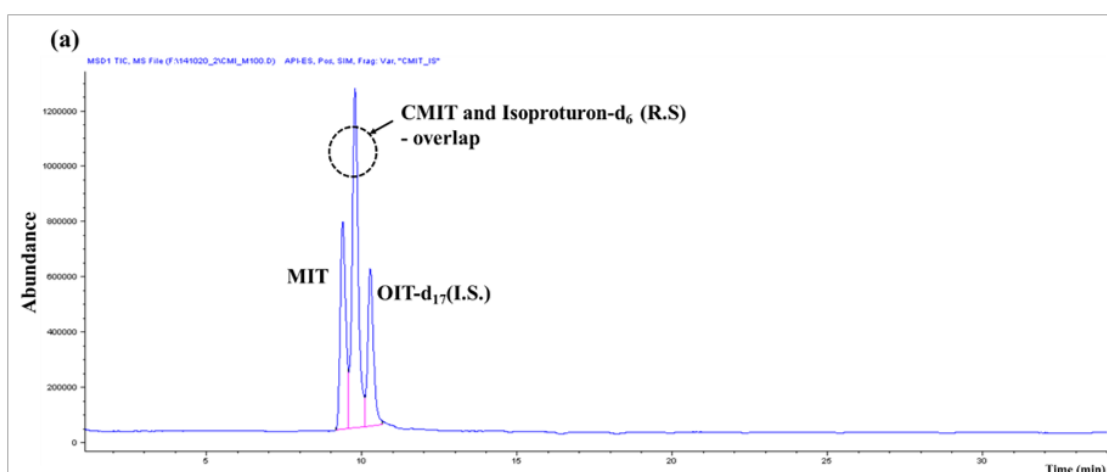


### SI 1. Preliminary chromatographic separation trials for MIT, CMIT and OIT-d<sub>17</sub>.

To establish the optimum separation for MIT and CMIT, two isocratic eluting conditions at a flow rate of 0.35 mL/min were tried: (a) with 100% MeOH (solvent B), and (b) 50% MeOH in water (solvent A). In addition, the gradient of elution was tested with a varying composition of water (solvent A) and MeOH (solvent B) and a flow rate that varied between 0.35 and 0.5 mL/min. For the isocratic condition (a), although the MIT, CMIT, and internal standard (OIT-d<sub>17</sub>) peaks were separated, the CMIT and recovery standard (Isoproturon-d<sub>6</sub>) peaks overlapped as shown in Figure below. To compare the separation resolution of each eluting condition, selectivity of each mobile phase condition estimated based on separation factor ( $\alpha$  = the separation factor between two different peaks; if the value is 1 then there is no resolution between two peaks, while a better resolution is secured with an  $\alpha$  larger than 1). For the isocratic condition (b), the peaks of MIT and CMIT showed a clearer separation, with  $\alpha$  of 1.26, but internal and recovery standards were not timely eluted. Therefore, to obtain faster elution, the gradient program was tested by increasing the composition of MeOH at an incremental rate by 10% from 60% to 100% after 14 min (*i.e.*, when MIT and CMIT were eluted), and manipulating the flow rate between 0.35 mL/min and 0.5 mL/min. With the larger MeOH content and faster flow rate, the internal and recovery standards were quickly eluted and the peak shape was sharpened. Main results were shown in the manuscript.



**Table S1.** Detailed Information of Method Validation Parameter Test Result

Compound	MDL (mg/kg)			Accuracy (RSD %)				
	Wet wipes	Liquid detergent	Powder detergent	N	spiking amount (ng/mL)	Wet wipes	Liquid detergent	Powder detergent
MIT	0.011	0.59	1.2	5	250	80.3 (4.8)	80.2 (4.4)	81.4 (11.5)
CMIT	0.013	1.5	1.6	5	250	101.5 (5.4)	102.7 (9.4)	81.2 (14.5)
BIT	0.032	1.3	1.1	5	250	81.0 (5.0)	62.4 (13.4)	60.4 (14.2)
IPBC	0.034	1.1	0.58	5	250	113.0 (3.3)	88.8 (6.0)	94.3 (4.2)
OIT	0.024	0.57	0.83	5	250	111.7 (3.5)	81.1 (4.4)	87.1 (6.9)

**Table S2.** LC/MS Conditions for Target Biocides

Parameter	Condition						
Column	Hypersil gold column (C18, 4.6 × 250 mm, 5µm)						
Guard column	ZORBAX Eclipse XDB-C18 guard cartridge (5 µm, 4.6 × 12.5 mm)						
Injection volume	10 µL						
Mobile phase	A : Water			B : MeOH			
Mobile phase gradient program	Time	5	11	14	25	35	
	% B	50	50	50	90	100	
	Flow rate	0.35	0.35	0.4	0.5	0.5	
	Time	5	11	15	20	38	
	% B	50	50	70	70	70	
	Flow rate	0.35	0.35	0.4	0.6	0.6	
Gas temperature	350 °C						
Ionization mode	ESI, Positive ion electrospray						
Gas flow	9 L/min						
Nebulizer pressure	40 psig						
Capillary voltage	4,000 V						
Compounds	Selective ion (m/z)*			Fragment energy (v)			
		Quantification	Confirm	Confirm	Quantification	Confirm	Confirm
	MIT	138	116	101	120	110	180
	CMIT	172	150	135	70	120	200
	BIT	174	152	134	90	120	210
	IPBC	304	282		120	270	
	OIT	214	102		100	180	
	OIT-d <sub>17</sub>	253	231		200	160	
	Isoproturon-d <sub>6</sub>	235	213		180	120	

(Note. \*The quantification ion was selected for  $[M+Na]^+$  based on consistent abundance with less ion suppression effect in both solvent based standard and spiked consumer product samples.)

**Table S3.** Information of Commercial Products Samples

No.	Labeling	Sample type	Condition	Color	Purpose of use
1	WW 1	Wet wipe	Liquid	Colorless	Infant
2	WW 2	Wet wipe	Liquid	Colorless	General
3	WW 3	Wet wipe	Liquid	Colorless	General
4	WW 4	Wet wipe	Liquid	Colorless	General
5	WW 5	Wet wipe	Foam liquid	Colorless	Cleaning

6	WW 6	Wet wipe	Liquid	Colorless	Infant
7	WW 7	Wet wipe	Liquid	Colorless	Infant
8	WW 8	Wet wipe	Liquid	Colorless	General
9	WW 9	Wet wipe	Liquid	Colorless	Non-branded products
10	WW 10	Wet wipe	Liquid	Colorless	Non-branded products
11	WW 11	Wet wipe	Liquid	Colorless	Non-branded products
12	WW 12	Wet wipe	Liquid	Colorless	Non-branded products
13	WW 13	Wet wipe	Liquid	Colorless	Non-branded products
14	WW 14	Wet wipe	Liquid	Colorless	Non-branded products
15	WW 15	Wet wipe	Liquid	Colorless	Non-branded products
16	WW 16	Wet wipe	Liquid	Colorless	Non-branded products
17	WW 17	Wet wipe	Liquid	Colorless	Non-branded products
18	WW 18	Wet wipe	Liquid	Colorless	Non-branded products
19	WW 19	Wet wipe	Liquid	Colorless	Non-branded products
20	WW 20	Wet wipe	Liquid	Colorless	Non-branded products
21	WW 21	Wet wipe	Liquid	Colorless	Non-branded products
22	PD 1	Laundry detergent	Powder	White	Clothes
23	PD 4	Laundry detergent	Powder	White	Clothes
24	PD 6	Laundry detergent	Powder	White	Clothes
25	LD 1	Laundry detergent	Gel	Colorless	Clothes
26	LD 2	Laundry detergent	Gel	Blue	Clothes
27	LD 3	Laundry detergent	Gel	Light blue	Clothes
28	LD 4	Fabric softener	Liquid	Pink	Clothes
29	LD 5	Fabric softener	Liquid	Colorless	Clothes

**Table S4.** Comparison of Recovery and MDL to Previous Studies

Sample type	Compound										Method	Instrument	Reference
	MIT		CMIT		BIT		IPBC		OIT				
	Recovery (%)	DL <sup>a</sup> (ppm)	Recovery (%)	DL (ppm)	Recovery (%)	DL (ppm)	Recovery (%)	DL (ppm)	Recovery (%)	DL (ppm)			
Wet wipes	80.3	0.011	101.5	0.013	81.0	0.032	113	0.034	112	0.024	UAE	HPLC/MS (ESI)	This study
Liquid	80.2	0.59	102.7	1.5	62.4	1.3	88.8	1.1	91.1	0.57			

detergent														
Powder	91.4	1.2	81.2	1.6	60.4	1.1	94.3	0.58	87.1	0.83				
detergent														
Household products	56.3	0.060	90.9	0.049	88.0	0.060	-	-	84.9	0.0066	MSPD	HPLC/MS/MS (ESI)	Alvarez-rivera et al. (2012)	
Paper for food packaging	82.6	0.002	86.5	0.01	93.5	0.001	-	-	99.0	0.001	UAE	UHPLC-MS/MS (ESI)	Lin et al. (2010)	
Cosmetic products	103	0.1	97.4	0.1	- <sup>c</sup>	-	-	-	-	-	Solvent extraction	UHPLC-MS/MS (ESI)	Wittenberg et al. (2015)	
Adhesives	102	0.037	103	0.147	-	-	-	-	-	-	Three-phase HF-LPME	HPLC-DAD	Rosero-Moreano et al. (2014)	
Distilled water	5	NA <sup>b</sup>	98	1.0.E-05	15	NA	89	3.0.E-05	95	1.0E-04	SPE (H2O Ophobic DVD)	HPLC/MS/MS (APCI)	Bester et al. (2010)	
Tap water	10.0	2.8E-04	95.0	2.6E-02	103.0	6.8E-02	-	1.3E-02	90.0		SPE (Strata X + Isolute C18)	GC/MS	Rafoth et al. (2007)	
River	91.7	NA	71.5	NA	-	-	-	-	-	-	large-volume	HPLC/MS/MS		
STP effluent	88.5	NA	49.3	NA	-	-	-	-	-	-	direct injection	HPLC/MS/MS (APCI)	Speksnijder et al. (2010)	
Shampoo	NA	NA	NA	NA	-	-	-	-	-	-				

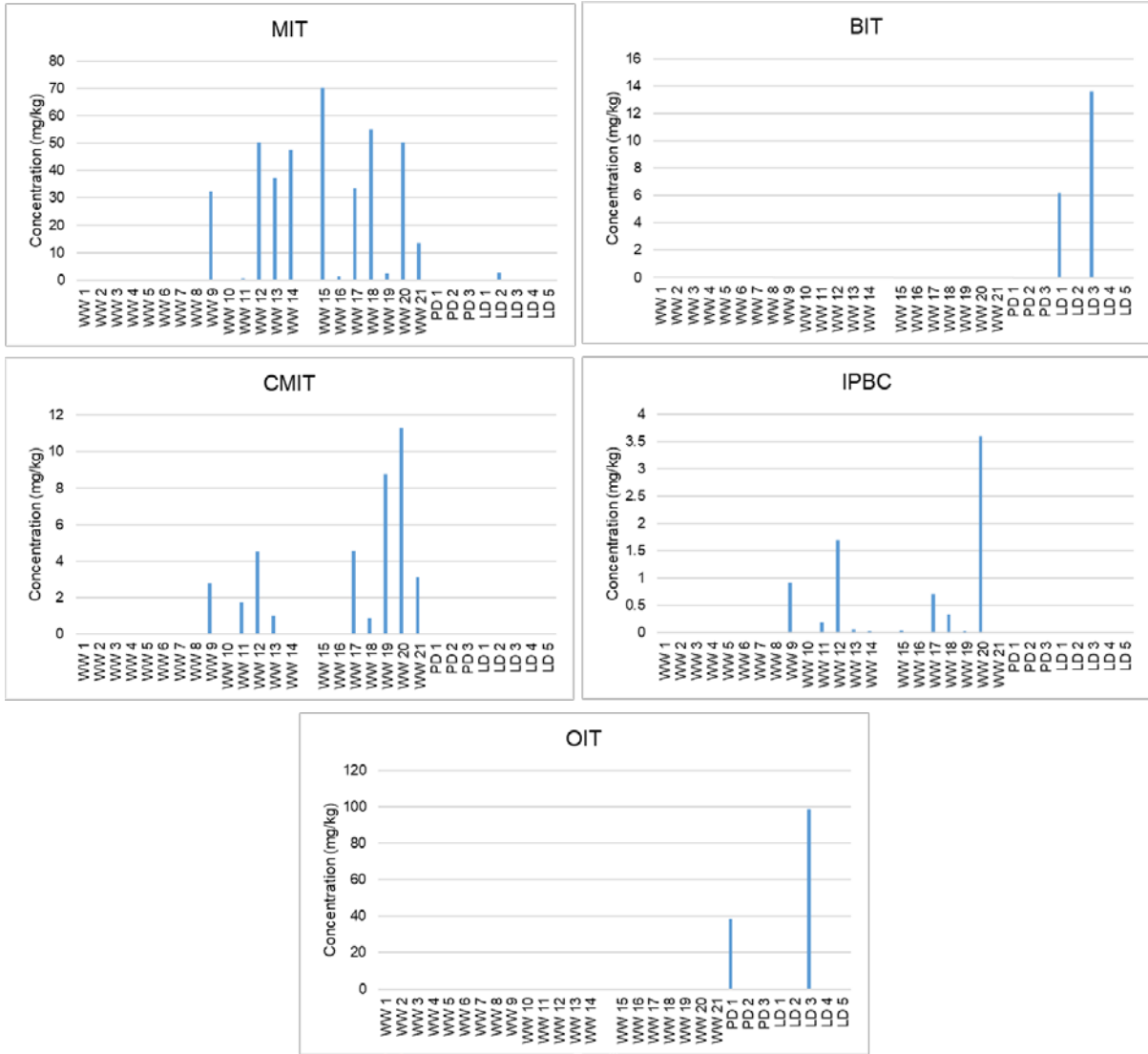
<sup>a</sup>DL: Detection limit, <sup>b</sup>NA: Not available, <sup>c</sup>-: Not analyzed

**Table S5.** Observed Concentration Levels (mg/kg) of Five Biocides in Common Products

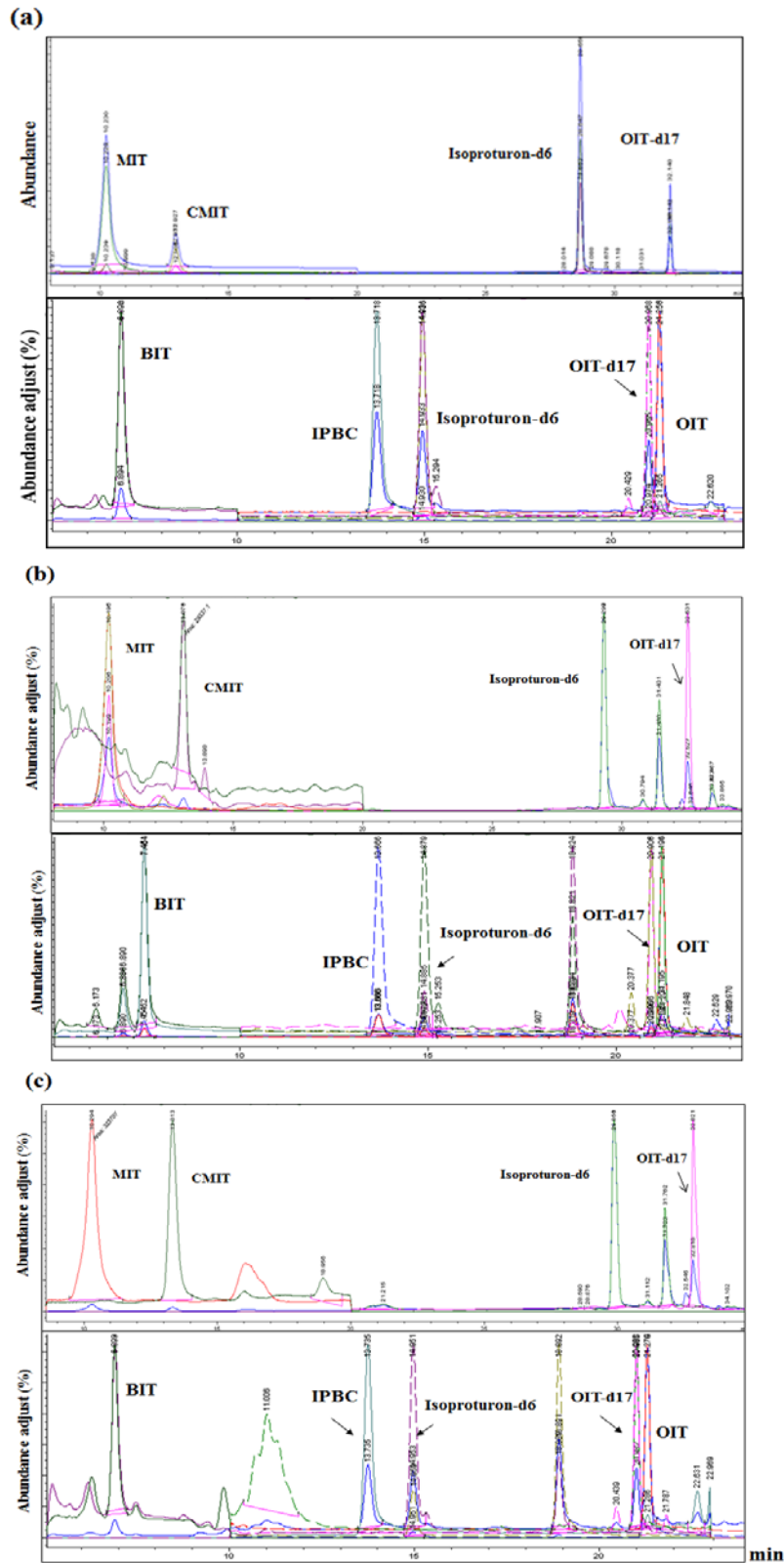
	MIT	CMIT	BIT	IPBC	OIT
Wet wipes					
for sales					
WW 1	ND <sup>a</sup>	ND	ND	ND	ND
WW 2	ND	ND	ND	ND	<MDL <sup>b</sup>
WW 3	ND	ND	ND	ND	0.100
WW 4	<MDL	<MDL	<MDL	ND	ND
WW 5	ND	ND	<MDL	ND	0.091
WW 6	ND	ND	ND	ND	ND
WW 7	ND	ND	<MDL	ND	ND
WW 8	ND	ND	ND	ND	<MDL
Detected Mean	-	-	-	-	0.096
DF <sup>c</sup>	0/8	0/8	0/8	0/8	2/8
Not for sales (complementary items)					
WW 9	32.4	2.80	ND	0.913	ND
WW 10	0.026	ND	ND	ND	ND
WW 11	0.415	1.73	ND	0.184	ND
WW 12	50.4	4.51	ND	1.70	ND
WW 13	37.2	0.983	ND	0.063	ND
WW 14	47.6	ND	ND	0.031	ND
WW 15	70.2	ND	ND	0.048	ND
WW 16	1.23	ND	ND	ND	ND
WW 17	33.5	4.56	ND	0.711	ND
WW 18	55.0	0.85	ND	0.334	ND
WW 19	2.37	8.79	ND	0.027	ND
WW 20	50.4	11.3	ND	3.59	ND
WW 21	13.4	3.11	ND	ND	ND
Detected Mean	30.3	2.97	-	0.58	-
DF	13/13	9/13	0/13	10/13	0/13
Powder type detergent					
PD 1	ND	ND	ND	ND	38.6
PD 2	ND	ND	ND	ND	ND
PD 3	ND	ND	ND	ND	ND
Detected Mean	-	-	-	-	38.6
DF	0/3	0/3	0/3	0/3	1/3
Liquid type detergent					
LD 1	ND	ND	6.17	ND	<MDL
LD 2	2.59	ND	ND	ND	ND
LD 3	ND	ND	13.6	ND	99.0
LD 4	ND	ND	ND	ND	ND
LD 5	ND	ND	ND	ND	ND
Detected Mean	2.59	-	9.9	-	99.0
DF	1/5	0/5	2/5	0/5	1/5

<sup>a</sup>ND; not detected, <sup>b</sup><MDL; below MDL, <sup>c</sup>DF; Detection frequency

The figure below depicted the data above in Table S5



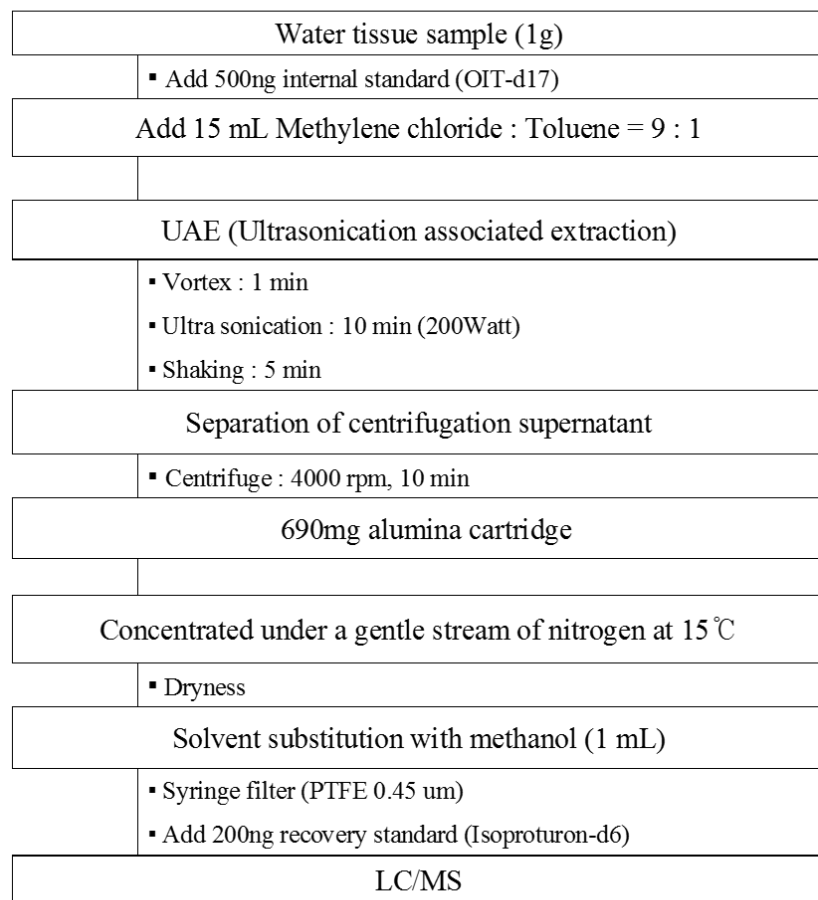
Graphical presentation of Table S5.



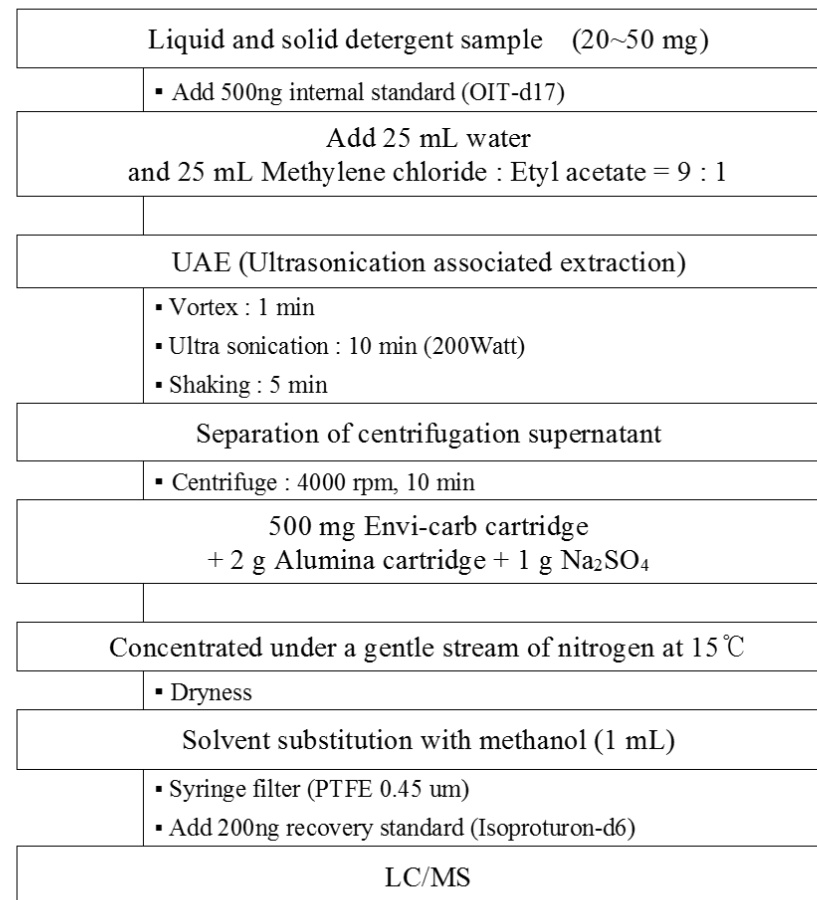
**Fig. S1.** Extracted ion chromatogram of 10 ng spiking for MIT/CMIT in the real consumer product sample; (a) wet wipe sample (b) liquid type detergent sample (c) powder type detergent sample.



(a)



(b)



**Fig. S2.** The flow chart of pretreatment method.

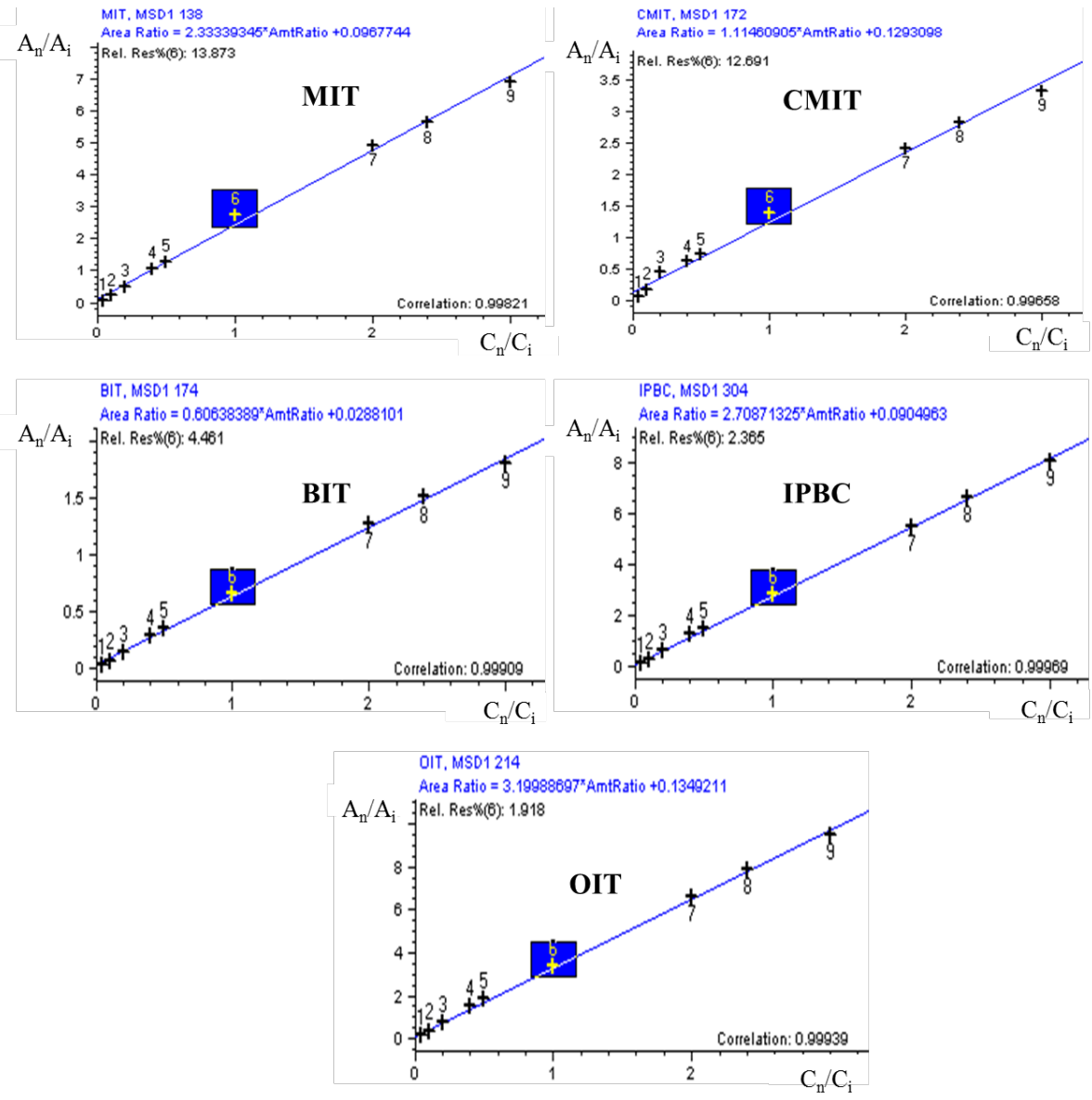


Fig. S3. The calibration curve of target compounds.