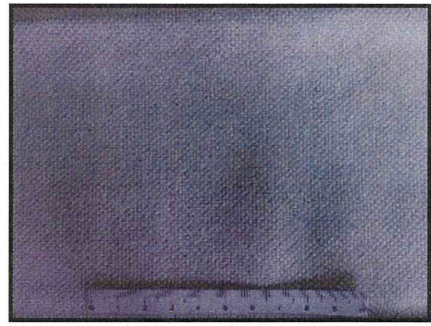
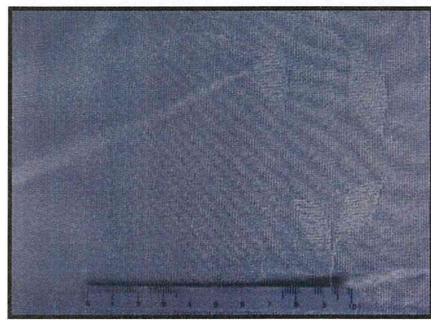


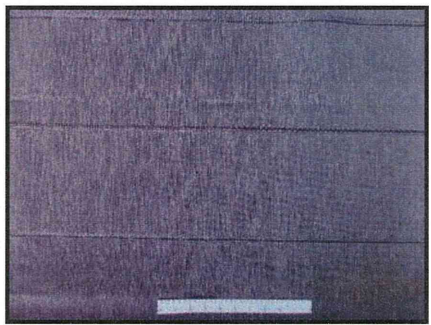
No. 1



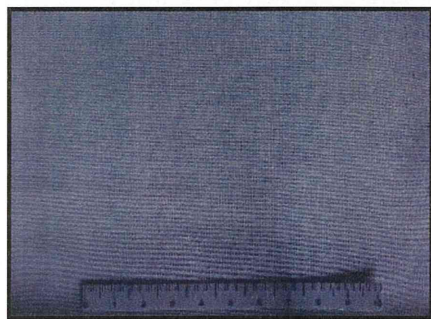
No. 2



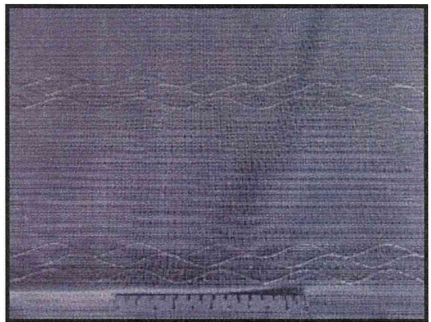
No. 3



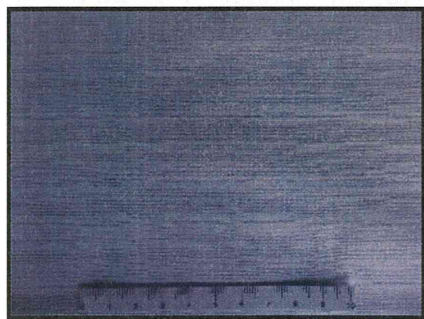
No. 4



No. 5



No. 6



No. 7



No. 8

図1 カーテン写真 (続き)



No. 9



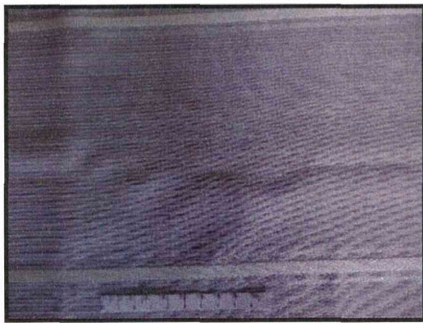
No. 10



No. 11



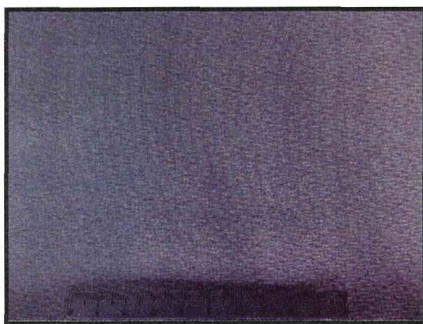
No. 12



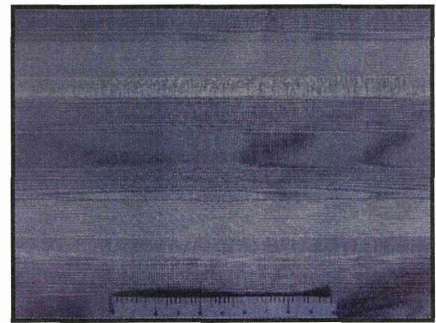
No. 13



No. 14



No. 15

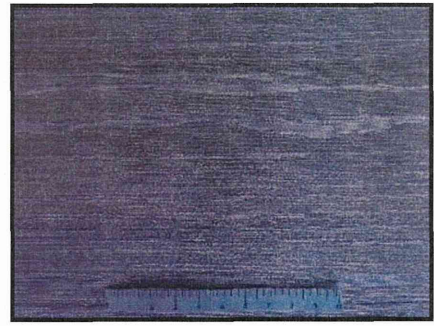


No. 16

図1 カーテン写真 (続き)



No.17



No.18



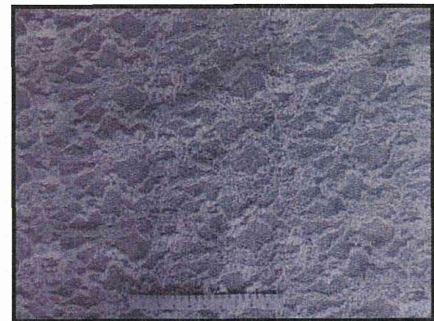
No.19



No.20



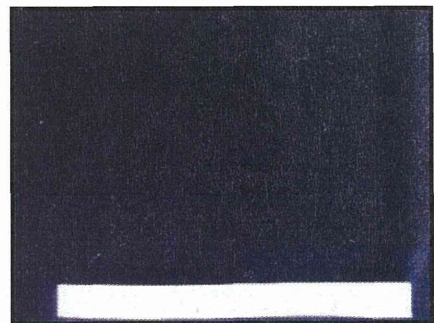
No.21



No.22

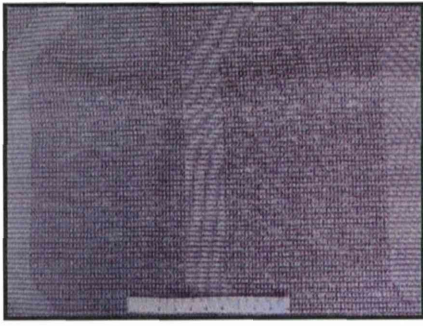


No. 23

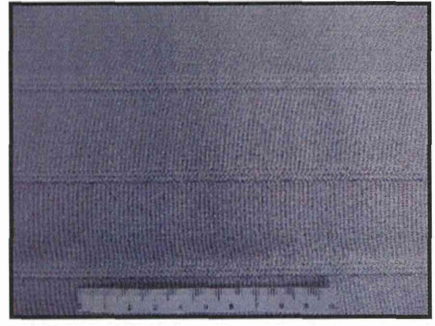


No.24

図1 カーテン写真 (続き)



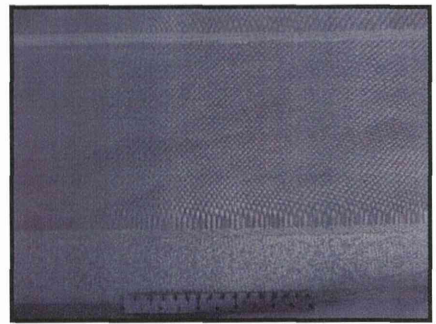
No. 25



No.26



No. 27



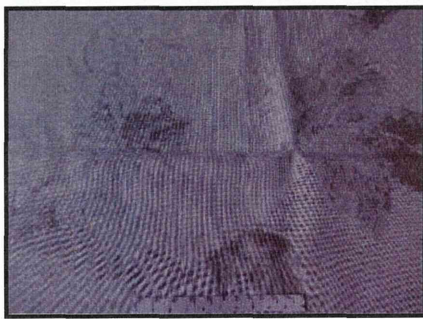
No.28



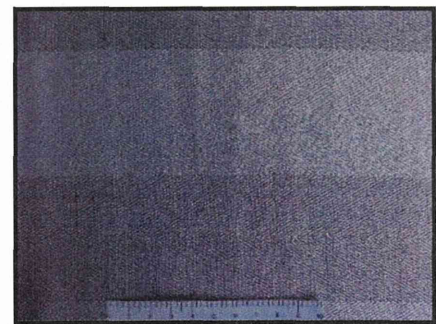
No. 29



No.30

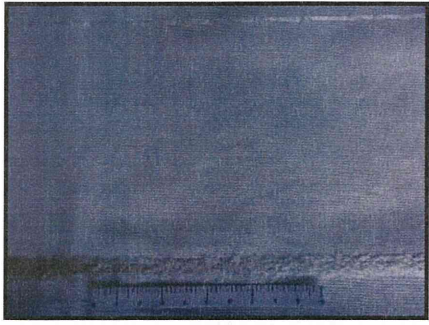


No. 31



No.32

図1 カーテン写真 (続き)



No. 33



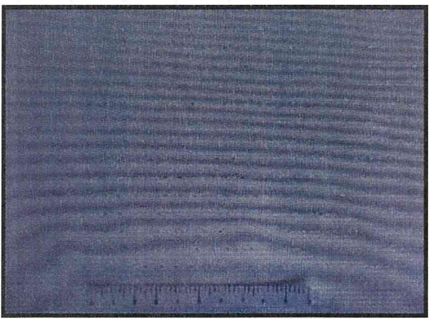
No.34



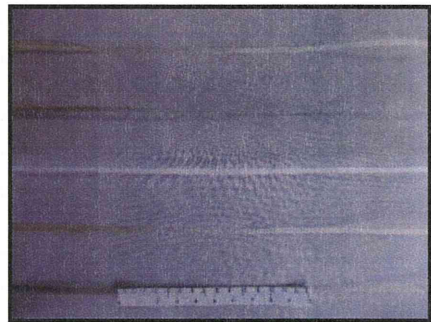
No. 35



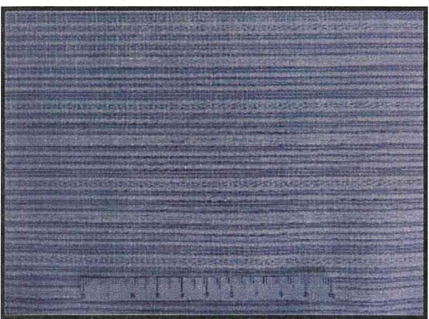
No.36



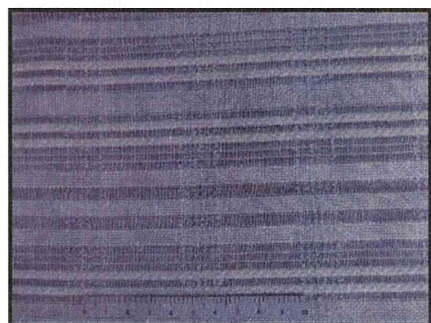
No. 37



No.38

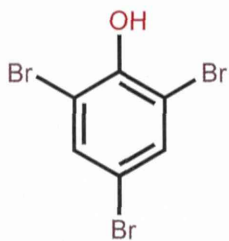


No. 39

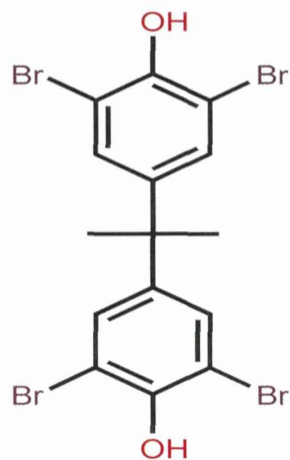


No.40

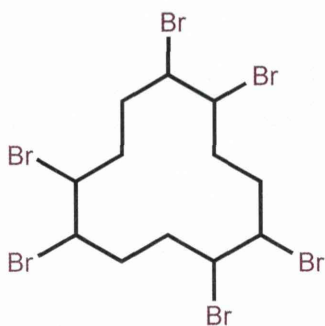
図1 カーテン写真 (続き)



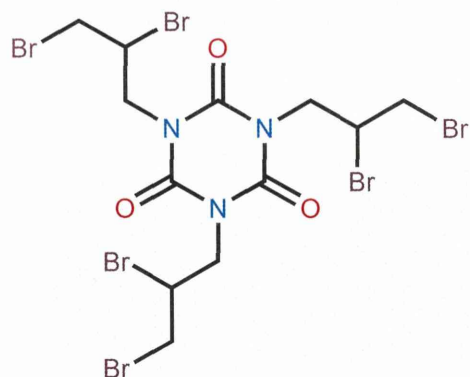
2,4,6-Tribromophenol
 Chemical Formula: C₆H₃Br₃O
 Exact Mass: 327.77
 Molecular Weight: 330.80



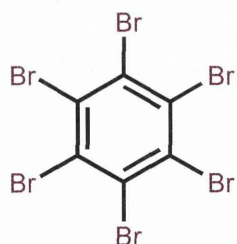
Tetrabromobisphenol A
 Chemical Formula: C₁₅H₁₂Br₄O₂
 Exact Mass: 539.76
 Molecular Weight: 543.88



1,2,5,6,9,10-
 Hexabromocyclododecane
 Chemical Formula: C₁₂H₁₈Br₆
 Exact Mass: 635.65
 Molecular Weight: 641.70

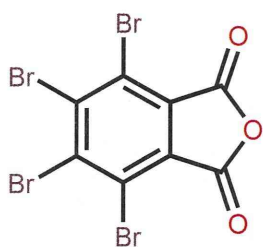


Tris(2,3-dibromopropyl) isocyanurate
 Chemical Formula: C₁₂H₁₅Br₆N₃O₃
 Exact Mass: 722.62
 Molecular Weight: 728.69

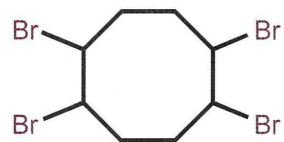


Hexabromobenzene
 Chemical Formula: C₆Br₆
 Exact Mass: 545.51
 Molecular Weight: 551.49

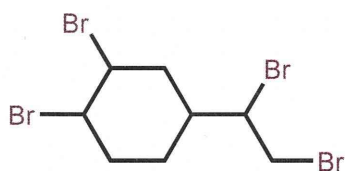
図 2 対象とした難燃剤の構造式



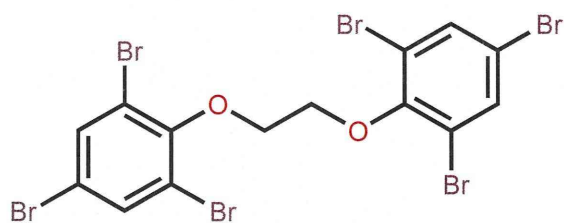
Tetrabromophthalic anhydride
 Chemical Formula: C₈Br₄O₃
 Exact Mass: 459.66
 Molecular Weight: 463.70



1,2,5,6-Tetrabromocyclooctane
 Chemical Formula: C₈H₁₂Br₄
 Exact Mass: 423.77
 Molecular Weight: 427.80

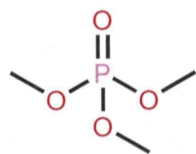


1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane
 Chemical Formula: C₈H₁₂Br₄
 Exact Mass: 423.77
 Molecular Weight: 427.80

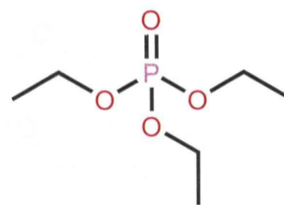


1,2-Bis(2,4,6-tribromophenoxy)ethane
 Chemical Formula: C₁₄H₈Br₆O₂
 Exact Mass: 681.56
 Molecular Weight: 687.64

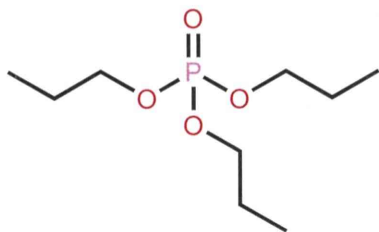
図 2 対象とした難燃剤の構造式



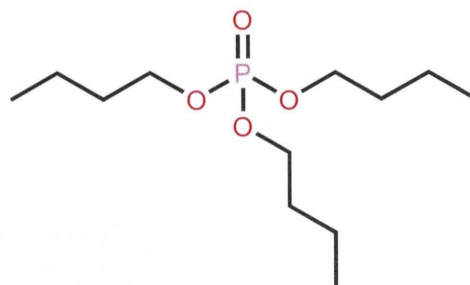
Trimethyl Phosphate
Chemical Formula: C₃H₉O₄P
Exact Mass: 140.02
Molecular Weight: 140.07



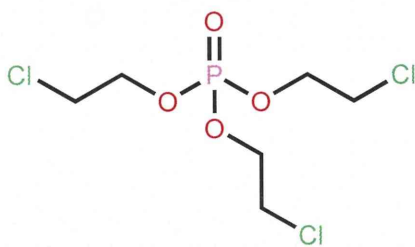
Triethyl Phosphate
Chemical Formula: C₆H₁₅O₄P
Exact Mass: 182.07
Molecular Weight: 182.16



Tripropyl Phosphate
Chemical Formula: C₉H₂₁O₄P
Exact Mass: 224.12
Molecular Weight: 224.24

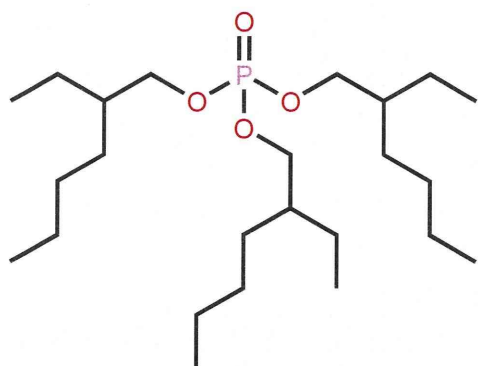


Tributyl Phosphate
Chemical Formula: C₁₂H₂₇O₄P
Exact Mass: 266.16
Molecular Weight: 266.32

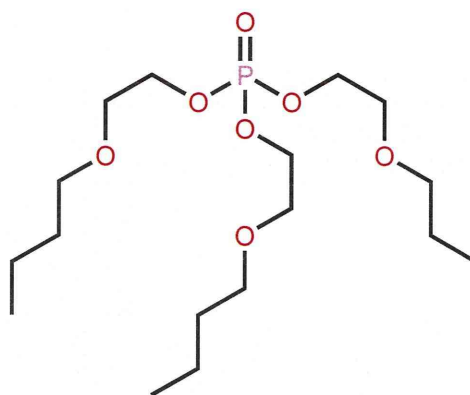


Tris(2-Chloroethyl) Phosphate
Chemical Formula: C₆H₁₂Cl₃O₄P
Exact Mass: 283.95
Molecular Weight: 285.48

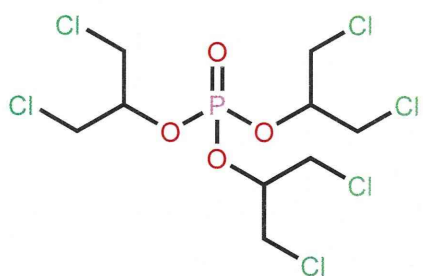
図 2 対象とした難燃剤の構造式



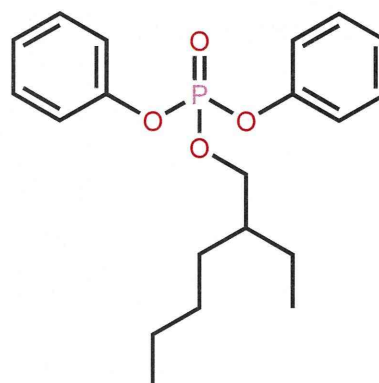
Tris(2-Ethylhexyl) Phosphate
 Chemical Formula: C₂₄H₅₁O₄P
 Exact Mass: 434.35
 Molecular Weight: 434.64



Tris(2-Butoxyethyl) Phosphate
 Chemical Formula: C₁₈H₃₉O₇P
 Exact Mass: 398.24
 Molecular Weight: 398.48

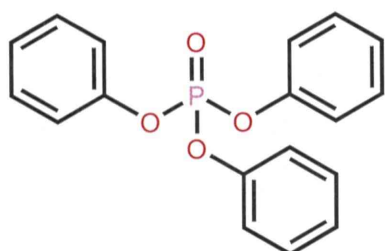


Tris(1,3-Dichloro-2-propyl) Phosphate
 Chemical Formula: C₉H₁₅Cl₆O₄P
 Exact Mass: 427.88
 Molecular Weight: 430.89

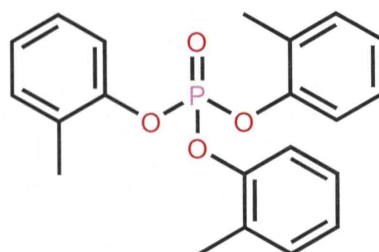


2-Ethylhexyl Diphenyl Phosphate
 Chemical Formula: C₂₀H₂₇O₄P
 Exact Mass: 362.16
 Molecular Weight: 362.41

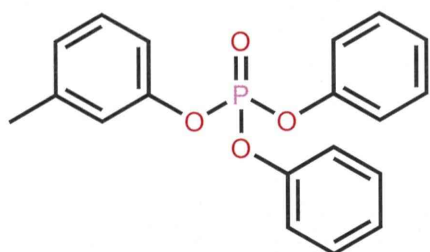
図 2 対象とした難燃剤の構造式



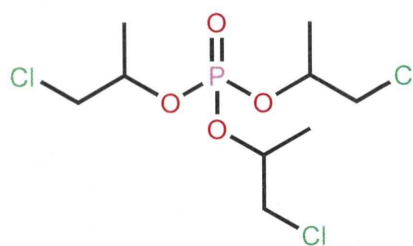
Triphenyl Phosphate
 Chemical Formula: C₁₈H₁₅O₄P
 Exact Mass: 326.07
 Molecular Weight: 326.29



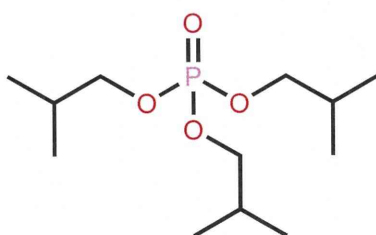
Tricresyl Phosphate
 Chemical Formula: C₂₁H₂₁O₄P
 Exact Mass: 368.12
 Molecular Weight: 368.37



Cresyl Diphenyl Phosphate
 Chemical Formula: C₁₉H₁₇O₄P
 Exact Mass: 340.09
 Molecular Weight: 340.31



Tris(1-Chloro-2-propyl) Phosphate
 Chemical Formula: C₉H₁₈Cl₃O₄P
 Exact Mass: 326.00
 Molecular Weight: 327.56



Triisobutyl Phosphate
 Chemical Formula: C₁₂H₂₇O₄P
 Exact Mass: 266.16
 Molecular Weight: 266.32

図 2 対象とした難燃剤の構造式



図 3 アセトン超音波抽出後の試料液

表 2 GC/MS の測定条件 (SIM)

Compounds	RT (min)	測定イオン(m/z)	
Tris(1,3-Dichloro-2-propyl) Phosphate	11.22	211	381
Triphenyl Phosphate-d15	12.15	341	243
Triphenyl Phosphate	12.22	326	215
Tricresyl Phosphate	15.37	368	367
	16.01		
	16.26		
Tri-p-cresyl Phosphate-d21	16.38	341	243
Perylene-d12	18.36	264	260
Tris(2,3-dibromopropyl) isocyanurate	25.50	82	56

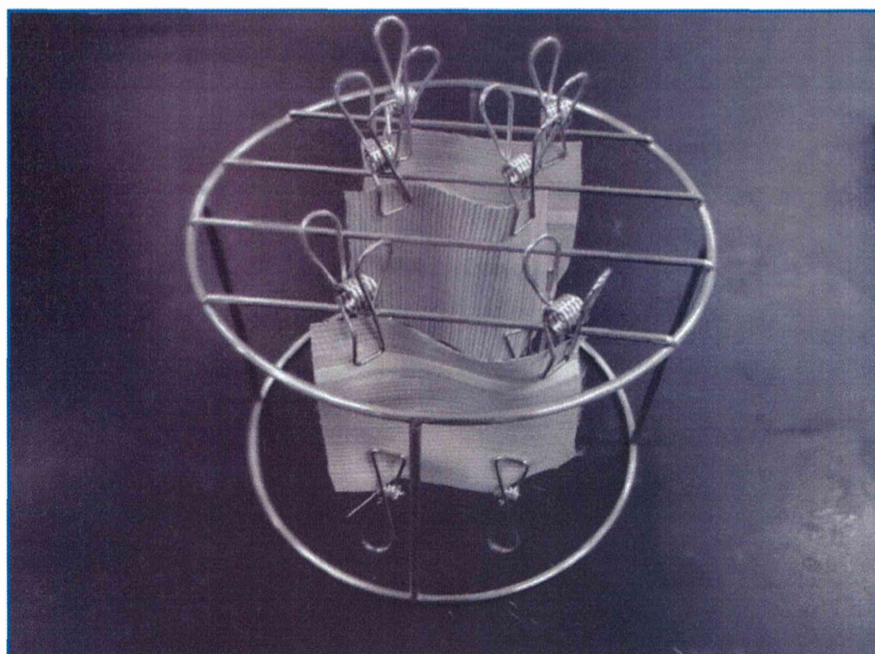


図4 サンプルラックに吊るしたカーテン試料



図5 サンプリングバック法による放散試験

表 3 カーテン中の難燃材の分析結果

No.	難燃処理方法	検出結果		
		リン系 難燃剤	臭素系 難燃剤	その他
1	後加工防炎	TPPO	TDBP- TANZO	
2	難燃糸			Benzoic acid 2-ethylhexyl ester
3	後加工防炎	リン系 a1,a2		Peak1
4	難燃糸			
5	難燃糸			
6	難燃糸			
7	難燃糸			
8	後加工防炎	TPhp, リン系 b	TDBP- TANZO	Bumetrizole
9	後加工防炎	リン系 a1,a2		
10	後加工防炎	TDCPP	TDBP- TANZO	Bumetrizole
11	後加工防炎			
12	後加工防炎	TPPO	TDBP- TANZO	
13	後加工防炎	TDCPP, TPhP	TDBP- TANZO	
14	後加工防炎	TPhp, リン系 b	TDBP- TANZO	Bumetrizole
15	後加工防炎	TPPO	TDBP- TANZO	
16	難燃糸			Benzyl Benzoate
17	難燃糸			Benzyl chloride、Limonene、 <i>n</i> -alkaneC ₂₃ ~C ₃₃
18	後加工防炎	リン系 a1,a2		
19	後加工防炎	TCsP, TPhP, リン系 a1,a2	TDBP- TANZO	Peak1
20	後加工防炎			Peak2

表 3 カーテン中の難燃材の分析結果

No.	難燃処理方法	検出結果		
		リン系 難燃剤	臭素系 難燃剤	その他
21	難燃糸			
22	後加工防炎	TPPO	TDBP- TANZO	
23	後加工防炎	リン系 a1,a2		
24	難燃糸			
25	難燃糸			<i>n</i> -alkaneC ₂₃ ~C ₃₂
26	後加工防炎	TPPO	TDBP- TANZO	
27	後加工防炎			Peak3
28	後加工防炎			Peak2
29	後加工防炎			Peak2
30	難燃糸			Peak4
31	後加工防炎	リン系 a1,a2		Peak1
32	難燃糸			BHT、 <i>n</i> -alkaneC ₂₄ ~C ₃₁
33	難燃糸			Benzyl chloride、 <i>n</i> -alkaneC ₂₂ ~C ₃₃
34	難燃糸			<i>n</i> -alkaneC ₂₃ ~C ₃₁
35	後加工防炎			Peak2
36	後加工防炎			
37	後加工防炎			
38	後加工防炎			
39	難燃糸			
40	難燃糸			<i>n</i> -alkaneC ₂₃ ~C ₃₁

*その他で検出されたものについてはスペクトルにより定性した

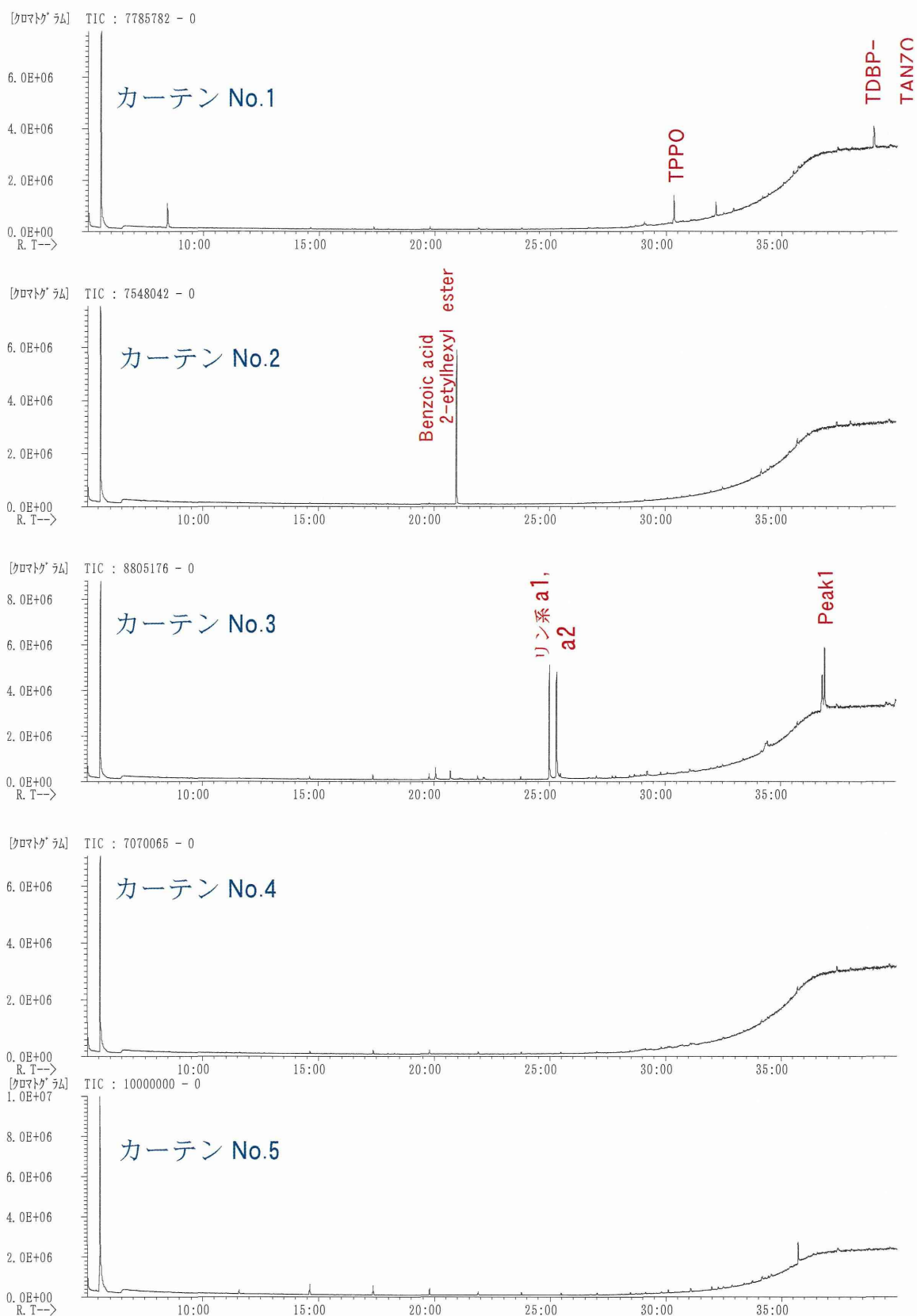


図 6 トータルイオンクロマトグラム

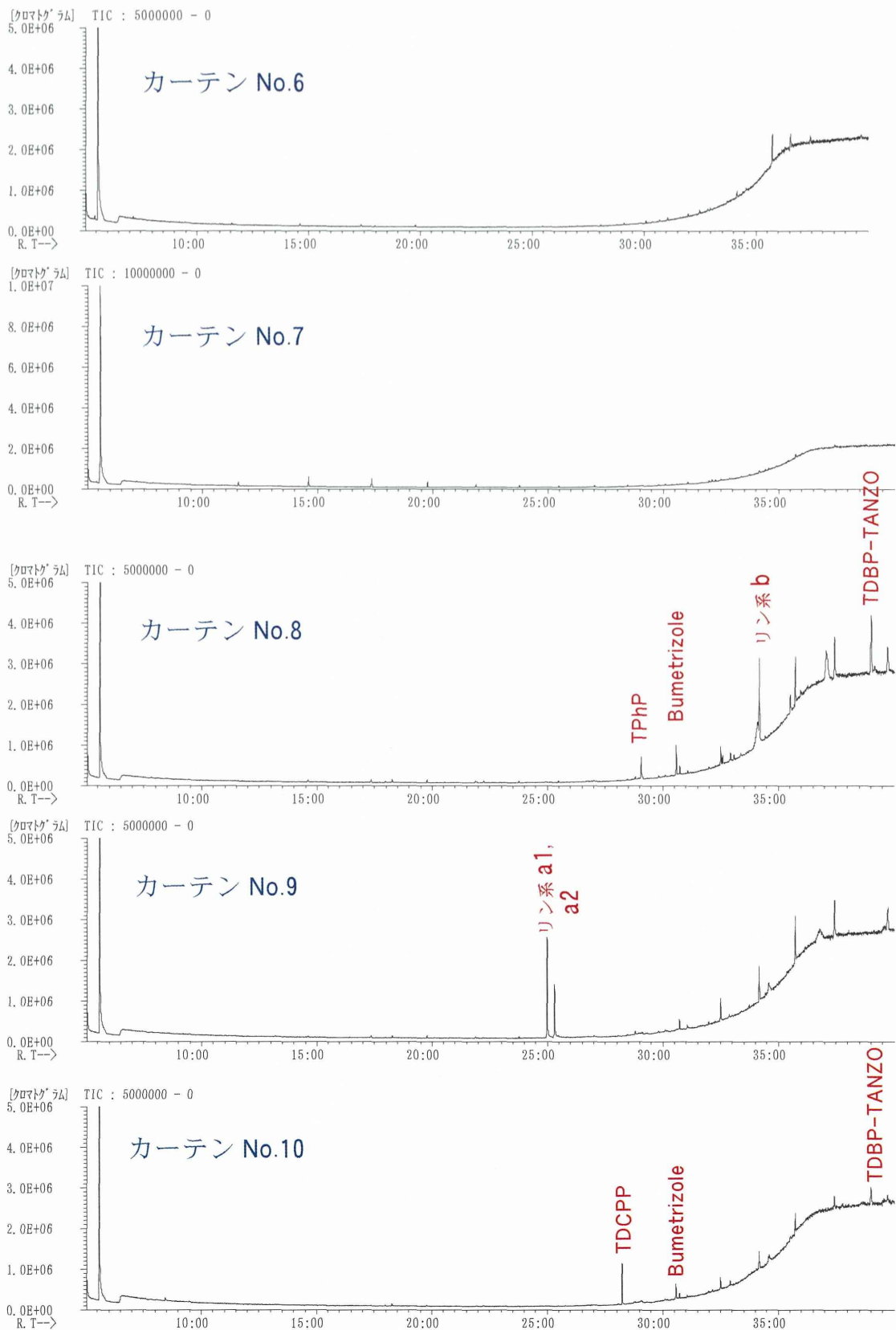


図 6 トータルイオンクロマトグラム

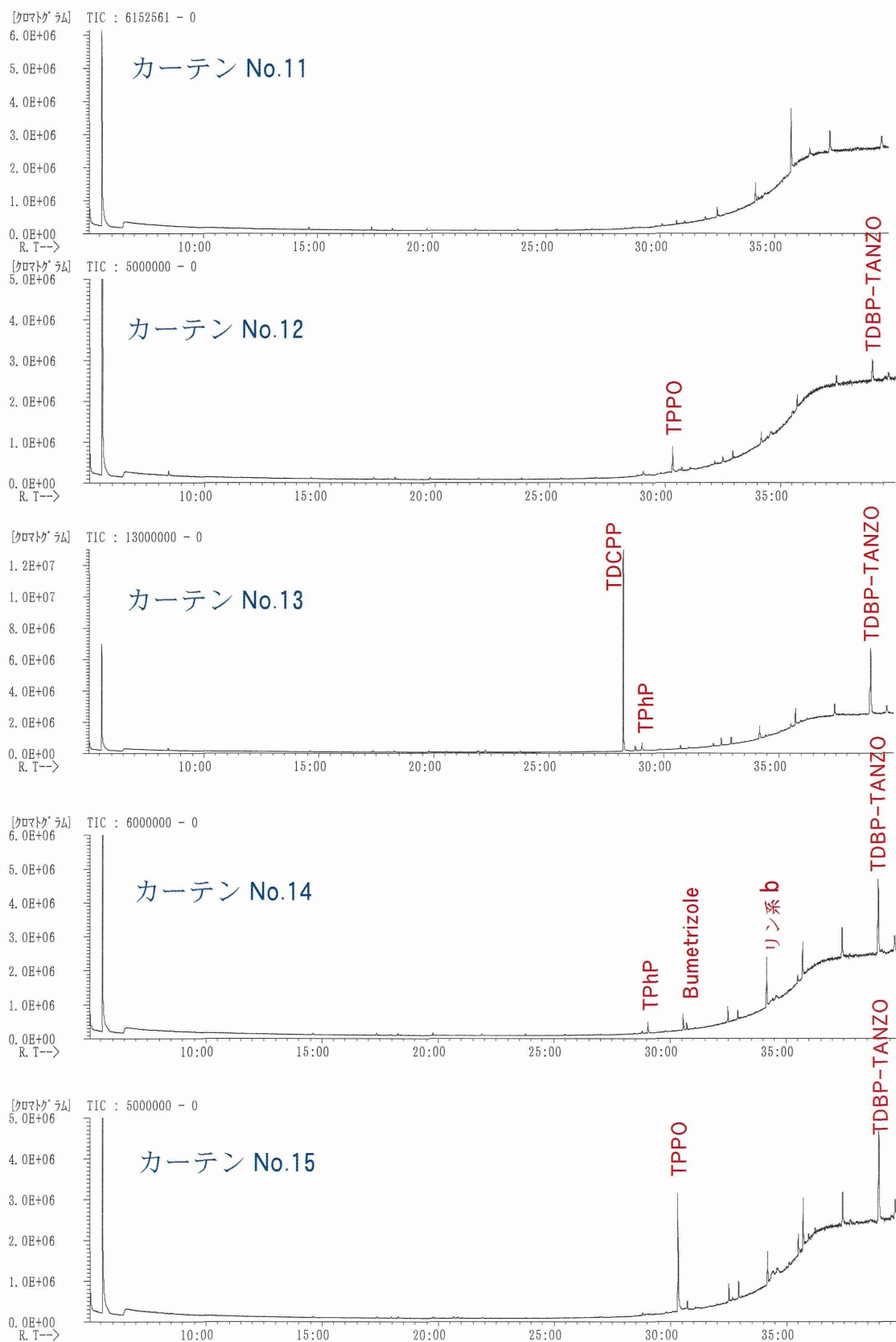


図 6 トータルイオンクロマトグラム

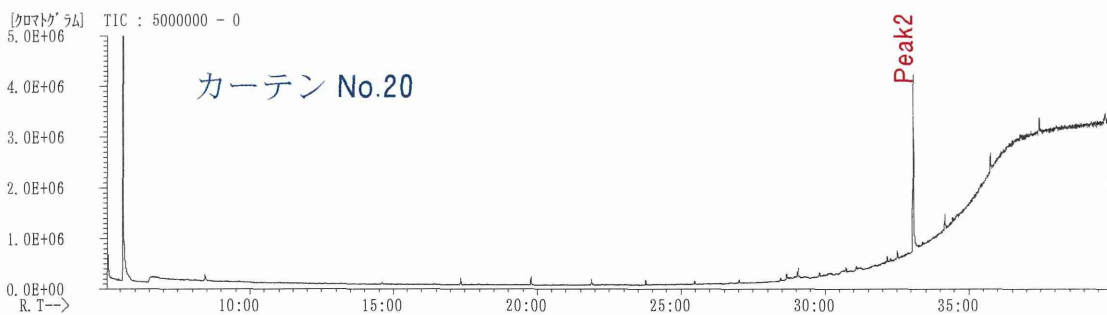
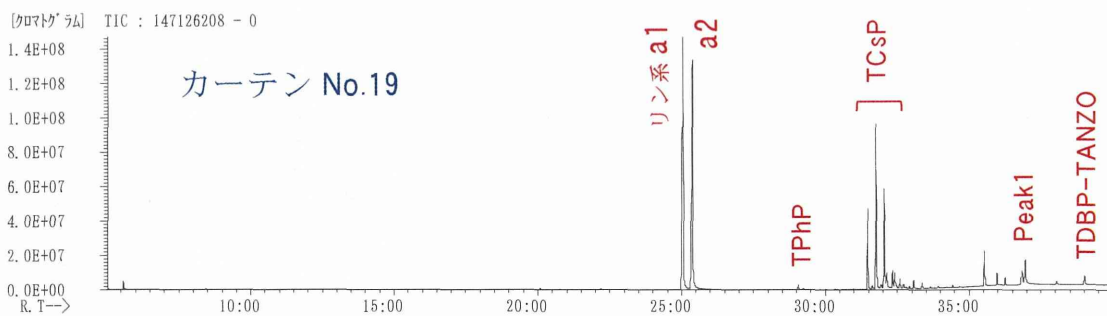
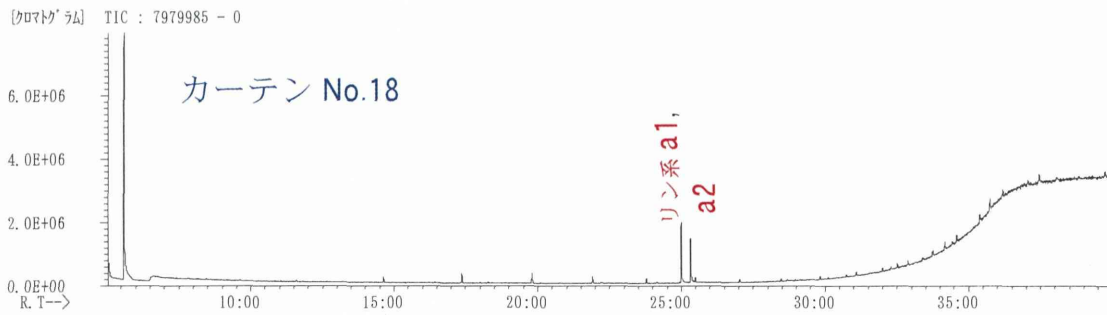
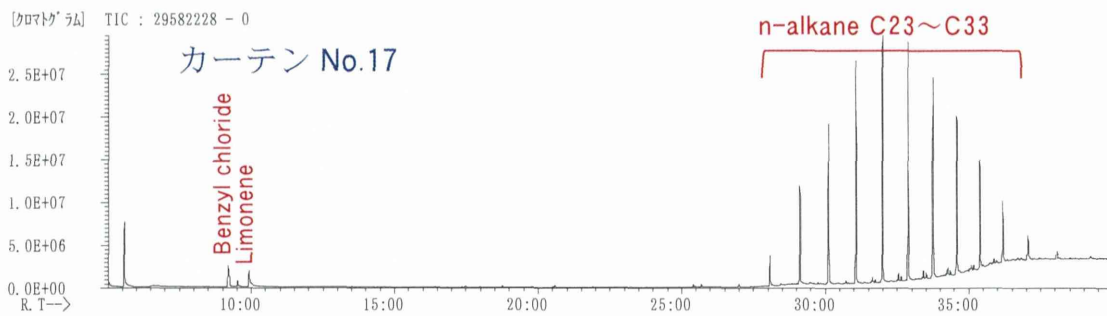
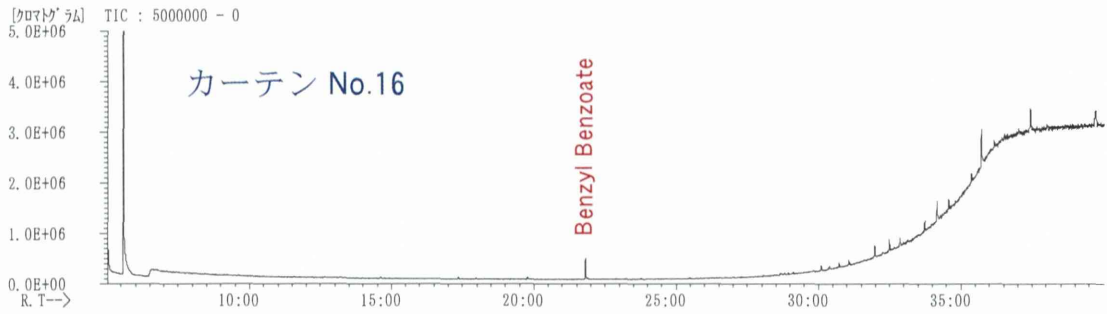


図 6 トータルイオンクロマトグラム

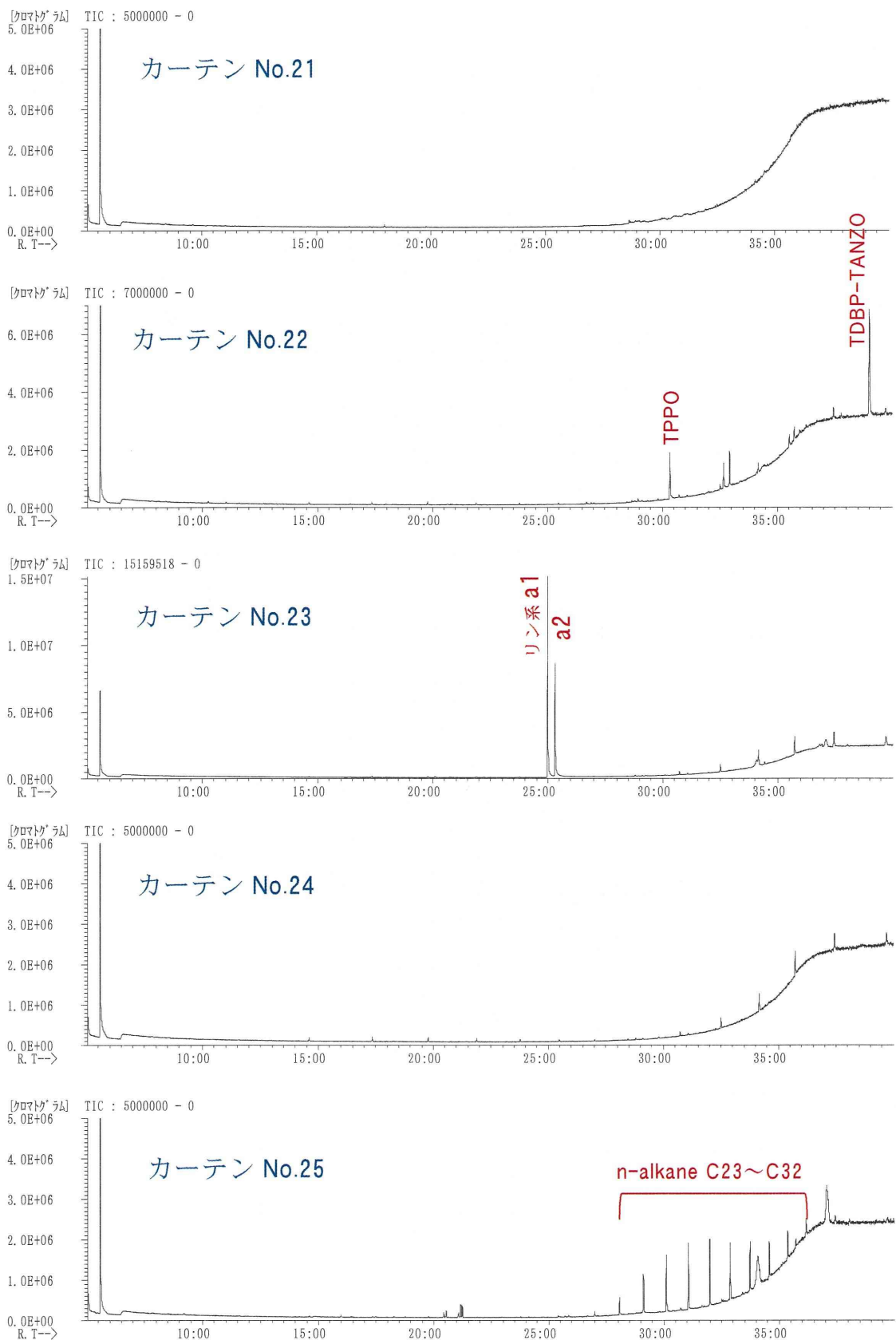


図 6 トータルイオンクロマトグラム

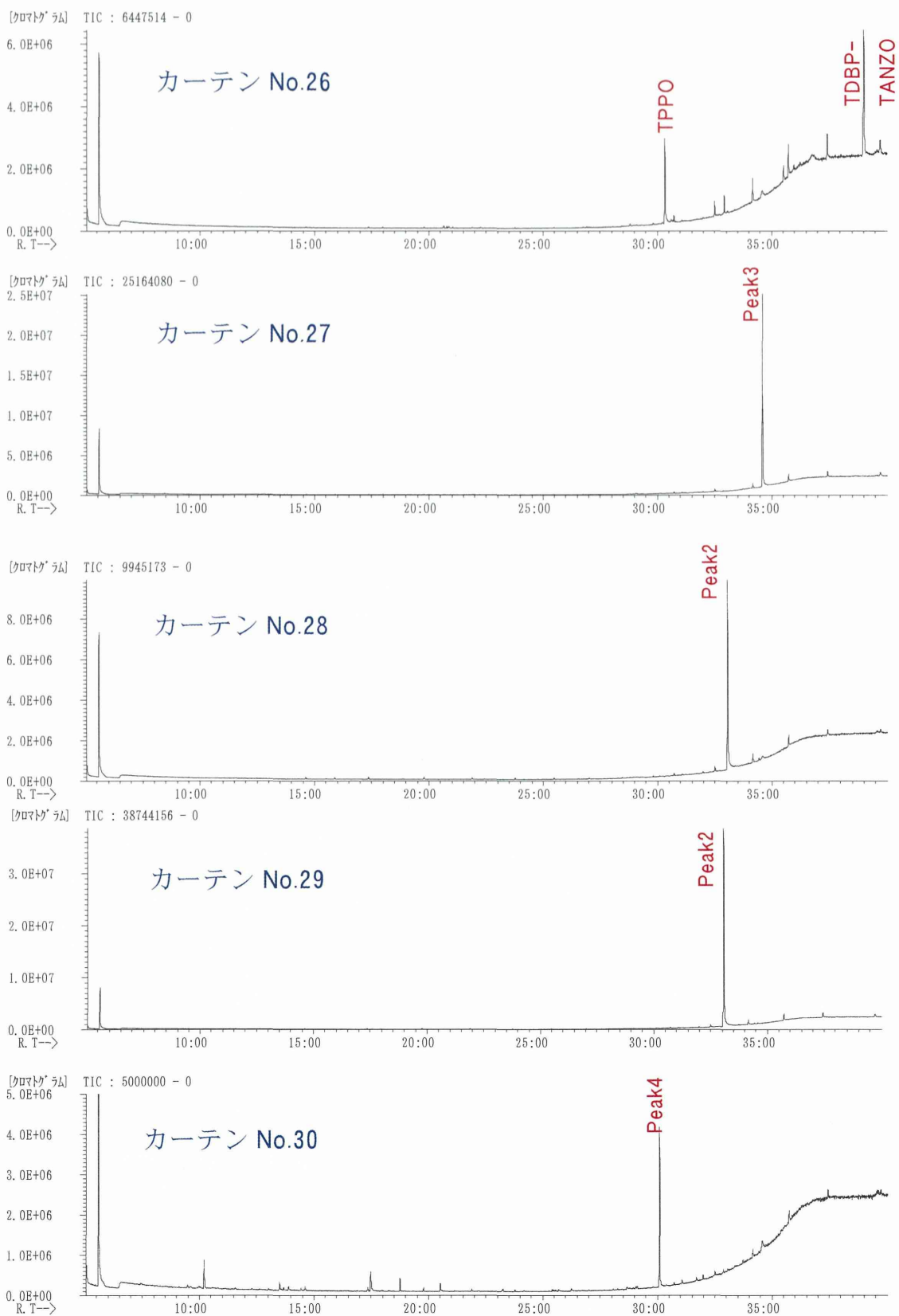


図 6 トータルイオンクロマトグラム