03
333.20 ± 0.02	0.8662 ± 0.0005	333.20 ± 0.02	6.27 ± 0.02
338.20 ± 0.02	0.8624 ± 0.0005	338.20 ± 0.02	5.14 ± 0.02
343.20 ± 0.02	0.8587 ± 0.0005	343.20 ± 0.02	4.27 ± 0.01
348.20 ± 0.02	0.8549 ± 0.0005	348.20 ± 0.02	3.59 ± 0.01
353.20 ± 0.02	0.8511 ± 0.0005	353.20 ± 0.02	3.06 ± 0.01
358.20 ± 0.02	0.8472 ± 0.0005	358.20 ± 0.02	2.63 ± 0.01
363.20 ± 0.02	0.8433 ± 0.0005	363.20 ± 0.02	2.29 ± 0.01
368.20 ± 0.02	0.8393 ± 0.0005	368.20 ± 0.02	2.00 ± 0.01
373.20 ± 0.02	0.8353 ± 0.0005	373.20 ± 0.02	1.77 ± 0.01

HES34- L-Menthol : 1-Tetradecanol (2:1)¹⁵			
293.20 ± 0.05	0.8733 ± 0.0001	293.20 ± 0.05	44.17 ± 0.09
298.20 ± 0.05	0.8697 ± 0.0001	298.20 ± 0.05	31.71 ± 0.06
303.20 ± 0.05	0.8662 ± 0.0001	303.20 ± 0.05	23.34 ± 0.05
308.20 ± 0.05	0.8626 ± 0.0001	308.20 ± 0.05	17.57 ± 0.04
313.20 ± 0.05	0.8591 ± 0.0001	313.20 ± 0.05	13.49 ± 0.03
318.20 ± 0.05	0.8555 ± 0.0001	318.20 ± 0.05	10.55 ± 0.02
323.20 ± 0.05	0.8520 ± 0.0001	323.20 ± 0.05	8.38 ± 0.02
328.20 ± 0.05	0.8484 ± 0.0001	328.20 ± 0.05	6.76 ± 0.01
333.20 ± 0.05	0.8449 ± 0.0001	333.20 ± 0.05	5.52 ± 0.01
338.20 ± 0.05	0.8413 ± 0.0001		
343.20 ± 0.05	0.8378 ± 0.0001		
348.20 ± 0.05	0.8342 ± 0.0001		
353.20 ± 0.05	0.8307 ± 0.0001		
358.20 ± 0.05	0.8271 ± 0.0001		
363.20 ± 0.05	0.8236 ± 0.0001		
368.20 ± 0.05	0.8200 ± 0.0001		
HES35- L-Menthol : Borneol (7:3)¹⁶			
278.20 ± 0.02	0.9295 ± 0.0005	278.20 ± 0.02	1431.00 ± 5.01
283.20 ± 0.02	0.9257 ± 0.0005	283.20 ± 0.02	680.52 ± 2.38
288.20 ± 0.02	0.9222 ± 0.0005	288.20 ± 0.02	345.99 ± 1.21
293.20 ± 0.02	0.9186 ± 0.0005	293.20 ± 0.02	189.27 ± 0.66
298.20 ± 0.02	0.9149 ± 0.0005	298.20 ± 0.02	110.40 ± 0.39
303.20 ± 0.02	0.9113 ± 0.0005	303.20 ± 0.02	68.06 ± 0.24
308.20 ± 0.02	0.9076 ± 0.0005	308.20 ± 0.02	44.00 ± 0.15
313.20 ± 0.02	0.9039 ± 0.0005	313.20 ± 0.02	29.65 ± 0.10
318.20 ± 0.02	0.9001 ± 0.0005	318.20 ± 0.02	20.73 ± 0.07
323.20 ± 0.02	0.8963 ± 0.0005	323.20 ± 0.02	14.97 ± 0.05
328.20 ± 0.02	0.8925 ± 0.0005	328.20 ± 0.02	11.12 ± 0.04
333.20 ± 0.02	0.8887 ± 0.0005	333.20 ± 0.02	8.47 ± 0.03
338.20 ± 0.02	0.8848 ± 0.0005	338.20 ± 0.02	6.60 ± 0.02
343.20 ± 0.02	0.8809 ± 0.0005	343.20 ± 0.02	5.26 ± 0.02
348.20 ± 0.02	0.8770 ± 0.0005	348.20 ± 0.02	4.26 ± 0.01
353.20 ± 0.02	0.8730 ± 0.0005	353.20 ± 0.02	3.51 ± 0.01
358.20 ± 0.02	0.8689 ± 0.0005	358.20 ± 0.02	2.94 ± 0.01
363.20 ± 0.02	0.8649 ± 0.0005	363.20 ± 0.02	2.50 ± 0.01
368.20 ± 0.02	0.8608 ± 0.0005	368.20 ± 0.02	2.14 ± 0.01
373.20 ± 0.02	0.8566 ± 0.0005	373.20 ± 0.02	1.86 ± 0.01

HES36- L-Menthol : Camphor (1:1)¹⁶			
298.20 ± 0.02	0.9237 ± 0.0005	298.20 ± 0.02	16.42 ± 0.06
303.20 ± 0.02	0.9199 ± 0.0005	303.20 ± 0.02	12.59 ± 0.04
308.20 ± 0.02	0.9161 ± 0.0005	308.20 ± 0.02	9.87 ± 0.03
313.20 ± 0.02	0.9122 ± 0.0005	313.20 ± 0.02	7.89 ± 0.03
318.20 ± 0.02	0.9084 ± 0.0005	318.20 ± 0.02	6.41 ± 0.02
323.20 ± 0.02	0.9045 ± 0.0005	323.20 ± 0.02	5.30 ± 0.02
328.20 ± 0.02	0.9006 ± 0.0005	328.20 ± 0.02	4.44 ± 0.02
333.20 ± 0.02	0.8967 ± 0.0005	333.20 ± 0.02	3.77 ± 0.01
338.20 ± 0.02	0.8928 ± 0.0005	338.20 ± 0.02	3.23 ± 0.01
343.20 ± 0.02	0.8888 ± 0.0005	343.20 ± 0.02	2.80 ± 0.01
348.20 ± 0.02	0.8849 ± 0.0005	348.20 ± 0.02	2.45 ± 0.01
353.20 ± 0.02	0.8809 ± 0.0005	353.20 ± 0.02	2.17 ± 0.01
358.20 ± 0.02	0.8769 ± 0.0005	358.20 ± 0.02	1.93 ± 0.01
363.20 ± 0.02	0.8729 ± 0.0005	363.20 ± 0.02	1.73 ± 0.01
368.20 ± 0.02	0.8689 ± 0.0005	368.20 ± 0.02	1.56 ± 0.01
373.20 ± 0.02	0.8645 ± 0.0005	373.20 ± 0.02	1.42 ± 0.01
HES37- L-Menthol : Sobrerol (19:1)¹⁶			
333.20 ± 0.02	0.8755 ± 0.0005	333.20 ± 0.02	6.72 ± 0.02
338.20 ± 0.02	0.8717 ± 0.0005	338.20 ± 0.02	5.25 ± 0.02
343.20 ± 0.02	0.8679 ± 0.0005	343.20 ± 0.02	4.21 ± 0.01
348.20 ± 0.02	0.8640 ± 0.0005	348.20 ± 0.02	3.42 ± 0.01
353.20 ± 0.02	0.8600 ± 0.0005	353.20 ± 0.02	2.84 ± 0.01
358.20 ± 0.02	0.8560 ± 0.0005	358.20 ± 0.02	2.39 ± 0.01
363.20 ± 0.02	0.8519 ± 0.0005	363.20 ± 0.02	2.03 ± 0.01
368.20 ± 0.02	0.8478 ± 0.0005	368.20 ± 0.02	1.75 ± 0.01
373.20 ± 0.02	0.8437 ± 0.0005	373.20 ± 0.02	1.53 ± 0.01

HES38- L-Menthol : Thymol (1:1) ¹⁶			
278.20 ± 0.02	0.9478 ± 0.0005	278.20 ± 0.02	293.22 ± 1.03
283.20 ± 0.02	0.9439 ± 0.0005	283.20 ± 0.02	159.37 ± 0.56
288.20 ± 0.02	0.9402 ± 0.0005	288.20 ± 0.02	92.96 ± 0.33
293.20 ± 0.02	0.9365 ± 0.0005	293.20 ± 0.02	57.88 ± 0.20
298.20 ± 0.02	0.9327 ± 0.0005	298.20 ± 0.02	38.08 ± 0.13
303.20 ± 0.02	0.9290 ± 0.0005	303.20 ± 0.02	26.19 ± 0.09
308.20 ± 0.02	0.9253 ± 0.0005	308.20 ± 0.02	18.68 ± 0.07
313.20 ± 0.02	0.9215 ± 0.0005	313.20 ± 0.02	13.75 ± 0.05
318.20 ± 0.02	0.9177 ± 0.0005	318.20 ± 0.02	10.42 ± 0.04
323.20 ± 0.02	0.9139 ± 0.0005	323.20 ± 0.02	8.10 ± 0.03
328.20 ± 0.02	0.9101 ± 0.0005	328.20 ± 0.02	6.43 ± 0.02
333.20 ± 0.02	0.9062 ± 0.0005	333.20 ± 0.02	5.20 ± 0.02
338.20 ± 0.02	0.9024 ± 0.0005	338.20 ± 0.02	4.29 ± 0.01
343.20 ± 0.02	0.8985 ± 0.0005	343.20 ± 0.02	3.58 ± 0.01
348.20 ± 0.02	0.8946 ± 0.0005	348.20 ± 0.02	3.03 ± 0.01
353.20 ± 0.02	0.8907 ± 0.0005	353.20 ± 0.02	2.60 ± 0.01
358.20 ± 0.02	0.8867 ± 0.0005	358.20 ± 0.02	2.25 ± 0.01
363.20 ± 0.02	0.8827 ± 0.0005	363.20 ± 0.02	1.97 ± 0.01
368.20 ± 0.02	0.8787 ± 0.0005	368.20 ± 0.02	1.73 ± 0.01
373.20 ± 0.02	0.8747 ± 0.0005	373.20 ± 0.02	1.54 ± 0.01
HES39- Oleic Acid :Tetraheptylammonium Chloride (2:1) ⁸			
298.20 ± 0.01	0.8670 ± 0.0090	298.20 ± 0.01	244.70 ± 0.40
313.20 ± 0.01	0.8520 ± 0.0090	313.20 ± 0.01	121.01± 0.06
328.20 ± 0.01	0.8430 ± 0.0090	328.20 ± 0.01	67.69 ± 0.02
343.20 ± 0.01	0.8340 ± 0.0090	343.20 ± 0.01	41.64 ± 0.04
HES40- Thymol : 2-Methyl-2,4-pentanediol (2:1) ¹³			
293.20 ± 0.02	0.9630 ± 0.0002	Not reported	
298.20 ± 0.02	0.9590 ± 0.0002		
303.20 ± 0.02	0.9550 ± 0.0002		
308.20 ± 0.02	0.9510 ± 0.0002		
313.20 ± 0.02	0.9480 ± 0.0002		
323.20 ± 0.02	0.9400 ± 0.0002		
333.20 ± 0.02	0.9320 ± 0.0002		
343.20 ± 0.02	0.9240 ± 0.0002		
353.20 ± 0.02	0.9160 ± 0.0002		
HES41- Thymol : 1-Decanol (2:1) ¹³			
293.20 ± 0.02	0.9190 ± 0.0002	Not reported	
298.20 ± 0.02	0.9150 ± 0.0002		
303.20 ± 0.02	0.9110 ± 0.0002		
308.20 ± 0.02	0.9080 ± 0.0002		
313.20 ± 0.02	0.9040 ± 0.0002		
323.20 ± 0.02	0.8960 ± 0.0002		
333.20 ± 0.02	0.8890 ± 0.0002		
343.20 ± 0.02	0.8810 ± 0.0002		
353.20 ± 0.02	0.8730 ± 0.0002		

HES42-Thymol : Octanoic Acid (0.73:1)¹⁴			
278.20 ± 0.02	0.9461 ± 0.0005	278.20 ± 0.02	19.22 ± 0.07
283.20 ± 0.02	0.9421 ± 0.0005	283.20 ± 0.02	15.02 ± 0.05
288.20 ± 0.02	0.9381 ± 0.0005	288.20 ± 0.02	11.97 ± 0.04
293.20 ± 0.02	0.9341 ± 0.0005	293.20 ± 0.02	9.71 ± 0.03
298.20 ± 0.02	0.9301 ± 0.0005	298.20 ± 0.02	8.00 ± 0.03
303.20 ± 0.02	0.9261 ± 0.0005	303.20 ± 0.02	6.68 ± 0.02
308.20 ± 0.02	0.9221 ± 0.0005	308.20 ± 0.02	5.65 ± 0.02
313.20 ± 0.02	0.9181 ± 0.0005	313.20 ± 0.02	4.83 ± 0.02
318.20 ± 0.02	0.9140 ± 0.0005	318.20 ± 0.02	4.17 ± 0.01
323.20 ± 0.02	0.9100 ± 0.0005	323.20 ± 0.02	3.64 ± 0.01
328.20 ± 0.02	0.9060 ± 0.0005	328.20 ± 0.02	3.20 ± 0.01
333.20 ± 0.02	0.9020 ± 0.0005	333.20 ± 0.02	2.83 ± 0.01
338.20 ± 0.02	0.8979 ± 0.0005	338.20 ± 0.02	2.53 ± 0.01
343.20 ± 0.02	0.8939 ± 0.0005	343.20 ± 0.02	2.27 ± 0.01
348.20 ± 0.02	0.8898 ± 0.0005	348.20 ± 0.02	2.05 ± 0.01
353.20 ± 0.02	0.8858 ± 0.0005	353.20 ± 0.02	1.86 ± 0.01
358.20 ± 0.02	0.8817 ± 0.0005	358.20 ± 0.02	1.69 ± 0.01
363.20 ± 0.02	0.8776 ± 0.0005	363.20 ± 0.02	1.54 ± 0.01
368.20 ± 0.02	0.8735 ± 0.0005	368.20 ± 0.02	1.41 ± 0.01
373.20 ± 0.02	0.8694 ± 0.0005	373.20 ± 0.02	1.30 ± 0.01
HES43-Thymol : Decanoic Acid (1:1)^{4,14}			
293.20 ± 0.02	0.9340 ± 0.0005	293.20 ± 0.02	15.28 ± 0.05
298.20 ± 0.02	0.9301 ± 0.0005	298.20 ± 0.02	12.16 ± 0.04
303.20 ± 0.02	0.9263 ± 0.0005	303.20 ± 0.02	9.86 ± 0.03
308.20 ± 0.02	0.9224 ± 0.0005	308.20 ± 0.02	8.12 ± 0.03
313.20 ± 0.02	0.9186 ± 0.0005	313.20 ± 0.02	6.78 ± 0.02
318.20 ± 0.02	0.9147 ± 0.0005	318.20 ± 0.02	5.74 ± 0.02
323.20 ± 0.02	0.9108 ± 0.0005	323.20 ± 0.02	4.91 ± 0.02
328.20 ± 0.02	0.9070 ± 0.0005	328.20 ± 0.02	4.24 ± 0.01
333.20 ± 0.02	0.9031 ± 0.0005	333.20 ± 0.02	3.70 ± 0.01
338.20 ± 0.02	0.8992 ± 0.0005	338.20 ± 0.02	3.26 ± 0.01
343.20 ± 0.02	0.8953 ± 0.0005	343.20 ± 0.02	2.88 ± 0.01
348.20 ± 0.02	0.8914 ± 0.0005	348.20 ± 0.02	2.57 ± 0.01
353.20 ± 0.02	0.8874 ± 0.0005	353.20 ± 0.02	2.31 ± 0.01
358.20 ± 0.02	0.8835 ± 0.0005	358.20 ± 0.02	2.08 ± 0.01
363.20 ± 0.02	0.8795 ± 0.0005	363.20 ± 0.02	1.89 ± 0.01
368.20 ± 0.02	0.8755 ± 0.0005	368.20 ± 0.02	1.72 ± 0.01
373.20 ± 0.02	0.8715 ± 0.0005	373.20 ± 0.02	1.57 ± 0.01

HES44-Thymol : Dodecanoic Acid (1.22:1)¹⁴			
303.20 ± 0.02	0.9221 ± 0.0005	303.20 ± 0.02	12.43 ± 0.04
308.20 ± 0.02	0.9183 ± 0.0005	308.20 ± 0.02	10.12 ± 0.04
313.20 ± 0.02	0.9145 ± 0.0005	313.20 ± 0.02	8.37 ± 0.03
318.20 ± 0.02	0.9107 ± 0.0005	318.20 ± 0.02	7.01 ± 0.02
323.20 ± 0.02	0.9069 ± 0.0005	323.20 ± 0.02	5.95 ± 0.02
328.20 ± 0.02	0.9031 ± 0.0005	328.20 ± 0.02	5.10 ± 0.02
333.20 ± 0.02	0.8992 ± 0.0005	333.20 ± 0.02	4.42 ± 0.02
338.20 ± 0.02	0.8954 ± 0.0005	338.20 ± 0.02	3.86 ± 0.01
343.20 ± 0.02	0.8916 ± 0.0005	343.20 ± 0.02	3.40 ± 0.01
348.20 ± 0.02	0.8878 ± 0.0005	348.20 ± 0.02	3.02 ± 0.01
353.20 ± 0.02	0.8842 ± 0.0005	353.20 ± 0.02	2.70 ± 0.01
358.20 ± 0.02	0.8803 ± 0.0005	358.20 ± 0.02	2.42 ± 0.01
363.20 ± 0.02	0.8764 ± 0.0005	363.20 ± 0.02	2.19 ± 0.01
368.20 ± 0.02	0.8724 ± 0.0005	368.20 ± 0.02	1.98 ± 0.01
373.20 ± 0.02	0.8685 ± 0.0005	373.20 ± 0.02	1.80 ± 0.01
HES45-Thymol : Tetradecanoic Acid (3:1)¹⁴			
313.20 ± 0.02	0.9279 ± 0.0005	313.20 ± 0.02	8.69 ± 0.03
318.20 ± 0.02	0.9240 ± 0.0005	318.20 ± 0.02	7.16 ± 0.03
323.20 ± 0.02	0.9202 ± 0.0005	323.20 ± 0.02	5.98 ± 0.02
328.20 ± 0.02	0.9164 ± 0.0005	328.20 ± 0.02	5.07 ± 0.02
333.20 ± 0.02	0.9126 ± 0.0005	333.20 ± 0.02	4.34 ± 0.02
338.20 ± 0.02	0.9087 ± 0.0005	338.20 ± 0.02	3.76 ± 0.01
343.20 ± 0.02	0.9049 ± 0.0005	343.20 ± 0.02	3.28 ± 0.01
348.20 ± 0.02	0.9010 ± 0.0005	348.20 ± 0.02	2.89 ± 0.01
353.20 ± 0.02	0.8971 ± 0.0005	353.20 ± 0.02	2.57 ± 0.01
358.20 ± 0.02	0.8933 ± 0.0005	358.20 ± 0.02	2.30 ± 0.01
363.20 ± 0.02	0.8893 ± 0.0005	363.20 ± 0.02	2.06 ± 0.01
368.20 ± 0.02	0.8853 ± 0.0005	368.20 ± 0.02	1.86 ± 0.01
373.20 ± 0.02	0.8814 ± 0.0005	373.20 ± 0.02	1.69 ± 0.01
HES46-Thymol : Hexadecanoic Acid (4:1)¹⁴			
313.20 ± 0.02	0.9294 ± 0.0005	313.20 ± 0.02	9.21 ± 0.03
318.20 ± 0.02	0.9255 ± 0.0005	318.20 ± 0.02	7.54 ± 0.03
323.20 ± 0.02	0.9217 ± 0.0005	323.20 ± 0.02	6.29 ± 0.02
328.20 ± 0.02	0.9179 ± 0.0005	328.20 ± 0.02	5.31 ± 0.02
333.20 ± 0.02	0.9140 ± 0.0005	333.20 ± 0.02	4.53 ± 0.02
338.20 ± 0.02	0.9102 ± 0.0005	338.20 ± 0.02	3.91 ± 0.01
343.20 ± 0.02	0.9063 ± 0.0005	343.20 ± 0.02	3.41 ± 0.01
348.20 ± 0.02	0.9024 ± 0.0005	348.20 ± 0.02	3.00 ± 0.01
353.20 ± 0.02	0.8986 ± 0.0005	353.20 ± 0.02	2.65 ± 0.01
358.20 ± 0.02	0.8946 ± 0.0005	358.20 ± 0.02	2.37 ± 0.01
363.20 ± 0.02	0.8906 ± 0.0005	363.20 ± 0.02	2.12 ± 0.01
368.20 ± 0.02	0.8867 ± 0.0005	368.20 ± 0.02	1.92 ± 0.01
373.20 ± 0.02	0.8828 ± 0.0005	373.20 ± 0.02	1.74 ± 0.01

HES47-Thymol : Octadecanoic Acid (9:1)¹⁴			
318.20 ± 0.02	0.9357 ± 0.0005	318.20 ± 0.02	6.88 ± 0.02
323.20 ± 0.02	0.9318 ± 0.0005	323.20 ± 0.02	5.68 ± 0.02
328.20 ± 0.02	0.9279 ± 0.0005	328.20 ± 0.02	4.77 ± 0.02
333.20 ± 0.02	0.9240 ± 0.0005	333.20 ± 0.02	4.06 ± 0.02
338.20 ± 0.02	0.9201 ± 0.0005	338.20 ± 0.02	3.49 ± 0.01
343.20 ± 0.02	0.9162 ± 0.0005	343.20 ± 0.02	3.03 ± 0.01
348.20 ± 0.02	0.9123 ± 0.0005	348.20 ± 0.02	2.66 ± 0.01
353.20 ± 0.02	0.9083 ± 0.0005	353.20 ± 0.02	2.35 ± 0.01
358.20 ± 0.02	0.9044 ± 0.0005	358.20 ± 0.02	2.10 ± 0.01
363.20 ± 0.02	0.9003 ± 0.0005	363.20 ± 0.02	1.88 ± 0.01
368.20 ± 0.02	0.8963 ± 0.0005	368.20 ± 0.02	1.70 ± 0.01
373.20 ± 0.02	0.8923 ± 0.0005	373.20 ± 0.02	1.54 ± 0.01
HES48-Thymol : Borneol (1:1)¹⁶			
308.20 ± 0.02	0.9631 ± 0.0005	308.20 ± 0.02	43.10 ± 0.15
313.20 ± 0.02	0.9593 ± 0.0005	313.20 ± 0.02	30.29 ± 0.11
318.20 ± 0.02	0.9556 ± 0.0005	318.20 ± 0.02	21.98 ± 0.08
323.20 ± 0.02	0.9518 ± 0.0005	323.20 ± 0.02	16.41 ± 0.06
328.20 ± 0.02	0.9479 ± 0.0005	328.20 ± 0.02	12.56 ± 0.04
333.20 ± 0.02	0.9440 ± 0.0005	333.20 ± 0.02	9.83 ± 0.03
338.20 ± 0.02	0.9401 ± 0.0005	338.20 ± 0.02	7.85 ± 0.03
343.20 ± 0.02	0.9362 ± 0.0005	343.20 ± 0.02	6.37 ± 0.02
348.20 ± 0.02	0.9323 ± 0.0005	348.20 ± 0.02	5.26 ± 0.02
353.20 ± 0.02	0.9283 ± 0.0005	353.20 ± 0.02	4.41 ± 0.02
358.20 ± 0.02	0.9243 ± 0.0005	358.20 ± 0.02	3.74 ± 0.01
363.20 ± 0.02	0.9202 ± 0.0005	363.20 ± 0.02	3.21 ± 0.01
368.20 ± 0.02	0.9161 ± 0.0005	368.20 ± 0.02	2.79 ± 0.01
373.20 ± 0.02	0.9119 ± 0.0005	373.20 ± 0.02	2.45 ± 0.01

HES49-Thymol : Camphor (1:1) ¹⁶			
278.20 ± 0.02	0.9821 ± 0.0005	278.20 ± 0.02	74.83 ± 0.27
283.20 ± 0.02	0.9782 ± 0.0005	283.20 ± 0.02	52.13 ± 0.18
288.20 ± 0.02	0.9744 ± 0.0005	288.20 ± 0.02	37.34 ± 0.13
293.20 ± 0.02	0.9706 ± 0.0005	293.20 ± 0.02	27.51 ± 0.01
298.20 ± 0.02	0.9668 ± 0.0005	298.20 ± 0.02	20.80 ± 0.01
303.20 ± 0.02	0.9631 ± 0.0005	303.20 ± 0.02	16.10 ± 0.06
308.20 ± 0.02	0.9593 ± 0.0005	308.20 ± 0.02	12.72 ± 0.04
313.20 ± 0.02	0.9555 ± 0.0005	313.20 ± 0.02	10.23 ± 0.04
318.20 ± 0.02	0.9517 ± 0.0005	318.20 ± 0.02	8.36 ± 0.03
323.20 ± 0.02	0.9479 ± 0.0005	323.20 ± 0.02	6.93 ± 0.02
328.20 ± 0.02	0.9441 ± 0.0005	328.20 ± 0.02	5.83 ± 0.02
333.20 ± 0.02	0.9403 ± 0.0005	333.20 ± 0.02	4.95 ± 0.02
338.20 ± 0.02	0.9364 ± 0.0005	338.20 ± 0.02	4.25 ± 0.01
343.20 ± 0.02	0.9326 ± 0.0005	343.20 ± 0.02	3.69 ± 0.01
348.20 ± 0.02	0.9288 ± 0.0005	348.20 ± 0.02	3.23 ± 0.01
353.20 ± 0.02	0.9249 ± 0.0005	353.20 ± 0.02	2.85 ± 0.01
358.20 ± 0.02	0.9210 ± 0.0005	358.20 ± 0.02	2.53 ± 0.01
363.20 ± 0.02	0.9171 ± 0.0005	363.20 ± 0.02	2.26 ± 0.01
368.20 ± 0.02	0.9132 ± 0.0005	368.20 ± 0.02	2.03 ± 0.01
373.20 ± 0.02	0.9093 ± 0.0005	373.20 ± 0.02	1.84 ± 0.01
HES50-Thymol : Lidocaine (2:1) ⁴			
Not reported		293.20 ± 0.03	124.00 ± 5.00
		298.20 ± 0.03	99.00 ± 5.00
		303.20 ± 0.03	68.00 ± 5.00
		308.20 ± 0.03	48.00 ± 5.00
		313.20 ± 0.03	35.00 ± 5.00
		318.20 ± 0.03	26.00 ± 5.00
		323.20 ± 0.03	20.00 ± 5.00
		328.20 ± 0.03	16.00 ± 5.00
HES51-Triethylphosphine Oxide : Decanoic Acid (1:1) ¹⁷			
293.20 ± 0.02	0.8847 ± 0.0003	293.20 ± 0.02	48.55 ± 0.03
298.20 ± 0.02	0.8813 ± 0.0003	298.20 ± 0.02	39.03 ± 0.03
303.20 ± 0.02	0.8779 ± 0.0003	303.20 ± 0.02	31.58 ± 0.03
308.20 ± 0.02	0.8746 ± 0.0003	308.20 ± 0.02	25.61 ± 0.03
313.20 ± 0.02	0.8712 ± 0.0003	313.20 ± 0.02	21.00 ± 0.03
318.20 ± 0.02	0.8679 ± 0.0003	318.20 ± 0.02	17.08 ± 0.03
323.20 ± 0.02	0.8645 ± 0.0003	323.20 ± 0.02	14.82 ± 0.03
328.20 ± 0.02	0.8612 ± 0.0003	328.20 ± 0.02	12.40 ± 0.03
333.20 ± 0.02	0.8579 ± 0.0003	333.20 ± 0.02	10.59 ± 0.03
338.20 ± 0.02	0.8545 ± 0.0003	338.20 ± 0.02	9.10 ± 0.03
343.20 ± 0.02	0.8512 ± 0.0003	343.20 ± 0.02	7.85 ± 0.03

HES52-Trioctylphosphine Oxide: Dodecanoic Acid (1:1)¹⁷			
293.20 ± 0.02	0.8828 ± 0.0003	293.20 ± 0.02	58.75 ± 0.03
298.20 ± 0.02	0.8795 ± 0.0003	298.20 ± 0.02	46.51 ± 0.03
303.20 ± 0.02	0.8762 ± 0.0003	303.20 ± 0.02	37.23 ± 0.03
308.20 ± 0.02	0.8728 ± 0.0003	308.20 ± 0.02	30.14 ± 0.03
313.20 ± 0.02	0.8695 ± 0.0003	313.20 ± 0.02	24.76 ± 0.03
318.20 ± 0.02	0.8662 ± 0.0003	318.20 ± 0.02	20.61 ± 0.03
323.20 ± 0.02	0.8629 ± 0.0003	323.20 ± 0.02	17.12 ± 0.03
328.20 ± 0.02	0.8595 ± 0.0003	328.20 ± 0.02	14.61 ± 0.03
333.20 ± 0.02	0.8562 ± 0.0003	333.20 ± 0.02	12.49 ± 0.03
338.20 ± 0.02	0.8529 ± 0.0003	338.20 ± 0.02	10.71 ± 0.03
343.20 ± 0.02	0.8496 ± 0.0003	343.20 ± 0.02	9.23 ± 0.03
HES53-Trioctylphosphine Oxide: Phenol (1:2)¹⁸			
293.20 ± 0.02	0.9350 ± 0.0005	293.20 ± 0.02	16.47 ± 0.50
298.20 ± 0.02	0.9330 ± 0.0005	298.20 ± 0.02	12.38 ± 0.50
303.20 ± 0.02	0.9270 ± 0.0005	303.20 ± 0.02	9.52 ± 0.50
313.20 ± 0.02	0.9230 ± 0.0005	313.20 ± 0.02	6.18 ± 0.50
323.20 ± 0.02	0.9120 ± 0.0005	323.20 ± 0.02	4.35 ± 0.50
333.20 ± 0.02	0.9050 ± 0.0005	333.20 ± 0.02	3.24 ± 0.50
343.20 ± 0.02	0.9020 ± 0.0005	343.20 ± 0.02	2.53 ± 0.50
353.20 ± 0.02	0.8950 ± 0.0005	353.20 ± 0.02	2.04 ± 0.50
363.20 ± 0.02	0.8880 ± 0.0005	363.20 ± 0.02	1.73 ± 0.50
HES54-Trioctylphosphine Oxide: Phenol (1:1)¹⁸			
293.20 ± 0.02	0.9100 ± 0.0005	293.20 ± 0.02 298.20 ± 0.02 313.20 ± 0.02 323.20 ± 0.02 333.20 ± 0.02	54.00 ± 0.50 43.00 ± 0.50 22.00 ± 0.50 15.02 ± 0.50 10.76 ± 0.50
298.20 ± 0.02	0.9070 ± 0.0005		
303.20 ± 0.02	0.9040 ± 0.0005		
323.20 ± 0.02	0.8900 ± 0.0005		
333.20 ± 0.02	0.8830 ± 0.0005		
343.20 ± 0.02	0.8770 ± 0.0005		
353.20 ± 0.02	0.8700 ± 0.0005		
363.20 ± 0.02	0.8630 ± 0.0005		

Table S.2: List of all the 66 descriptors utilized in this work, which include 10 molecular descriptors, the temperature descriptor, and 55 interaction descriptors.

		#	Descriptor
1	S_1		
2	S_2		
3	S_3		
4	S_4		
5	S_5		
6	S_6		
7	S_7		
8	S_8		
9	S_9		
10	S_{10}		
11	T		
12	$\{S_1, T\}$		
13	$\{S_2, T\}$		
14	$\{S_3, T\}$		
15	$\{S_4, T\}$		
16	$\{S_5, T\}$		
17	$\{S_6, T\}$		
18	$\{S_7, T\}$		
19	$\{S_8, T\}$		
20	$\{S_9, T\}$		
21	$\{S_{10}, T\}$		
22	$\{S_1, S_2\}$		
23	$\{S_1, S_3\}$		
24	$\{S_1, S_4\}$		
25	$\{S_1, S_5\}$		
26	$\{S_1, S_6\}$		
27	$\{S_1, S_7\}$		
28	$\{S_1, S_8\}$		
29	$\{S_1, S_9\}$		
30	$\{S_1, S_{10}\}$		
31	$\{S_2, S_3\}$		
32	$\{S_2, S_4\}$		
33	$\{S_2, S_5\}$		
34	$\{S_2, S_6\}$		
35	$\{S_2, S_7\}$		
36	$\{S_2, S_8\}$		
37	$\{S_2, S_9\}$		
38	$\{S_2, S_{10}\}$		
39	$\{S_3, S_4\}$		
40	$\{S_3, S_5\}$		
41	$\{S_3, S_6\}$		
42	$\{S_3, S_7\}$		
43	$\{S_3, S_8\}$		
44	$\{S_3, S_9\}$		
45	$\{S_3, S_{10}\}$		
46	$\{S_4, S_5\}$		
47	$\{S_4, S_6\}$		
48	$\{S_4, S_7\}$		
49	$\{S_4, S_8\}$		
50	$\{S_4, S_9\}$		
51	$\{S_4, S_{10}\}$		
52	$\{S_5, S_6\}$		
53	$\{S_5, S_7\}$		
54	$\{S_5, S_8\}$		
55	$\{S_5, S_9\}$		
56	$\{S_5, S_{10}\}$		
57	$\{S_6, S_7\}$		
58	$\{S_6, S_8\}$		
59	$\{S_6, S_9\}$		

60	$\{S_6, S_{10}\}$
61	$\{S_7, S_8\}$
62	$\{S_7, S_9\}$
63	$\{S_7, S_{10}\}$
64	$\{S_8, S_9\}$
65	$\{S_8, S_{10}\}$
66	$\{S_9, S_{10}\}$

Table S.3: Summary of the results of the Analysis of Variance (ANOVA) conducted on the density and viscosity models.

Source	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio
Density Model				
Model	53	0.6860	0.0129	47654.40
Error	365	0.0001	2.74×10^{-7}	Prob > F
Total	418	0.6861		<0.0001
Viscosity Model				
Model	38	1188.7321	31.2824	1319.58
Error	338	9.4115	0.0278	Prob > F
Total	376	1198.1437		<0.0001

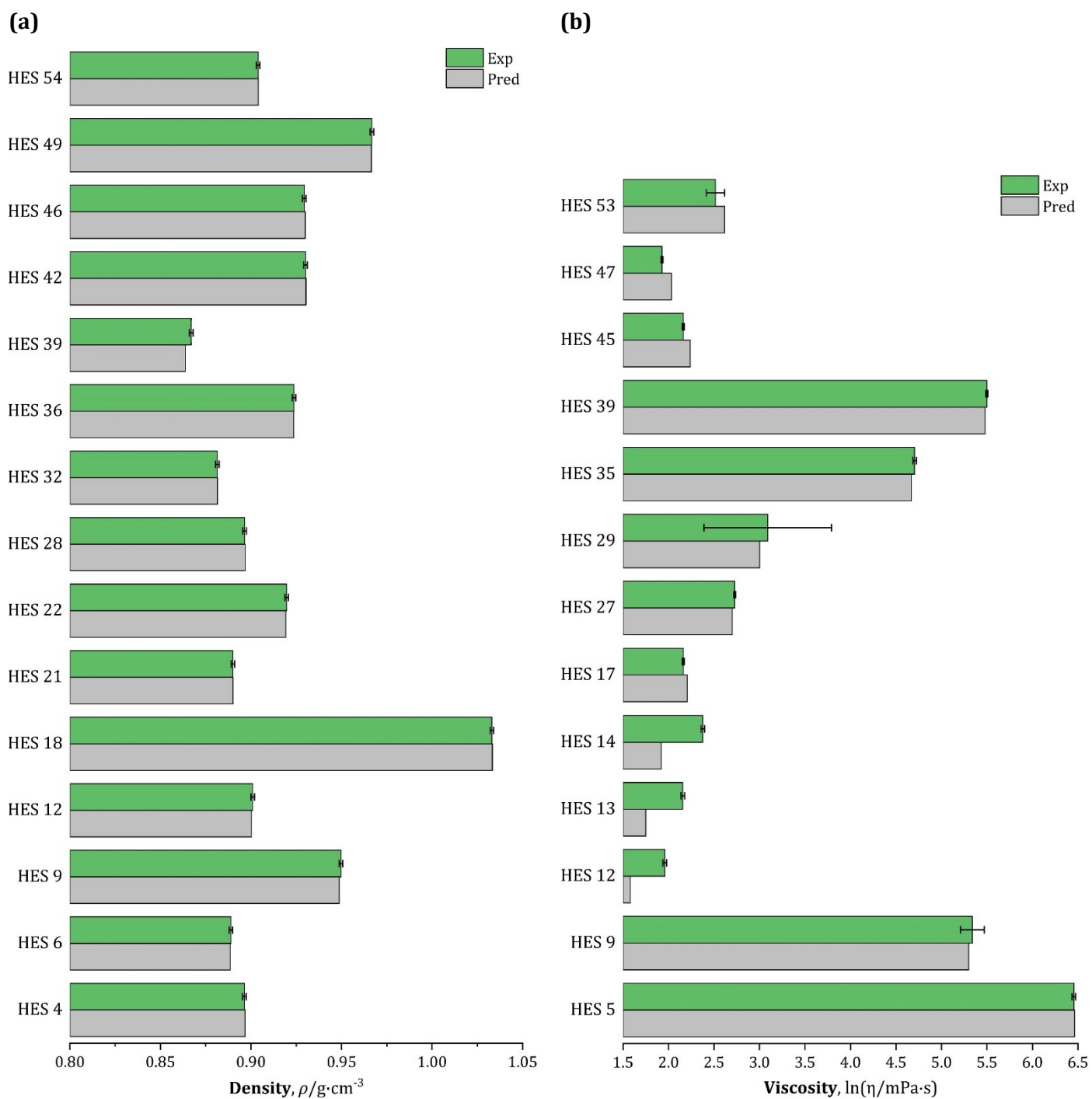


Figure S.1. The predicted (a) density and (b) viscosity values at 298.2 K compared to their experimental uncertainties of the HESs in the testing set.

References

- 1 D. J. G. P. Van Osch, L. F. Zubeir, A. Van Den Bruinhorst, M. A. A. Rocha and M. C. Kroon, *Green Chem.*, 2015, **17**, 4518–4521.
- 2 L. F. Zubeir, D. J. G. P. Van Osch, M. A. A. Rocha, F. Banat and M. C. Kroon, *J. Chem. Eng. Data*, 2018, **63**, 913–919.
- 3 D. J. G. P. Van Osch, D. Parmentier, C. H. J. T. Dietz, A. Van Den Bruinhorst, R. Tuinier and M. C. Kroon, *Chem. Commun.*, 2016, **52**, 11987–11990.
- 4 C. H. J. T. Dietz, J. T. Creemers, M. A. Meuleman, C. Held, G. Sadowski, M. Van Sint Annaland, F. Gallucci and M. C. Kroon, *ACS Sustain. Chem. Eng.*, 2019, **7**, 4047–4057.
- 5 C. Florindo, L. G. Celia-Silva, L. F. G. Martins, L. C. Branco and I. M. Marrucho, *Chem. Commun.*, 2018, **54**, 7527–7530.
- 6 C. Florindo, L. Romero, I. Rintoul, L. C. Branco and I. M. Marrucho, *ACS Sustain. Chem. Eng.*, 2018, **6**, 3888–3895.
- 7 T. Li, Y. Song, J. Xu and J. Fan, *Talanta*, 2019, **195**, 298–305.
- 8 E. E. Tereshatov, M. Y. Boltoeva and C. M. Folden, *Green Chem.*, 2016, **18**, 4616–4622.
- 9 B. D. Ribeiro, C. Florindo, L. C. Iff, M. A. Z. Coelho and I. M. Marrucho, *ACS Sustain. Chem. Eng.*, 2015, **3**, 2469–2477.
- 10 R. Verma and T. Banerjee, *Ind. Eng. Chem. Res.*, 2018, **57**, 3371–3381.
- 11 R. Verma and T. Banerjee, *Glob. Challenges*, 2019, **3**, 1900024.
- 12 S. A. Mat Hussin, P. Varanusupakul, S. Shahabuddin, B. Yih Hui and S. Mohamad, *J. Mol. Liq.*, 2020, **308**, 113015.
- 13 G. Almustafa, R. Sulaiman, M. Kumar, I. Adeyemi, H. A. Arafat and I. AlNashef, *Chem. Eng. J.*, 2020, **395**, 125173.
- 14 M. A. R. Martins, E. A. Crespo, P. V. A. Pontes, L. P. Silva, M. Bülow, G. J. Maximo, E. A. C. Batista, C. Held, S. P. Pinho and J. A. P. Coutinho, *ACS Sustain. Chem. Eng.*, 2018, **6**, 8836–8846.
- 15 D. J. G. P. Van Osch, J. Van Spronsen, A. C. C. Esteves, R. Tuinier and M. Vis, *Phys. Chem. Chem. Phys.*, 2020, **22**, 2181–2187.
- 16 M. A. R. Martins, L. P. Silva, N. Schaeffer, D. O. Abranches, G. J. Maximo, S. P. Pinho and J. A. P. Coutinho, *ACS Sustain. Chem. Eng.*, 2019, **7**, 17414–17423.
- 17 E. Riveiro, B. González and Á. Domínguez, *Sep. Purif. Technol.*, 2020, **241**, 116692.
- 18 M. Gilmore, É. N. McCourt, F. Connolly, P. Nockemann, M. Swadźba-Kwaśny and J. D. Holbrey, *ACS Sustain. Chem. Eng.*, 2018, **6**, 17323–17332.