

**Table S1.** Compounds found at  $t_0$  and after 4 weeks ( $t_0+4w$ ) of aging of the investigated polymers. HDPE: high density polyethylene; LDPE: low density polyethylene; PET: polyethylene terephthalate; PP: polypropylene; PS: polystyrene.

Compounds	Tr (min)	HDPE at $t_0$	HDPE at $t_0+4w$	LDPE at $t_0$	LDPE at $t_0+4w$	PET at $t_0$	PET at $t_0+4w$	PP at $t_0$	PP at $t_0+4w$	PS at $t_0$	PS at $t_0+4w$
Acetone	9,52	X	X	X	X	X	X	X	X		X
Acetic acid, methyl ester	11,49										X
Silanol, trimethyl-	14,23					X	X	X	X	X	X
Pentane, 2-methyl-	14,27							X			
Methacrolein	14,48					X					
Formic acid, 1-methylethyl ester	14,99										
Acetic acid	15,22	X	X	X	X	X	X	X		X	
Pentane, 3-methyl-	15,49							X			
Methyl vinyl ketone	15,79		X		X				X	X	
2,3-Butanedione	16,06										
Butanal	16,32	X		X	X		X				
Propanal, 2-methyl-	16,35							X			
n-Hexane	16,78							X			X
2-Butanone	16,79			X			X		X		X
Furan, 3-methyl-	17,07					X					
Trichloromethane	18,94										
Tetrahydrofuran	19,35	X		X		X	X			X	
Ethyl Acetate	19,36			X					X	X	X
Cyclopentane, methyl-	19,42							X			
Cyclopentene, 3-methyl-	19,91								X		
2-Propanone, 1-hydroxy-	21,79										
Benzene, pentafluoro-	21,92			X	X	X	X	X	X	X	X
Cyclohexane	22,15								X		
Benzene	22,46	X	X	X				X			X
1-Propen-2-ol, acetate	22,54								X		
Furan, 2,3-dihydro-5-methyl-	22,91	X									
Propanoic acid	23,17	X					X			X	
2-Propenoic acid	23,26						X				
2-Pentanone	23,53					X	X		X	X	X
2-Butanone, 3-methyl-	23,55						X				

Pentane, 2,2,4-trimethyl-	23,76				X			
Hexane, 2,2-dimethyl-	23,76							
Isopropylcyclobutane	23,86							
3-Pantanone	24,19						X	X
Pentanal	24,34							
Allyl acetate	24,34							
Pentane, 2,2,4-trimethyl-	24,36	X						
Methane, oxybis[chloro-	24,38							
Pentanal	24,47	X	X	X				X
(R)-(-)-2-Pentanol	24,47						X	
Heptane	24,48				X	X		
2-Propenoic acid	24,55						X	
Furan, 2,5-dimethyl-	24,90						X	
n-Propyl acetate	25,33						X	
2,4-Dimethylfuran	25,46				X			X
Furan, 2-methoxy-	25,52						X	
Furan, 2,5-dihydro-3,4-dimethyl-	26,19							
2-Pentanol, 2-methyl-	26,79						X	
2-Butanol, 2,3-dimethyl-	26,80							
3-Penten-2-one, (E)-	27,02						X	
3-Penten-2-one	27,05							X
Methyl Isobutyl Ketone	27,13						X	
1-Methylcyclohexa-1,3-diene	27,42						X	
Pyridine	27,76				X			X
1,6-Heptadiene, 2-methyl-	27,76							
Heptane	27,82	X						
sec-Butyl acetate	28,20						X	
2-Heptene, 4-methyl-, (E)-	28,31							
Acetic anhydride	28,89							
Heptane, 4-methyl-	28,92					X		
Toluene	29,19					X	X	
Pyridine	29,19	X						X
Spiro[2,4]hepta-4,6-diene	29,20	X	X					X

Heptane, 3-methyl-	29,32						
Butanoic acid	29,50					X	
Acetylacetone	29,76					X	
2-Butenoic acid, (E)-	29,84					X	
CH <sub>3</sub> C(O)CH <sub>2</sub> CH <sub>2</sub> OH	30,07					X	
2-Hexanone	30,17						X
Toluene	30,18	X					
Pentanal, 2-methyl-	30,18						
Butane, 1-(2-propenyoxy)-	30,18						
2-Pantanone, 3-methylene-	30,29						
1-Methylallyl acetate	30,41						
Cyclopentanone	30,55						X
1,3-Cyclohexadiene, 5,6-dimethyl-	30,57						
2-Butenal, 2-methyl-	30,57						
Propanoic acid, TMS derivative	30,60					X	
3-Penten-2-one, 4-methyl-	30,77						
Furan, 2-methoxy-	30,77		X				X
3-Penten-2-one, 4-methyl-	30,77			X			X
1,1-Ethanediol, diacetate	30,90					X	
2-Hexanone	30,93	X					
Octane	30,93				X		
Hexanal	30,93		X	X			X
2-Butenoic acid, (E)-	31,06			X			X
Acetic acid, butyl ester	31,56		X	X			X
Furan, 2,3,5-trimethyl-	31,75					X	
2-Pantanone, 4-hydroxy-	31,94		X			X	
Heptane, 2,4-dimethyl-	32,20					X	
Heptane, 3-methyl-	32,20						
Ethanol, 2-(1,1-dimethylethoxy)-	32,45				X		
Benzonitrile, pentafluoro-	32,68			X			
2-Pantanone, 4-hydroxy-4-methyl-	33,27		X			X	

2,4-Dimethyl-1-heptene	33,33					X		
2-Pentanol, acetate	33,45						X	
1,1-Ethanediol, diacetate	33,45						X	
3-Oxetanol, 2,2,3-trimethyl-	33,60							
1,3-Cyclohexadiene, 5,6-dimethyl-	33,68							
Cyclopentadiene, 2,5,5-trimethyl-	33,68						X	
2-Hexanone, 5-methyl-	34,12							
Butanoic acid, 3-hydroxy-, methyl ester, (S)-	34,13						X	
2-Propanone, 1-(acetoxy)-	34,31				X	X		X
m-Dioxane, 4,5,5-trimethyl-	34,78						X	X
Unk_1	34,80	X	X	X	X			
Ethylbenzene	34,81					X		
2(3H)-Furanone, 5-methyl-	34,82						X	
1,2-Propanediol, 1-acetate	35,11							
Ethylbenzene	35,26	X						X
Benzene, 1,3-dimethyl-	35,27				X			X
4-Cyclopentene-1,3-dione	35,53							X
Hexan-2,4-dione, enol	35,55						X	
3-Heptanone	35,68							
1,2-Propanediol, 2-acetate	35,70						X	
2-Pentanone, 4-hydroxy-4-methyl-	35,80				X			X
2-Heptanone	35,87							X
Benzene, 1,3-dimethyl-	35,87	X	X	X				
2-METHYLPENTYL FORMATE	35,90							
Cyclobutane, butyl-	36,02							
2-Heptanone	36,03							
1-Pentanol, 4-methyl-	36,03							
1-Nonene	36,03							
4-Methyl-2-pentyl acetate	36,04							
1-Hexanol	36,12							

Ethyl orthoformate	36,20								
3-Heptanol	36,26								
Nonane	36,48								
Styrene	36,49			X		X		X	X
Pentafluorobenzaldehyde	36,49	X	X						
Ethylbenzene	36,58					X			
p-Xylene	36,58						X		
Benzene, 1,3-dimethyl-	36,58								
Heptanal	36,58								
3,3-Dimethyl-2,4-pentane dione	36,98						X		
2(5H)-Furanone	37,01			X		X			X
Styrene	37,15	X							
Butanoic acid, 4-hydroxy-	37,16			X				X	X
1,2-Propanediol, 2-acetate	37,44							X	
Acetic acid, diethyl-	37,56								
2,5-Hexanedione	37,74		X	X	X	X	X		X
Butanoic acid, 4-hydroxy-	37,74			X					
Cyclopentanone, 3-methyl-	37,83								X
Pentanoic acid, 3-methyl-	37,96								
Benzene, (1-methylethyl)-	38,19							X	X
Butanoic acid, 3-hydroxy-, ethyl ester	38,23								
2-Heptanone, 4-methyl-	38,43						X		
Benzene, (chloromethyl)pentafluoro-	38,68		X	X	X	X	X	X	X
2,5-Hexanedione	38,69								
Bicyclo[3.1.0]hex-2-ene, 2-methyl-5-(1-methylethyl)-	38,97				X	X			
2-Butyn-1-al diethyl acetal	39,30								
Benzene, (chloromethyl)pentafluoro-	39,42	X	X						
Octane, 4-ethyl-	39,46	X							
2-Acetyl-2-methyltetrahydrofuran	39,46			X					
Pentanoic acid	39,53						X		

2(3H)-Furanone, dihydro-5-methyl-	39,57	X	X			X		
Pentanoic acid	39,84		X					
Heptane, 2,2,3,5-tetramethyl-	39,92							
Octane, 2,2,6-trimethyl-	39,92							
2H-Pyran-2-one, tetrahydro-	39,94			X				
Hexanoic acid	39,94							
1-Heptanol	40,18							
2,4-Pentanedione, 3-ethyl-	40,21						X	
2-Cyclopenten-1-one, 3-methyl-	40,36							
3-Isopropyl-5-methylhexan-2-one	40,46							
Phenol	40,47					X		X
Benzaldehyde	40,54	X	X	X	X	X		X
2-Butanone, 4-(acetoxy)-	40,66				X		X	
Octane, 2,2,6-trimethyl-	40,74							
Benzene, 1,2,4-trimethyl-	40,76						X	
Pentanoic acid, 4-oxo-, methyl ester	40,95							X
1,9-Decadiene	41,02							
1H-Pyrrole-2,5-dione	41,10			X		X		
3-Octanone	41,11							
3-Pentenoic acid, 4-methyl-	41,14							X
Benzaldehyde	41,31	X	X					
2-Octanone	41,32							X
Cyclopropane, 1,2-dimethyl-1-pentyl-	41,41							
1-Decene	41,42							
Furan, 2-pentyl-	41,50		X	X	X			X
tert-Butylamine, N-ethyl-N-nitroso-	41,55						X	
Heptane, 2,2,4,6,6-pentamethyl-	41,69	X						
Decane	41,80			X		X		X
Octane, 2,7-dimethyl-	41,81		X					
2-Furanone, 2,5-dihydro-3,5-dimethyl	41,85						X	

Octane, 2,6,6-trimethyl-	41,98									
Octanal	42,01		X	X	X	X	X		X	X
Decane	42,01	X								
Nonane, 2,6-dimethyl-	42,17						X			
2(5H)-Furanone, 3,5,5-trimethyl-	42,24							X		
1,2-Propanediol, diacetate	42,31							X		
Nonane, 2,6-dimethyl-	42,35						X			
Benzofuran	42,37									X
Heptane, 2,2,4,6,6-pentamethyl-	42,56			X						
Propanoic acid, 2-methyl-, anhydride	42,69									
Benzene, (2-methylpropyl)-	42,70								X	
Benzene, (bromomethyl)pentafluoro-	42,81	X	X	X	X	X	X	X	X	X
Octanal	42,81	X	X							
Heptane, 5-ethyl-2,2,3-trimethyl-	42,82									
Formic acid, heptyl ester	42,94									
Acetic acid, 1-methyl-3-oxo-but-1-enyl ester	42,98							X		
Tetrasiloxane, decamethyl-	43,23									
Heptane, 2,2,4,6,6-pentamethyl-	43,23									
Acetic acid, (acetoxy)-	43,30									
2,2,4,4-Tetramethyloctane	43,39									
Formic acid, heptyl ester	43,54									
Octane, 6-ethyl-2-methyl-	43,55			X						
Benzyl alcohol	43,56									X
Octane, 2,6,6-trimethyl-	43,57	X								
6-Heptenoic acid	43,86				X					
Propanoic acid, 2-methyl-, anhydride	43,88									
Hexanoic acid	43,99					X	X			
Nonane, 4,5-dimethyl-	44,08							X		
Benzeneacetaldehyde	44,09						X		X	X
Heptanoic acid	44,15		X							





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Butanoic acid, 3-hexenyl ester, (Z)-	49,51						
Cyclobutanecarboxylic acid, 3-methylbut-2-enyl ester	49,55	X					
Undecane, 5-methyl-	49,67	X					
Benzothiazole	49,75						X
Benzene, 1,3-bis(1,1-dimethylethyl)-	49,76		X				
1,2-Benzisothiazole	49,76	X				X	
Benzothiazole	49,79		X				
1-Methoxydecane	49,84						
2(3H)-Furanone, dihydro-5-propyl-	49,93		X				
Undecane, 3-methyl-	50,09	X					
1,11-Dodecadiene	50,09						
Octyl chloroformate	50,23			X			
1-Nonanol	50,23						
1-Dodecene	50,23	X					
Undecane, 4,7-dimethyl-	50,37			X			
Oxalic acid, butyl propyl ester	50,39						
Cinnamaldehyde, (E)-	50,40						X
Cyclodecane, methyl-	50,49	X					
Decanal	50,62			X	X		
Undecane, 2,3-dimethyl-	50,64	X					
Undecane, 4-ethyl-	50,64	X					
Undecane, 6-ethyl-	50,94	X					
Dodecane, 2,6,11-trimethyl-	50,98					X	
Dodecane, 2,6,11-trimethyl-	50,98						
Undecane, 3,8-dimethyl-	51,14					X	
Undecane, 4,7-dimethyl-	51,14						
1-Decanol	51,16		X				
Dodecane, 5-methyl-	51,32			X			
2-Undecanone	52,91						
Dodecane, 4,6-dimethyl-	52,97				X		

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1-Tridecene	53,69				
Tridecane, 5-methyl-	54,58				
n-Nonylcyclohexane	55,21	X			
Benzene, (1-butylheptyl)-	56,53				
Dodecane, 1-iodo-	56,60				
Hexadecane	56,61	X	X		
Diphenyl sulfide	56,72			X	X
2-Decanone	56,72				
Cyclopropanecarboxamide, N-(3-methylphenyl)-	57,62		X		
Benzoic acid, phenyl ester	57,91				

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