

Electronic supplementary material for:

Impacts of washing and deodorisation treatment on packaging-sourced post-consumer polypropylene.

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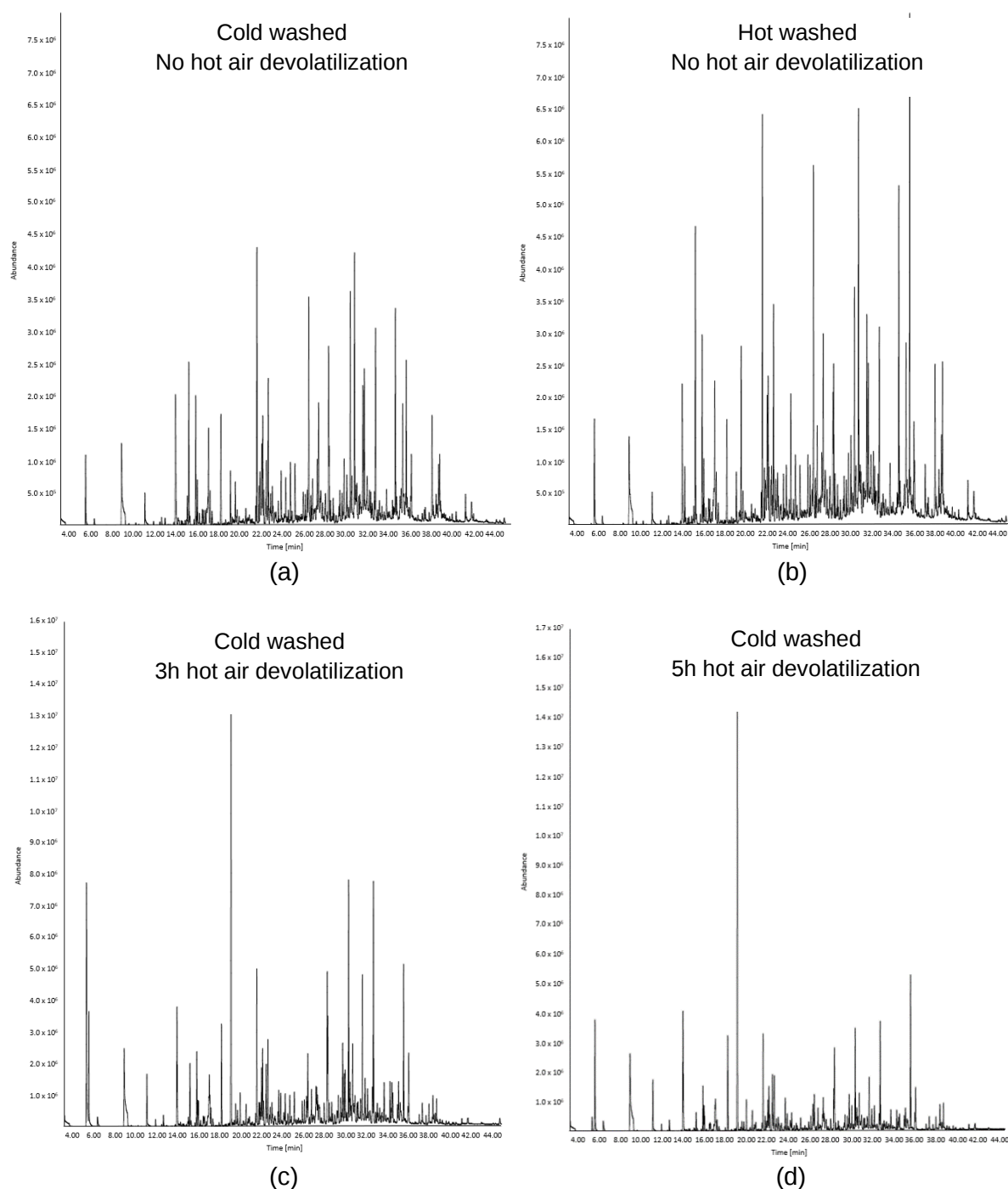


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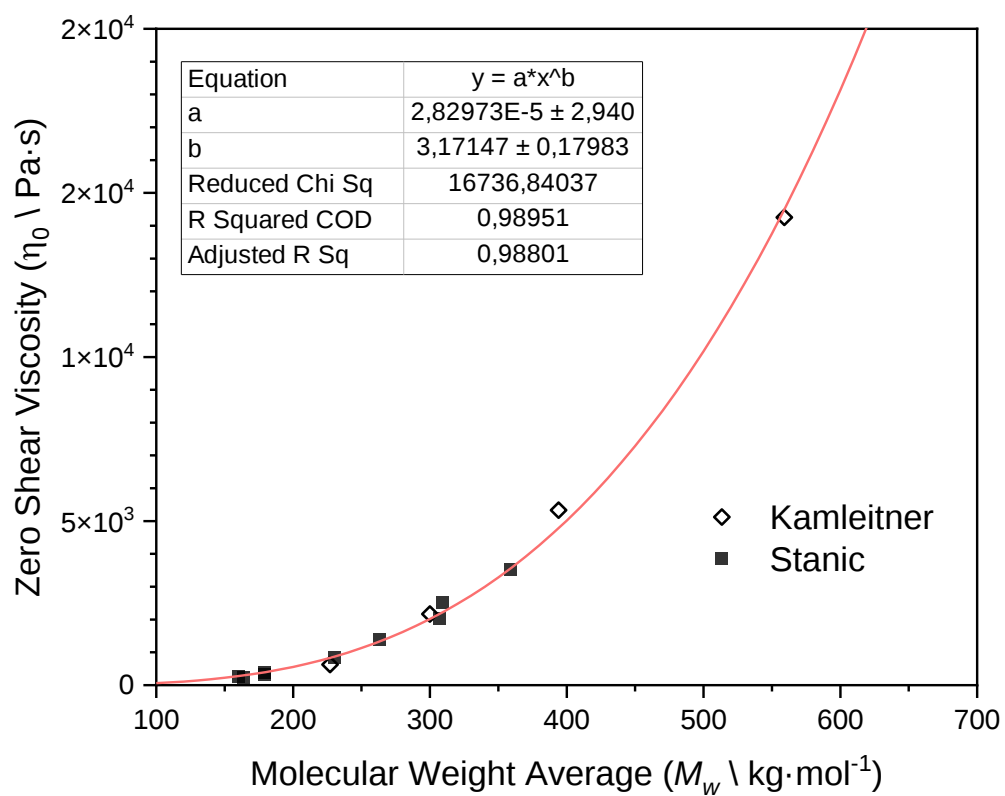
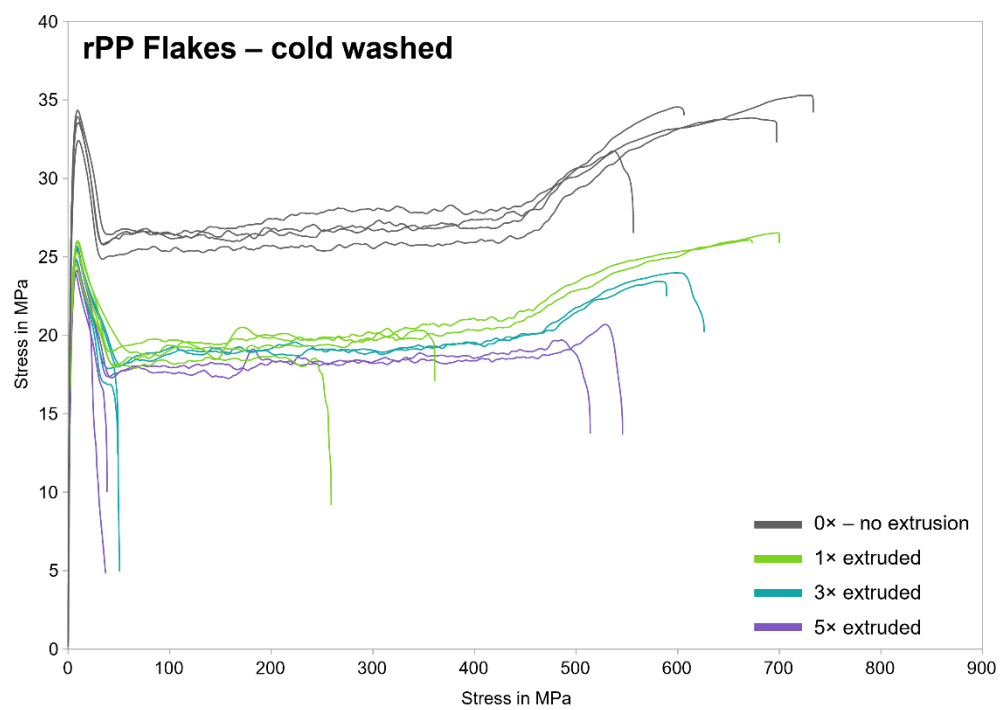
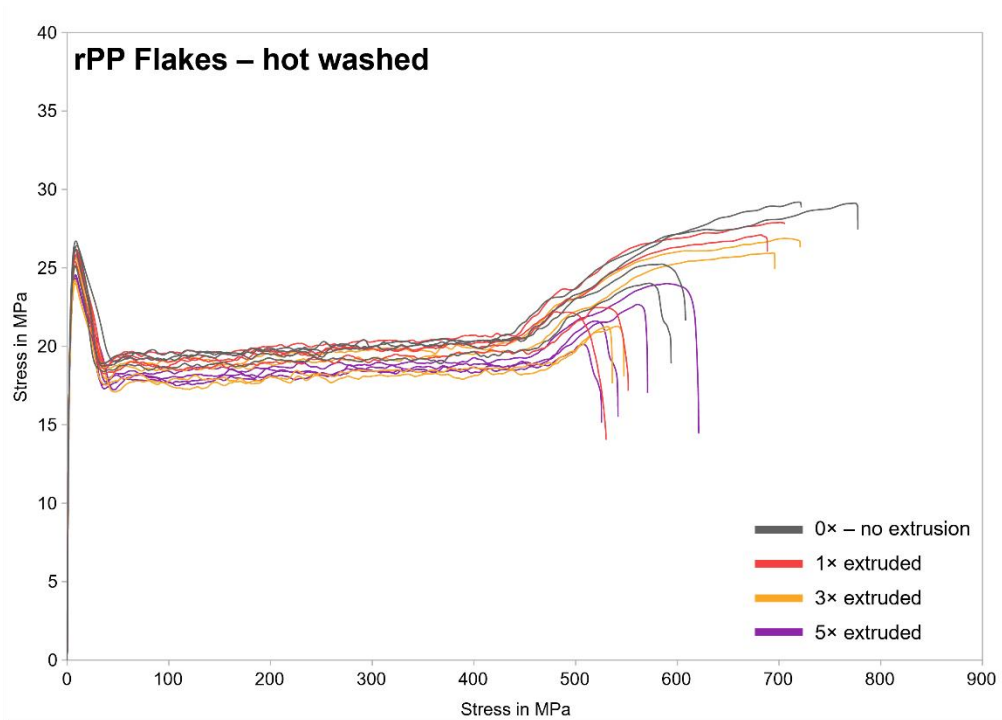


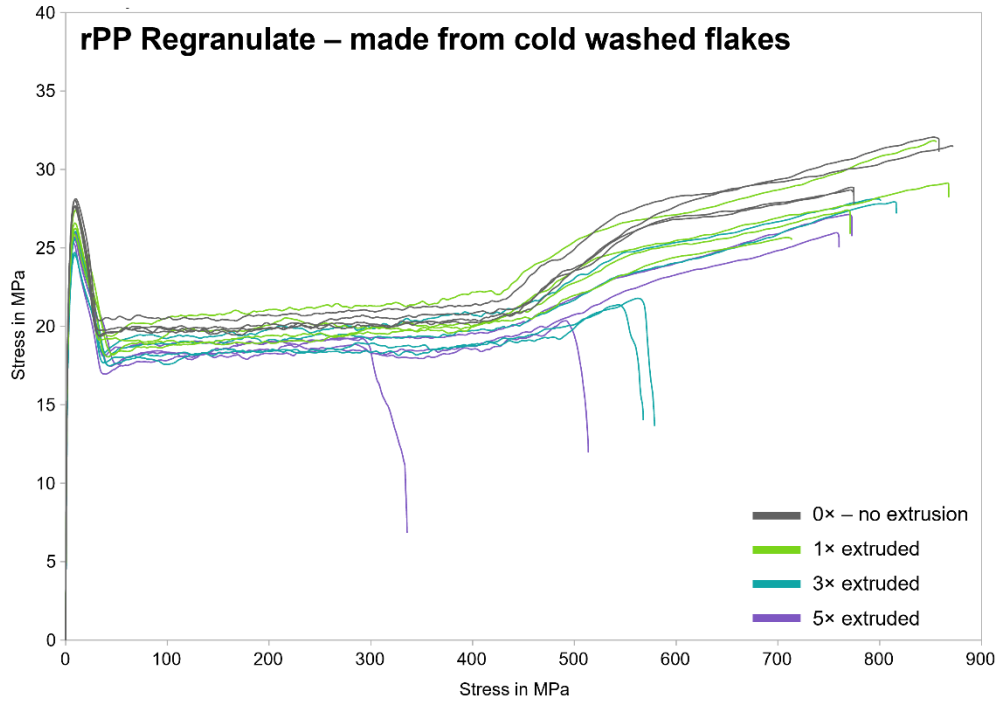
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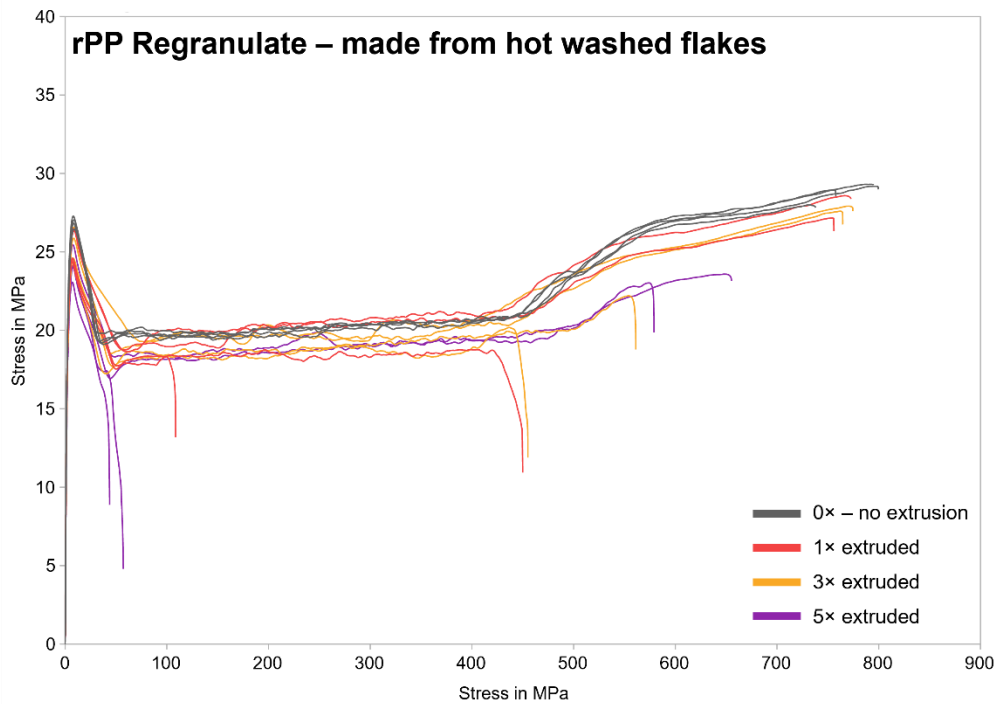
(a)



(b)



(c)



(d)

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Table S1. Substances identified in cold- and hot-washed regranulates with no (0 h), 3, 5, 7 and 22 h hot air devolatilization.

Retention time [min]	Substance name (IUPAC)	CAS-Nr.	Qual%	Cramer Class	Hot air devolatilization					Cold Wash (0 h) [µg/kg]**	Hot Wash (0 h) [µg/kg]**
					0 h [µg/kg]**	3 h [µg/kg]**	5 h [µg/kg]**	7 h [µg/kg]**	22 h [µg/kg]**		
5.304	2,2-dimethylhexane	590-73-8	83	I	-	416* ± 336	-	-	109 ± 77	-	-
14.219	Decane	124-18-5	95	I	-	-	-	-	-	-	144 ± 102
15.070	1-methyl-4-propan-2-ylbenzene	99-87-6	97	I	-	-	-	-	-	67 ± 8	-
15.166	(4R)-1-methyl-4-prop-1-en-2-ylcyclohexene	5989-27-5	99	I	378* ± 19	107 ± 1	-	-	-	406* ± 16	812* ± 36
15.814	Unidentified Hydrocarbon	-	<80	-	305* ± 8	135 ± 4	79 ± 1	-	-	329* ± 17	537* ± 21
15.968	Unidentified Hydrocarbon	-	<80	-	144 ± 3	-	-	-	-	123 ± 1	187 ± 11
16.472	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	67 ± 48
16.586	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	78 ± 55
16.972	Undecane	1120-21-4	92	I	-	-	-	-	-	-	142 ± 7
17.009	Unidentified Hydrocarbon	-	<80	-	371* ± 23	56 ± 8	42 ± 3	-	-	403* ± 28	515* ± 28
17.156	Unidentified Hydrocarbon	-	<80	-	90 ± 3	-	-	-	-	85 ± 5	145 ± 2
19.514	Dodecane	112-40-3	96	I	125 ± 10	-	-	63 ± 2.5	-	96 ± 8	324* ± 230
19.731	Decanal	112-31-2	91	I	-	-	-	-	-	-	102 ± 12
21.461	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	85 ± 60
21.529	Unidentified Hydrocarbon	-	<80	-	488* ± 15	251 ± 28	172 ± 9	141 ± 2	-	676* ± 86	1074* ± 154
21.726	Unidentified Hydrocarbon	-	<80	-	80 ± 6	-	-	-	-	86 ± 22	148 ± 22
21.823	Undecan-2-one	112-12-9	91	II	171 ± 7	-	-	-	-	183 ± 32	108 ± 9
21.984	[(1S,2S,4S)-1,7,7-trimethyl-2-bicyclo[2.2.1]heptanyl] acetate	125-12-2	99	I	241 ± 10	101 ± 1	55 ± 1	50 ± 35	-	232 ± 29	416* ± 34
22.081	(2-tert-butylcyclohexyl) acetate	88-41-5	90	II	302 ± 12	137 ± 1	79 ± 1	68 ± 3	-	322* ± 44	480* ± 43
22.163	Unidentified Hydrocarbon	-	<80	-	79 ± 1	-	-	-	-	81 ± 57	137 ± 11
22.592	Unidentified Hydrocarbon	-	<80	-	339* ± 7	171 ± 16	121 ± 8	97 ± 14	-	426* ± 52	108 ± 8
22.812	Unidentified Hydrocarbon	-	<80	-	81 ± 4	-	-	-	-	104 ± 74	683* ± 86
22.975	Unidentified Hydrocarbon	-	<80	-	62 ± 2	-	-	-	-	72 ± 11	184 ± 23
23.016	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	84 ± 5
23.538	2-methylundecanal	110-41-8	90	I	65 ± 2	-	-	-	-	-	113 ± 18
23.806	Unknown substance	-	<80	-	-	56 ± 2	-	-	-	-	158 ± 17

23.806	(4-tert-butylcyclohexyl) acetate	32210-23-4	87	II	122 ± 7	-	-	-	-	151 ± 12	-
24.234	Tetradecane	629-59-4	98	I	110 ± 5	54 ± 39	-	-	-	100 ± 15	243 ± 137
24.669	Phenoxybenzene	101-84-8	96	III	161 ± 10	54 ± 1	-	-	-	141 ± 12	216 ± 5
25.096	Unknown substance	-	<80	-	170 ± 7	70 ± 1	-	-	-	176 ± 3	190 ± 11
25.856	Cyclodecane	293-96-9	93	I	102 ± 5	-	-	-	-	94 ± 13	206 ± 14
26.059	2,6-ditert-butylcyclohexa-2,5-diene-1,4-dione	719-22-2	96	II	69 ± 2	-	-	-	-	-	147 ± 13
26.386	Unidentified Hydrocarbon	-	<80	-	263 ± 35	152 ± 29	91 ± 8	78 ± 2	-	627* ± 143	1038* ± 258
26.606	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	91 ± 26
26.740	2,4-ditert-butylphenol	96-76-4	97	I	108 ± 22	76 ± 3	-	-	-	140 ± 7	312* ± 55
27.173	Unknown substance	-	<80	-	165 ± 8	65 ± 3	-	-	-	166 ± 6	240 ± 20
27.305	Unidentified Hydrocarbon	-	<80	-	109 ± 18	-	-	-	-	312* ± 79	679* ± 170
27.537	Unknown substance	-	<80	-	-	-	-	-	-	161 ± 114	310* ± 219
27.977	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	198 ± 27
27.444	2-methylbutyl 2-hydroxybenzoate	51115-63-0	96	I	37 ± 26	-	-	-	-	-	-
27.938	Unknown substance	-	<80	-	91 ± 9	-	-	-	-	-	-
28.246	Pentyl 2-hydroxybenzoate	2050-08-0	96	I	482* ± 3	270 ± 7	69 ± 4	52 ± 1	-	455* ± 15	346* ± 22
28.302	Ethyl dodecanoate	106-33-2	98	I	205 ± 8	180 ± 4	133 ± 5	131 ± 5	101 ± 5	173 ± 9	412* ± 32
28.459	Hexadecane	544-76-3	98	I	-	-	-	-	-	-	88 ± 36
28.665	Decan-2-ylbenzene	4537-13-7	94	I	52 ± 1	-	-	-	-	-	72 ± 8
29.295	Undecan-5-ylbenzene	4537-15-9	97	I	68 ± 2	-	-	-	-	82 ± 58	125 ± 12
29.507	Undecan-4-ylbenzene	4536-86-1	95	I	55 ± 2	-	-	-	-	63 ± 44	93 ± 11
29.699	1-octoxyoctane	629-82-3	81	I	196 ± 4	158 ± 1	-	-	-	181 ± 36	204 ± 34
29.945	Undecan-3-ylbenzene	4536-87-2	90	I	142 ± 1	113 ± 1	-	-	-	152 ± 18	289 ± 61
30.270	Unknown substance	-	<80	-	619* ± 8	440* ± 11	170 ± 9	-	-	-	-
30.267	Hexyl 2-hydroxybenzoate	6259-76-3	83	I	-	-	-	150 ± 6	-	655* ± 22	699* ± 75
30.394	Heptadecane	629-78-7	86	I	-	-	-	-	-	-	90 ± 35
30.416	Unknown substance	-	97	I	162 ± 6	120 ± 3	-	-	-	180 ± 31	194 ± 41
30.656	Unknown substance	-	99	I	218 ± 19	-	-	-	-	718* ± 182	1162* ± 391
30.650	Undecan-2-ylbenzene	4536-88-3	99	I	-	143 ± 5	71 ± 1	67 ± 4	-	-	-
30.885	Unknown substance	-	<80	-	102 ± 72	-	-	-	-	-	170 ± 120
31.101	Dodecan-6-ylbenzene	2719-62-2	93	I	-	-	-	-	-	-	125 ± 88

31.195	Dodecan-5-ylbenzene	2719-63-3	96	I	-	-	-	-	-	-	114 ± 81
31.451	Unidentified Hydrocarbon	-	<80	-	110 ± 78	-	-	-	-	341* ± 91	599* ± 228
31.590	(2E)-2-benzylideneoctanal	101-86-0	96	I	324* ± 7	254 ± 9	95 ± 3	82 ± 4	-	380* ± 19	518* ± 126
31.842	Unknown substance	-	<80	-	-	89 ± 5	-	-	-	129 ± 9	248 ± 120
31.845	dodecan-3-ylbenzene	2400-00-2	86	I	104 ± 2	-	-	-	-	-	-
32.081	Ethyl tetradecanoate	124-06-1	96	I	66 ± 1	61 ± 1	-	-	-	-	199 ± 95
32.217	Octadecane	593-45-3	97	I	-	-	-	-	-	-	208 ± 147
32.539	Dodecan-2-ylbenzene	2719-61-1	94	I	72 ± 3	70 ± 6	-	-	-	80 ± 57	127 ± 37
32.640	Propan-2-yl tetradecanoate	110-27-0	98	I	473* ± 6	424* ± 9	188 ± 1	177 ± 12	-	522* ± 54	547* ± 93
33.652	Unknown substance	-	<80	-	-	89 ± 1	-	-	-	92 ± 10	165 ± 29
33.652	Hexadec-1-ene	629-73-2	97	I	85 ± 1	-	-	-	-	-	119 ± 33
34.215	(3,3,5-trimethylcyclohexyl) 2-hydroxybenzoate	118-56-9	99	I	78 ± 2	73 ± 1	-	-	-	-	-
34.394	Methyl hexadecanoate	112-39-0	99	I	-	72 ± 51	-	-	-	-	-
34.484	Unidentified Hydrocarbon	-	<80	-	120 ± 85	61 ± 5	-	-	-	513* ± 120	811* ± 254
34.630	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	68 ± 48
35.030	Unknown substance	-	<80	-	70 ± 1	73 ± 1	-	-	-	92 ± 14	171 ± 121
35.175	Unidentified Hydrocarbon	-	<80	-	51 ± 36	-	-	-	-	284 ± 59	459* ± 240
35.514	Ethyl hexadecanoate	628-97-7	99	I	227 ± 12	246 ± 23	263 ± 13	265 ± 8	244 ± 8	341* ± 110	1449* ± 219
35.948	Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, ethylester	1000460-94-4	98	II	-	-	-	-	-	-	252 ± 38
35.998	Propan-2-yl hexadecanoate	142-91-6	99	I	105 ± 6	119 ± 16	80 ± 4	85 ± 1	-	150 ± 23	126 ± 34
37.016	Octadec-1-ene	112-88-9	99	I	-	-	-	-	-	-	190 ± 13
37.939	Octadecane	593-45-3	90	I	-	-	-	-	-	-	405* ± 100
38.315	Ethyl (Z)-octadec-9-enoate	111-62-6	99	I	-	-	-	-	-	-	129 ± 18
37.928	Unidentified Hydrocarbon	-	<80	-	73 ± 52	-	-	-	-	271 ± 56	205 ± 52
38.551	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	128 ± 28	-
38.646	Ethyl octadecanoate	111-61-5	99	I	-	-	48 ± 6	51 ± 1	47 ± 1	132 ± 42	395* ± 46
41.059	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	57 ± 40	90 ± 32
41.626	Unidentified hydrocarbon	-	<80	-	-	-	-	-	-	-	160 ± 113

* value outside the calibration standard

** based on the standard surface/volume-ratio of 1 dm²/100 mL

Table S2. Estimations of molecular weight (M_w) of recycled cold- and hot-washed PP for 0, 1 and 5 extrusions based on complex viscosity ($|\eta^*|$) (from manuscript Figure 4) at $0.1 \text{ rad}\cdot\text{s}^{-1}$ using a power law fit.

Wash	Sample	Extrusions	$ \eta^* \text{ (Pa}\cdot\text{s)}$	$\bar{M}_w \text{ (kg}\cdot\text{mol}^{-1}\text{)}$
Hot	Regranulate 22h	0	1209.5	255
	Flakes	1	1203.3	255
		5	722.0	217
Cold	Regranulate 22h	0	1454.7	271
	Flakes	1	1771.6	271
		5	797.4	224