Thixotropic rheological behavior of Maya crude oil

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Table S1. Shear thinning behavior of Maya oil[a].

T = 254 K		*T* = 258 K		*T* = 263 K	
$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)
2.67	882	2.57	482	10	106
3.15	769	3.12	425	15.3	80.5
3.61	689	3.65	383	20.6	67.7
4.01	641	4.18	350	25.9	59.2
		4.71	322	31.2	53.2
		5.24	299	36.5	48.8
		5.76	283	41.8	45.2
		6.29	267	47.1	42.3
		6.82	254	52.4	39.9
		7.35	240	57.6	37.9
		7.88	227	62.9	36.1
		8.41	218	68.2	34.5
		8.94	208	73.5	33.1
		9.47	199	78.8	31.7
		10	194		
T = 268 K		*T* = 273 K		*T* = 278 K	
$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)
10	49.5	10	20.5	10	8.5
15.3	39.3	15.3	17.4	15.3	7.64
20.6	34	20.6	15.6	20.6	7.13
25.9	30.3	25.9	14.3	25.9	6.74
31.2	27.6	31.2	13.4	31.2	6.44
36.5	25.6	36.5	12.6	36.5	6.19
41.8	23.9	41.8	12	41.8	5.98
47.1	22.6	47.1	11.5	47.1	5.80
52.4	21.5	52.4	11	52.4	5.63
57.6	20.5	57.6	10.6	57.6	5.49
62.9	19.7	62.9	10.3	62.9	5.36

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68.2	18.9	68.2	9.95	68.2	5.24
73.5	18.2	73.5	9.67	73.5	5.13
78.8	17.6	78.8	9.41	78.8	5.03
84.1	17.1	84.1	9.18	84.1	4.94
89.4	16.5	89.4	8.96	89.4	4.85
94.7	16.1	94.7	8.76	94.7	4.77
100	15.7	100	8.58	100	4.70
144	13.4	144	8.55	144	4.27
189	11.8	189	7.56	189	3.96
		233	6.83	233	3.7
		278	6.25	278	3.48
		322	5.78	322	3.3
		367	5.38	367	3.13
		411	5.04	411	2.99
		456	4.74	456	2.86
		500	4.48	500	2.75
T = 283 K		T = 288 K		T = 293 K	
$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)
10	3.7	10	1.58	10	0.997
15.3	3.47	15.3	1.57	15.3	0.986
20.6	3.32	20.6	1.54	20.6	0.979
25.9	3.21	25.9	1.53	25.9	0.97
31.2	3.12	31.2	1.52	31.2	0.96
36.5	3.05	36.5	1.51	36.5	0.955
41.8	2.99	41.8	1.5	41.8	0.945
47.1	2.93	47.1	1.49	47.1	0.942
52.4	2.88	52.4	1.48	52.4	0.933
57.6	2.84	57.6	1.47	57.6	0.929
62.9	2.8	62.9	1.46	62.9	0.923
68.2	2.76	68.2	1.46	68.2	0.919
73.5	2.72	73.5	1.45	73.5	0.915
78.8	2.69	78.8	1.44	78.8	0.911
84.1	2.66	84.1	1.43	84.1	0.908
89.4	2.63	89.4	1.43	89.4	0.903
94.7	2.6	94.7	1.42	94.7	0.899
100	2.57	100	1.41	100	0.896
144	2.42	144	1.36	144	0.871
189	2.29	189	1.32	189	0.852
233	2.18	233	1.28	233	0.833
278	2.09	278	1.25	278	0.817
322	2.01	322	1.22	322	0.803
367	1.93	367	1.19	367	0.789
411	1.87	411	1.16	411	0.776
456	1.81	456	1.14	456	0.763
500	1.75	500	1.11	500	0.752
T = 298 K		T = 303 K		T = 308 K	
$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)
10	0.689	10	0.375	10	0.259
15.3	0.672	15.3	0.378	15.3	0.263
20.6	0.669	20.6	0.377	20.6	0.264
25.9	0.663	25.9	0.377	25.9	0.264
31.2	0.657	31.2	0.377	31.2	0.265
36.5	0.655	36.5	0.376	36.5	0.264
41.8	0.65	41.8	0.376	41.8	0.264
47.1	0.644	47.1	0.374	47.1	0.266
52.4	0.642	52.4	0.375	52.4	0.263
57.6	0.639	57.6	0.375	57.6	0.263
62.9	0.636	62.9	0.373	62.9	0.264
68.2	0.632	68.2	0.373	68.2	0.263
73.5	0.629	73.5	0.373	73.5	0.263

78.8	0.627	78.8	0.372	78.8	0.263
84.1	0.625	84.1	0.371	84.1	0.262
89.4	0.622	89.4	0.371	89.4	0.264
94.7	0.619	94.7	0.371	94.7	0.263
100	0.617	100	0.371	100	0.262
144	0.602	144	0.366	144	0.261
189	0.59	189	0.363	189	0.259
233	0.579	233	0.359	233	0.257
278	0.569	278	0.357	278	0.255
322	0.56	322	0.354	322	0.254
367	0.552	367	0.351	367	0.253
411	0.544	411	0.349	411	0.251
456	0.537	456	0.346	456	0.25
500	0.53	500	0.344	500	0.249
T = 313 K		T = 318 K		T = 323 K	
$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)
10	0.183	10	0.134	10	0.108
15.3	0.186	15.3	0.138	15.3	0.104
20.6	0.188	20.6	0.14	20.6	0.105
25.9	0.188	25.9	0.138	25.9	0.103
31.2	0.188	31.2	0.138	31.2	0.104
36.5	0.189	36.5	0.14	36.5	0.105
41.8	0.189	41.8	0.139	41.8	0.104
47.1	0.19	47.1	0.142	47.1	0.106
52.4	0.19	52.4	0.14	52.4	0.107
57.6	0.189	57.6	0.139	57.6	0.106
62.9	0.189	62.9	0.139	62.9	0.105
68.2	0.189	68.2	0.14	68.2	0.105
73.5	0.189	73.5	0.14	73.5	0.105
78.8	0.189	78.8	0.14	78.8	0.105
84.1	0.189	84.1	0.14	84.1	0.106
89.4	0.189	89.4	0.139	89.4	0.106
94.7	0.19	94.7	0.139	94.7	0.106
100	0.189	100	0.139	100	0.106
144	0.188	144	0.139	144	0.105
189	0.187	189	0.139	189	0.106
233	0.187	233	0.139	233	0.105
278	0.186	278	0.139	278	0.105
322	0.185	322	0.138	322	0.105
367	0.184	367	0.138	367	0.105
411	0.184	411	0.138	411	0.105
456	0.183	456	0.137	456	0.105
500	0.183	500	0.137	500	0.104
T = 328 K		T = 333 K		T = 338 K	
$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)	$\dot{\gamma}$ /s^{-1}	μ/(Pa.s)
10	0.0772	10	0.0564	10	0.0428
15.3	0.0759	15.3	0.0589	15.3	0.0456
20.6	0.0794	20.6	0.0587	20.6	0.0516
25.9	0.078	25.9	0.0604	25.9	0.0512
31.2	0.0792	31.2	0.0598	31.2	0.051
36.5	0.0796	36.5	0.061	36.5	0.0491
41.8	0.0801	41.8	0.0611	41.8	0.05
47.1	0.0806	47.1	0.0627	47.1	0.0497
52.4	0.0806	52.4	0.0624	52.4	0.0506
57.6	0.0809	57.6	0.0628	57.6	0.0498
62.9	0.0804	62.9	0.063	62.9	0.051
68.2	0.0804	68.2	0.0636	68.2	0.0513
73.5	0.0808	73.5	0.0636	73.5	0.0501

78.8	0.0812	78.8	0.0631	78.8	0.0516
84.1	0.0809	84.1	0.0632	84.1	0.0504
89.4	0.0812	89.4	0.0637	89.4	0.0502
94.7	0.0809	94.7	0.0632	94.7	0.0505
100	0.0812	100	0.0642	100	0.0507
144	0.0812	144	0.0635	144	0.0508
189	0.0808	189	0.0636	189	0.0508
233	0.081	233	0.0633	233	0.0508
278	0.0811	278	0.0635	278	0.0509
322	0.081	322	0.0637	322	0.0508
367	0.0808	367	0.0635	367	0.0509
411	0.0808	411	0.0636	411	0.0509
456	0.0807	456	0.0636	456	0.0508
500	0.0807	500	0.0635	500	0.0509

[a] Standard uncertainties u: u(T) = 0.02 K, u($\dot{\gamma}$) = 0.003$\dot{\gamma}$, u(μ) = 0.03 μ; T: temperature, $\dot{\gamma}$: shear rate, μ: viscosity.

Table S2. Temperature dependence of reduced enclosed area for Maya oil obtained from the hysteresis technique measurements[a].

T /K	$\bar{A}$ /Pa
308	0.08
303	0.42
298	0.85
293	2.32
288	4.93
283	14.79
278	30.95
273	58.30
268	138.91
263	228.41
258	310.69

[a] Standard uncertainty: u(T) = 0.02 K, Combined standard uncertainty: $u_c(\bar{A}) = 0.004\ \bar{A}$; T: temperature, $\bar{A}$: reduced enclosed area.

Table S3. Impact of rest period on hysteresis area for Maya oil at 278 K[a].

Rest time (hr)	A/(Pa/s)
0.25	4,594
0.5	4,697
1	5,018
3	7459
20	8,465
24	8,252
120	11140
600	12204

[a] Combined standard uncertainty: $u_c(A) = 0.003\ A$; A: Hysteresis area.

Table S4. Build-up behavior of Maya oil after a step-down in shear rate from (40 to 10) s^{-1a}.

T = 278 K		T = 273 K		T = 268 K	
Time (sec)	τ/Pa	Time (sec)	τ/Pa	Time (sec)	τ/Pa
0.00	31.72	0.00	67.58	0.00	140.6
0.33	32.14	0.33	69.38	0.33	147.5
0.67	32.24	0.67	70.08	0.67	150.1
1.00	32.35	1.00	70.51	1.00	151.8
1.33	32.38	1.33	70.87	1.33	153.1
1.67	32.5	1.67	71.13	1.67	154.1
2.00	32.53	2.00	71.42	2.00	154.9
2.33	32.61	2.33	71.58	2.33	155.6
2.67	32.59	2.67	71.79	2.67	156.2
3.00	32.64	3.00	71.9	3.00	156.8
3.33	32.64	3.33	72.04	3.33	157.3
3.67	32.68	3.67	72.17	3.67	157.7
4.00	32.72	4.00	72.38	4.00	158.1
4.33	32.72	4.33	72.48	4.33	158.5
4.67	32.77	4.67	72.51	4.67	158.9
5.00	32.75	5.00	72.64	5.00	159.2
5.33	32.81	5.33	72.73	5.33	159.5
5.67	32.8	5.67	72.82	5.67	159.7
6.00	32.83	6.00	72.87	6.00	160.1
6.33	32.85	6.33	72.98	6.33	160.3
6.67	32.87	6.67	73.02	6.67	160.6
7.00	32.84	7.00	73.11	7.00	160.8
7.33	32.84	7.33	73.14	7.33	161.1
7.67	32.89	7.67	73.21	7.67	161.4
8.00	32.87	8.00	73.3	8.00	161.4
8.33	32.92	8.33	73.32	8.33	161.6
8.67	32.92	8.67	73.38	8.67	161.7
9.00	32.97	9.00	73.4	9.00	162
9.33	32.96	9.33	73.52	9.33	162.1
9.67	32.98	9.67	73.52	9.67	162.3
10.00	33	10.00	73.64	10.00	162.4
10.33	32.96	10.33	73.63	10.33	162.6
10.67	32.97	10.67	73.67	10.67	162.8
11.00	32.96	11.00	73.73	11.00	163
11.33	32.99	11.33	73.74	11.33	163
11.67	32.97	11.67	73.79	11.67	163.2
12.00	33.02	12.00	73.83	12.00	163.3
12.33	33	12.33	73.89	12.33	163.4
12.67	33.01	12.67	73.88	12.67	163.6
13.00	33.01	13.00	73.95	13.00	163.7
13.33	33.01	13.33	73.95	13.33	163.8
13.67	33.01	13.67	74	13.67	163.9
14.00	33.14	14.00	74.01	14.00	164.1
14.33	33.18	14.33	74.07	14.33	164.2
14.67	33.1	14.67	74.1	14.67	164.3
15.00	33.09	15.00	74.14	15.00	164.4
15.33	33.07	15.33	74.17	15.33	164.5
15.67	33.13	15.67	74.16	15.67	164.6
16.00	33.13	16.00	74.26	16.00	164.8
16.33	33.13	16.33	74.28	16.33	164.9
16.67	33.1	16.67	74.3	16.67	164.9
17.00	33.14	17.00	74.28	17.00	165
17.33	33.14	17.33	74.33	17.33	165
17.67	33.22	17.67	74.38	17.67	165.2
18.00	33.14	18.00	74.44	18.00	165.2
18.33	33.12	18.33	74.43	18.33	165.4
18.67	33.19	18.67	74.42	18.67	165.4

19.00	33.2	19.00	74.44	19.00	165.5
19.33	33.2	19.33	74.43	19.33	165.6
19.67	33.16	19.67	74.48	19.67	165.7
20.00	33.17	20.00	74.47	20.00	165.8
20.33	33.2	20.33	74.52	20.33	165.8
20.67	33.19	20.67	74.53	20.67	165.9
21.00	33.23	21.00	74.58	21.00	166
21.33	33.18	21.33	74.56	21.33	166.1
21.67	33.19	21.67	74.56	21.67	166.2
22.00	33.21	22.00	74.58	22.00	166.2
22.33	33.22	22.33	74.62	22.33	166.3
22.67	33.19	22.67	74.62	22.67	166.3
23.00	33.26	23.00	74.65	23.00	166.4
23.33	33.22	23.33	74.7	23.33	166.5
23.67	33.36	23.67	74.72	23.67	166.6
24.00	33.22	24.00	74.76	24.00	166.6
24.33	33.22	24.33	74.8	24.33	166.7
24.67	33.21	24.67	74.85	24.67	166.7
25.00	33.19	25.00	74.84	25.00	166.8
25.33	33.23	25.33	74.83	25.33	166.9
25.67	33.21	25.67	74.82	25.67	166.9
26.00	33.21	26.00	74.82	26.00	167
26.33	33.19	26.33	74.9	26.33	167
26.67	33.26	26.67	74.92	26.67	167.1
27.00	33.24	27.00	74.88	27.00	167.1
27.33	33.25	27.33	74.86	27.33	167.2
27.67	33.28	27.67	74.97	27.67	167.3
28.00	33.28	28.00	74.96	28.00	167.4
28.33	33.27	28.33	75.03	28.33	167.3
28.67	33.28	28.67	75	28.67	167.5
29.00	33.28	29.00	75.01	29.00	167.5
29.33	33.32	29.33	75	29.33	167.5
29.67	33.42	29.67	74.99	29.67	167.6
30.00	33.37	30.00	75.04	30.00	167.7
30.33	33.32	30.33	75.04	30.33	167.7
30.67	33.31	30.67	75.07	30.67	167.7
31.00	33.39	31.00	75.1	31.00	167.8
31.33	33.5	31.33	75.09	31.33	167.8
31.67	33.26	31.67	75.14	31.67	167.9
32.00	33.29	32.00	75.18	32.00	167.9
32.33	33.25	32.33	75.15	32.33	168
32.67	33.29	32.67	75.15	32.67	168
33.00	33.28	33.00	75.17	33.00	168.1
33.33	33.31	33.33	75.15	33.33	168.1
33.67	33.28	33.67	75.2	33.67	168.1
34.00	33.29	34.00	75.21	34.00	168.3
34.33	33.29	34.33	75.22	34.33	168.3
34.67	33.28	34.67	75.22	34.67	168.3
35.00	33.31	35.00	75.23	35.00	168.3
35.33	33.31	35.33	75.22	35.33	168.4
35.67	33.39	35.67	75.27	35.67	168.4
36.00	33.3	36.00	75.28	36.00	168.5
36.33	33.34	36.33	75.31	36.33	168.5
36.67	33.29	36.67	75.33	36.67	168.5
37.00	33.33	37.00	75.3	37.00	168.6
37.33	33.31	37.33	75.32	37.33	168.6
37.67	33.34	37.67	75.36	37.67	168.7
38.00	33.32	38.00	75.36	38.00	168.7
38.33	33.33	38.33	75.33	38.33	168.7
38.67	33.36	38.67	75.34	38.67	168.8
39.00	33.33	39.00	75.37	39.00	168.9
39.33	33.37	39.33	75.38	39.33	169

39.67	33.39	39.67	75.41	39.67	168.9
40.00	33.35	40.00	75.44	40.00	168.9
40.33	33.32	40.33	75.42	40.33	169
40.67	33.35	40.67	75.38	40.67	169
41.00	33.34	41.00	75.47	41.00	169
41.33	33.39	41.33	75.41	41.33	169.2
41.67	33.45	41.67	75.45	41.67	169.1
42.00	33.38	42.00	75.51	42.00	169.2
42.33	33.39	42.33	75.51	42.33	169.1
42.67	33.52	42.67	75.49	42.67	169.2
43.00	33.42	43.00	75.49	43.00	169.2
43.33	33.39	43.33	75.5	43.33	169.3
43.67	33.39	43.67	75.57	43.67	169.3
44.00	33.55	44.00	75.59	44.00	169.3
44.33	33.35	44.33	75.53	44.33	169.4
44.67	33.34	44.67	75.55	44.67	169.4
45.00	33.37	45.00	75.58	45.00	169.5
45.33	33.44	45.33	75.56	45.33	169.5
45.67	33.43	45.67	75.65	45.67	169.5
46.00	33.42	46.00	75.56	46.00	169.5
46.33	33.38	46.33	75.58	46.33	169.6
46.67	33.39	46.67	75.57	46.67	169.6
47.00	33.37	47.00	75.63	47.00	169.7
47.33	33.43	47.33	75.56	47.33	169.7
47.67	33.37	47.67	75.63	47.67	169.6
48.00	33.4	48.00	75.58	48.00	169.7
48.33	33.39	48.33	75.62	48.33	169.7
48.67	33.4	48.67	75.62	48.67	169.8
49.00	33.42	49.00	75.64	49.00	169.8
49.33	33.41	49.33	75.64	49.33	169.9
49.67	33.43	49.67	75.62	49.67	169.8
50.00	33.4	50.00	75.65	50.00	169.9
50.33	33.43	50.33	75.64	50.33	169.9
50.67	33.41	50.67	75.75	50.67	169.9
51.00	33.47	51.00	75.7	51.00	170
51.33	33.4	51.33	75.7	51.33	170
51.67	33.42	51.67	75.74	51.67	170
52.00	33.42	52.00	75.7	52.00	170.1
52.33	33.41	52.33	75.69	52.33	170.1
52.67	33.43	52.67	75.78	52.67	170.1
53.00	33.42	53.00	75.78	53.00	170.2
53.33	33.42	53.33	75.79	53.33	170.2
53.67	33.41	53.67	75.73	53.67	170.2
54.00	33.42	54.00	75.72	54.00	170.2
54.33	33.48	54.33	75.8	54.33	170.2
54.67	33.38	54.67	75.78	54.67	170.3
55.00	33.4	55.00	75.83	55.00	170.3
55.33	33.38	55.33	75.82	55.33	170.4
55.67	33.4	55.67	75.79	55.67	170.3
56.00	33.4	56.00	75.76	56.00	170.4
56.33	33.39	56.33	75.79	56.33	170.4
56.67	33.41	56.67	75.81	56.67	170.4
57.00	33.38	57.00	75.79	57.00	170.4
57.33	33.39	57.33	75.82	57.33	170.5
57.67	33.41	57.67	75.8	57.67	170.5
58.00	33.43	58.00	75.87	58.00	170.5
58.33	33.39	58.33	75.8	58.33	170.5
58.67	33.37	58.67	75.85	58.67	170.6
59.00	33.4	59.00	75.82	59.00	170.6
59.33	33.38	59.33	75.84	59.33	170.6
59.67	33.4	59.67	75.85	59.67	170.7
60.00	33.44	60.00	75.99	60.00	170.6

60.33	33.58	60.33	75.89	60.33	170.7
60.67	33.54	60.67	75.89	60.67	170.7
61.00	33.51	61.00	75.91	61.00	170.8
61.33	33.49	61.33	75.85	61.33	170.8
61.67	33.51	61.67	75.91	61.67	170.7
62.00	33.48	62.00	75.89	62.00	170.9
62.33	33.48	62.33	75.91	62.33	170.8
62.67	33.49	62.67	75.98	62.67	170.9
63.00	33.5	63.00	75.93	63.00	170.8
63.33	33.46	63.33	76.01	63.33	170.9
63.67	33.49	63.67	75.99	63.67	170.9
64.00	33.51	64.00	75.95	64.00	171
64.33	33.52	64.33	76	64.33	170.9
64.67	33.48	64.67	75.99	64.67	171
65.00	33.49	65.00	75.98	65.00	171.1
65.33	33.47	65.33	75.99	65.33	171
65.67	33.48	65.67	75.97	65.67	171.1
66.00	33.47	66.00	76.02	66.00	171
66.33	33.48	66.33	75.98	66.33	171.1
66.67	33.5	66.67	76	66.67	171.1
67.00	33.44	67.00	76	67.00	171.1
67.33	33.47	67.33	76.02	67.33	171.1
67.67	33.44	67.67	76.03	67.67	171.2
68.00	33.47	68.00	76.02	68.00	171.2
68.33	33.43	68.33	76.03	68.33	171.2
68.67	33.47	68.67	76.03	68.67	171.2
69.00	33.46	69.00	76.08	69.00	171.2
69.33	33.46	69.33	76.1	69.33	171.4
69.67	33.46	69.67	76.09	69.67	171.3
70.00	33.47	70.00	76.08	70.00	171.3
70.33	33.5	70.33	76.05	70.33	171.3
70.67	33.45	70.67	76.04	70.67	171.3
71.00	33.49	71.00	76.07	71.00	171.3
71.33	33.46	71.33	76.08	71.33	171.4
71.67	33.49	71.67	76.06	71.67	171.4
72.00	33.47	72.00	76.09	72.00	171.4
72.33	33.49	72.33	76.06	72.33	171.4
72.67	33.49	72.67	76.1	72.67	171.4
73.00	33.54	73.00	76.04	73.00	171.5
73.33	33.61	73.33	76.1	73.33	171.4
73.67	33.51	73.67	76.09	73.67	171.5
74.00	33.52	74.00	76.11	74.00	171.5
74.33	33.51	74.33	76.12	74.33	171.6
74.67	33.54	74.67	76.11	74.67	171.5
75.00	33.51	75.00	76.14	75.00	171.6
75.33	33.55	75.33	76.08	75.33	171.6
75.67	33.61	75.67	76.14	75.67	171.6
76.00	33.57	76.00	76.11	76.00	171.6
76.33	33.55	76.33	76.15	76.33	171.7
76.67	33.56	76.67	76.11	76.67	171.7
77.00	33.53	77.00	76.11	77.00	171.7
77.33	33.55	77.33	76.14	77.33	171.7
77.67	33.6	77.67	76.14	77.67	171.7
78.00	33.55	78.00	76.15	78.00	171.7
78.33	33.58	78.33	76.17	78.33	171.7
78.67	33.59	78.67	76.2	78.67	171.8
79.00	33.56	79.00	76.15	79.00	171.8
79.33	33.58	79.33	76.18	79.33	171.8
79.67	33.6	79.67	76.19	79.67	171.8
80.00	33.61	80.00	76.24	80.00	171.8
80.33	33.58	80.33	76.23	80.33	171.8
80.67	33.57	80.67	76.2	80.67	171.8

81.00	33.53	81.00	76.17	81.00	171.9
81.33	33.6	81.33	76.2	81.33	171.8
81.67	33.5	81.67	76.21	81.67	171.9
82.00	33.59	82.00	76.18	82.00	172
82.33	33.59	82.33	76.23	82.33	172
82.67	33.62	82.67	76.25	82.67	172
83.00	33.55	83.00	76.25	83.00	172

[a] Standard uncertainties u: u(T) = 0.03 K, u(τ) = 0.0005 τ; T: temperature, τ: Shear stress.

Table S4. Continued.

T = 263 K		T = 258 K	
Time (sec)	τ/Pa	Time (sec)	τ/Pa
0.00	301.3	0.00	543.9
0.33	323.9	0.33	595.8
0.67	331.9	0.67	599.2
1.00	337.2	1.00	616.1
1.33	341	1.33	628.2
1.67	343.9	1.67	637.7
2.00	346.3	2.00	644.7
2.33	348.2	2.33	650.4
2.67	350	2.67	655.2
3.00	351.4	3.00	659.2
3.33	353	3.33	662.9
3.67	354	3.67	666
4.00	355.2	4.00	668.9
4.33	356.1	4.33	671.4
4.67	356.9	4.67	673.8
5.00	357.8	5.00	676
5.33	358.6	5.33	677.9
5.67	359.3	5.67	679.8
6.00	360	6.00	681.5
6.33	360.7	6.33	683.2
6.67	361.2	6.67	684.7
7.00	361.9	7.00	686.2
7.33	362.4	7.33	687.5
7.67	363	7.67	688.8
8.00	363.4	8.00	690.1
8.33	363.9	8.33	691.2
8.67	364.5	8.67	692.3
9.00	364.8	9.00	693.3
9.33	365.3	9.33	694.3
9.67	365.6	9.67	695.3
10.00	366	10.00	696.2
10.33	366.4	10.33	697.1
10.67	366.8	10.67	698
11.00	367.1	11.00	698.8
11.33	367.5	11.33	699.6
11.67	367.8	11.67	700.3
12.00	368.1	12.00	701.1
12.33	368.4	12.33	701.8
12.67	368.7	12.67	702.5
13.00	369	13.00	703.1
13.33	369.2	13.33	703.8
13.67	369.5	13.67	704.5
14.00	369.8	14.00	705.1
14.33	370.1	14.33	705.7
14.67	370.3	14.67	706.2
15.00	370.6	15.00	706.8
15.33	370.8	15.33	707.4

15.67	371	15.67	707.9
16.00	371.3	16.00	708.5
16.33	371.5	16.33	709
16.67	371.7	16.67	709.5
17.00	371.9	17.00	710
17.33	372.1	17.33	710.5
17.67	372.3	17.67	711
18.00	372.6	18.00	711.4
18.33	372.7	18.33	711.9
18.67	372.9	18.67	712.4
19.00	373.1	19.00	712.9
19.33	373.3	19.33	713.3
19.67	373.5	19.67	713.8
20.00	373.7	20.00	714
20.33	373.8	20.33	714.5
20.67	373.9	20.67	714.9
21.00	374.2	21.00	715.2
21.33	374.3	21.33	715.6
21.67	374.5	21.67	715.9
22.00	374.7	22.00	716.3
22.33	374.8	22.33	716.7
22.67	375.1	22.67	716.9
23.00	375.1	23.00	717.2
23.33	375.2	23.33	717.7
23.67	375.4	23.67	717.9
24.00	375.6	24.00	718.2
24.33	375.6	24.33	718.6
24.67	375.8	24.67	718.8
25.00	375.9	25.00	719.2
25.33	376.1	25.33	719.5
25.67	376.2	25.67	719.8
26.00	376.3	26.00	720
26.33	376.4	26.33	720.3
26.67	376.6	26.67	720.6
27.00	376.8	27.00	721
27.33	376.8	27.33	721.1
27.67	377	27.67	721.4
28.00	377.1	28.00	721.7
28.33	377.3	28.33	721.9
28.67	377.4	28.67	722.2
29.00	377.5	29.00	722.4
29.33	377.5	29.33	722.7
29.67	377.6	29.67	723
30.00	377.8	30.00	723.3
30.33	377.8	30.33	723.5
30.67	378	30.67	723.7
31.00	378.1	31.00	724
31.33	378.2	31.33	724.3
31.67	378.3	31.67	724.5
32.00	378.5	32.00	724.7
32.33	378.5	32.33	724.9
32.67	378.6	32.67	725.2
33.00	378.7	33.00	725.4
33.33	378.8	33.33	725.6
33.67	378.9	33.67	725.9
34.00	379	34.00	726
34.33	379.1	34.33	726.3
34.67	379.1	34.67	726.5
35.00	379.3	35.00	726.7
35.33	379.3	35.33	726.8
35.67	379.5	35.67	727
36.00	379.6	36.00	727.2

36.33	379.6	36.33	727.4
36.67	379.7	36.67	727.6
37.00	379.8	37.00	727.8
37.33	379.9	37.33	728
37.67	379.9	37.67	728.2
38.00	380.1	38.00	728.4
38.33	380.1	38.33	728.6
38.67	380.2	38.67	728.7
39.00	380.3	39.00	729
39.33	380.4	39.33	729.1
39.67	380.4	39.67	729.3
40.00	380.5	40.00	729.5
40.33	380.6	40.33	729.6
40.67	380.7	40.67	729.8
41.00	380.8	41.00	730
41.33	380.9	41.33	730.3
41.67	380.9	41.67	730.5
42.00	380.9	42.00	730.6
42.33	381.1	42.33	730.8
42.67	381.1	42.67	731
43.00	381.2	43.00	731.2
43.33	381.3	43.33	731.3
43.67	381.3	43.67	731.4
44.00	381.4	44.00	731.6
44.33	381.5	44.33	731.7
44.67	381.5	44.67	732
45.00	381.6	45.00	732.1
45.33	381.7	45.33	732.3
45.67	381.7	45.67	732.4
46.00	381.9	46.00	732.5
46.33	381.9	46.33	732.7
46.67	381.9	46.67	732.8
47.00	382	47.00	733
47.33	382	47.33	733.2
47.67	382.1	47.67	733.3
48.00	382.2	48.00	733.4
48.33	382.3	48.33	733.6
48.67	382.3	48.67	733.7
49.00	382.5	49.00	733.9
49.33	382.4	49.33	733.9
49.67	382.5	49.67	734.1
50.00	382.6	50.00	734.3
50.33	382.6	50.33	734.4
50.67	382.7	50.67	734.6
51.00	382.7	51.00	734.7
51.33	382.8	51.33	734.8
51.67	382.9	51.67	734.9
52.00	382.9	52.00	735
52.33	382.9	52.33	735.2
52.67	383	52.67	735.3
53.00	383.1	53.00	735.4
53.33	383.2	53.33	735.5
53.67	383.1	53.67	735.6
54.00	383.2	54.00	735.8
54.33	383.4	54.33	735.9
54.67	383.3	54.67	735.9
55.00	383.4	55.00	736.1
55.33	383.4	55.33	736.2
55.67	383.5	55.67	736.4
56.00	383.5	56.00	736.4
56.33	383.6	56.33	736.5
56.67	383.6	56.67	736.6

57.00	383.7	57.00	736.8
57.33	383.7	57.33	736.8
57.67	383.7	57.67	737
58.00	383.8	58.00	737.1
58.33	383.8	58.33	737.2
58.67	383.9	58.67	737.4
59.00	383.9	59.00	737.5
59.33	384	59.33	737.6
59.67	384	59.67	737.7
60.00	384.1	60.00	737.8
60.33	384.1	60.33	737.8
60.67	384.2	60.67	738
61.00	384.2	61.00	738.1
61.33	384.3	61.33	738.2
61.67	384.3	61.67	738.2
62.00	384.4	62.00	738.4
62.33	384.4	62.33	738.5
62.67	384.4	62.67	738.6
63.00	384.6	63.00	738.7
63.33	384.5	63.33	738.8
63.67	384.6	63.67	738.9
64.00	384.6	64.00	739
64.33	384.7	64.33	739.2
64.67	384.8	64.67	739.3
65.00	384.7	65.00	739.3
65.33	384.8	65.33	739.5
65.67	384.8	65.67	739.6
66.00	385	66.00	739.6
66.33	384.9	66.33	739.7
66.67	385	66.67	739.9
67.00	385	67.00	739.9
67.33	385.1	67.33	740.1
67.67	385	67.67	740.1
68.00	385.1	68.00	740.2
68.33	385.2	68.33	740.3
68.67	385.2	68.67	740.5
69.00	385.4	69.00	740.5
69.33	385.3	69.33	740.6
69.67	385.4	69.67	740.7
70.00	385.3	70.00	740.9
70.33	385.5	70.33	740.9
70.67	385.5	70.67	741
71.00	385.5	71.00	741.2
71.33	385.5	71.33	741.3
71.67	385.5	71.67	741.4
72.00	385.6	72.00	741.4
72.33	385.6	72.33	741.5
72.67	385.7	72.67	741.7
73.00	385.7	73.00	741.7
73.33	385.7	73.33	741.8
73.67	385.7	73.67	741.9
74.00	385.9	74.00	742
74.33	385.9	74.33	742.1
74.67	385.9	74.67	742.2
75.00	385.9	75.00	742.3
75.33	386	75.33	742.3
75.67	386	75.67	742.4
76.00	386	76.00	742.4
76.33	386	76.33	742.6
76.67	386	76.67	742.6
77.00	386.1	77.00	742.7
77.33	386.1	77.33	742.8

77.67	386.2	77.67	742.9
78.00	386.2	78.00	743
78.33	386.3	78.33	743
78.67	386.3	78.67	743.1
79.00	386.3	79.00	743.1
79.33	386.4	79.33	743.2
79.67	386.4	79.67	743.2
80.00	386.4	80.00	743.3
80.33	386.4	80.33	743.3
80.67	386.5	80.67	743.3
81.00	386.5	81.00	743.5
81.33	386.6	81.33	743.6
81.67	386.5	81.67	743.5
82.00	386.6	82.00	743.6
82.33	386.6	82.33	743.7
82.67	386.7	82.67	743.7
83.00	386.7	83.00	743.8

Figure S5. Change of transient shear stress over time during start-up measurements at 273 K, where a 30 s^{-1} shear rate was imposed on a Maya oil sample formerly at rest. Rest time prior to start-up is a parameter. All samples were pre-sheared at 50 s^{-1} for 5 min[a].

Rest time = 5 min		Rest time = 15 min		Rest time = 30 min	
Time (min)	τ/Pa	Time (min)	τ/Pa	Time (min)	τ/Pa
5.12	460.7	15.12	483.6	30.12	501.9
5.23	439.2	15.23	455.3	30.23	470.9
5.35	432.5	15.35	447.4	30.35	461.7
5.47	428.5	15.47	442.1	30.47	455.6
5.58	425.7	15.58	438.5	30.58	451.3
5.7	423.6	15.7	435.7	30.7	448
5.82	422	15.82	433.3	30.82	445.3
5.93	420.6	15.93	431.5	30.93	443.1
6.05	419.5	16.05	429.8	31.05	441.1
6.17	418.5	16.17	428.4	31.17	439.5
6.28	417.6	16.28	427.2	31.28	438
6.4	416.8	16.4	426.1	31.4	436.7
6.52	416.2	16.52	425.2	31.52	435.5
6.63	415.5	16.63	424.2	31.63	434.4
6.75	414.9	16.75	423.4	31.75	433.4
6.87	414.5	16.87	422.6	31.87	432.5
6.98	414	16.98	421.9	31.98	431.6
7.1	413.5	17.1	421.3	32.1	430.8
7.22	413.1	17.22	420.7	32.22	430.1
7.33	412.7	17.33	420	32.33	429.3
7.45	412.3	17.45	419.5	32.45	428.8
7.57	412	17.57	419	32.57	428.1
7.68	411.6	17.68	418.5	32.68	427.5
7.8	411.3	17.8	418	32.8	426.9
7.92	411	17.92	417.7	32.92	426.4
8.03	410.8	18.03	417.2	33.03	425.9
8.15	410.4	18.15	416.8	33.15	425.4
8.27	410.2	18.27	416.4	33.27	424.9
8.38	410	18.38	416.1	33.38	424.5

8.5	409.7	18.5	415.7	33.5	424
8.62	409.5	18.62	415.4	33.62	423.6
8.73	409.3	18.73	415	33.73	423.2
8.85	409	18.85	414.7	33.85	422.8
8.97	408.8	18.97	414.5	33.97	422.4
9.08	408.6	19.08	414.1	34.08	422.1
9.2	408.4	19.2	413.9	34.2	421.7
9.32	408.2	19.32	413.5	34.32	421.3
9.43	408	19.43	413.3	34.43	421
9.55	407.8	19.55	413	34.55	420.7
9.67	407.6	19.67	412.8	34.67	420.4
9.78	407.4	19.78	412.5	34.78	420.1
9.9	407.3	19.9	412.3	34.9	419.8
10.02	407.1	20.02	412.1	35.02	419.5
10.13	406.9	20.13	411.8	35.13	419.3
10.25	406.8	20.25	411.6	35.25	418.9
10.37	406.6	20.37	411.4	35.37	418.7
10.48	406.5	20.48	411.2	35.48	418.4
10.6	406.2	20.6	411	35.6	418.2
10.72	406.1	20.72	410.7	35.72	417.9
10.83	405.9	20.83	410.5	35.83	417.7

[a] Standard uncertainties: u(τ) = 0.0005 τ, τ: Shear stress.

Table 5S. Continued

Rest time = 1 hr		Rest time = 2 hr	
Time (min)	τ/Pa	Time (min)	τ/Pa
60.12	516.1	120.1	517
60.23	483.9	120.2	481.5
60.35	473	120.4	470.9
60.47	466.3	120.5	464
60.58	461.6	120.6	459
60.7	457.8	120.7	455.1
60.82	454.8	120.8	451.9
60.93	452.3	120.9	449.2
61.05	450.1	121.1	447
61.17	448.2	121.2	444.9
61.28	446.5	121.3	443.1
61.4	445	121.4	441.4
61.52	443.7	121.5	440
61.63	442.4	121.6	438.7
61.75	441.2	121.8	437.5
61.87	440.2	121.9	436.3
61.98	439.2	122	435.2
62.1	438.3	122.1	434.2
62.22	437.4	122.2	433.3
62.33	436.7	122.3	432.4
62.45	435.9	122.5	431.6
62.57	435.2	122.6	430.8
62.68	434.5	122.7	430.1
62.8	433.9	122.8	429.4
62.92	433.2	122.9	428.7
63.03	432.7	123	428
63.15	432	123.2	427.4
63.27	431.6	123.3	426.9
63.38	431	123.4	426.3
63.5	430.5	123.5	425.8
63.62	430.1	123.6	425.2
63.73	429.6	123.7	424.7
63.85	429.1	123.9	424.2
63.97	428.7	124	423.8

64.08	428.3	124.1	423.3
64.2	427.8	124.2	422.9
64.32	427.5	124.3	422.4
64.43	427.1	124.4	422
64.55	426.7	124.6	421.6
64.67	426.3	124.7	421.3
64.78	426	124.8	420.8
64.9	425.6	124.9	420.4
65.02	425.3	125	420.1
65.13	425	125.1	419.8
65.25	424.7	125.3	419.4
65.37	424.3	125.4	419.1
65.48	424.1	125.5	418.8
65.6	423.7	125.6	418.4
65.72	423.5	125.7	418.1
65.83	423.2	125.8	417.8

Table S6. Effect of rest time on stress decay during start-up experiments, where shear rate of 30 s^{-1} was imposed on samples formerly at rest. All samples were pre-sheared at 50 s^{-1} for 5 min. Temperature is a parameter[a].

T = 258 K		T = 263 K		T = 268 K	
Rest time (min)	$\Delta\tau$/Pa	Rest time (min)	$\Delta\tau$/Pa	Rest time (min)	$\Delta\tau$/Pa
5	431	5	414	5	169.3
15	577	15	549	15	227
30	745	30	640	30	264
60	787	60	732	60	296
120	923	120	818	120	327
T = 273 K		T = 278 K			
Rest time (min)	$\Delta\tau$/Pa	Rest time (min)	$\Delta\tau$/Pa		
5	54.8	5	16		
15	73.1	15	20.6		
30	84.2	30	23		
60	92.9	60	28.3		
120	99.2	120	30.62		

[a] Standard uncertainties u: u(T) = 0.03 K, u($\Delta\tau$) = 0.0005 $\Delta\tau$; T: temperature $\Delta\tau$: Shear decay.