HYDRO

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Title:

BA-93-1159-A

RESERVOIR GEOCHEMISTRY

WELL: 34/8-9S.

24 | 1 1993

REGISTRERT

OLJEDIREKTORATET

Summary/Conclusion/Recommendation:

Keywords:
Petroleum geochemistry, Reservoir geochemistry
Residual hydrocarbons, Oil correlation.

Pages-appendix	Amendment no.	Revision no.	Revision date
21			
Quadrant/Block-well	**Project no.**	**Licens no.**	**Date**
34/8-8	22601	PL120	14.04.93
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1. INTRODUCTION.

Well 34/8-9S was spudded on 25.10.92 and reached total depth 28.12.92 at 3530 m RKB (3380 m TVD) in the Triassic Lunde Fm. The well is located on the A South segment of the Visund A structure. Well location maps are given in Figure 1.1 and a well summary with formation tops is given in Table 1.1.

Well 34/8-9S revealed hydrocarbon shows in the Brent Group, where an oil RFT sample was obtained at 2926.3 m RKB in the Tarbert Fm.

The aims of this study were to perform a reservoir geochemistry study using extracts from the cores, enabling detection of possible hydrocarbon content in the Brent Group and in the Statfjord Formation, and to characterize the oil obtained from 2926.3 m and correlate this with the rest of the oils in the Visund area. A list of samples analysed in this study is given in Table 1.2.

Stable carbon isotope measurements on the fractions of the oil and the core extracts was undertaken by Geolab Nor, Trondheim, Norway. All other analytical work, together with the interpretation of data and the compilation of this report was done at Norsk Hydro Research Centre, Bergen , Norway.

All depths in this report are in mRKB MD unless otherwise stated.

TABLE: 1.2

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ANALYSIS PROGRAMME, WELL NOR:34/8-9S

Depth (m)	Lithology	Type	R-Ev	Extr	MPLC	Iatr	SatGC	PyGC	Isot	Biom	Vitr	VisK
2925.00	SST	SWC	1	1	1	1	1		1			
2926.30		OIL		1	1	1	1		1			
2932.00	SST	SWC	1	1	1	1	1		1			
2936.00		COCH	1	1	1	1	1					
2936.25		COCH	1									
2937.00		COCH	1									
2937.45		COCH	1									
2937.90		COCH	1									
2938.00		COCH	1									
2938.25		COCH	1									
2938.90		COCH	1									
2939.00		COCH	1	1	1	1	1					
2939.25		COCH	1									
2940.00		COCH	1									
2940.50		COCH	1									
2941.00		COCH	1									
2941.75		COCH	1									
2942.00		COCH	1	1	1	1	1		1			
2942.25		COCH	1									
2943.00		COCH	1									
2943.25		COCH	1									
2944.00		COCH	1									
2944.25		COCH	1									
2945.00		COCH	1	1	1	1	1					
2946.00		COCH	1	1	1							
2946.25		COCH	1									
2947.00		COCH	1									
2947.50		COCH	1									
2948.50		COCH	2	1	1	1	1					
2949.00		COCH	1									
2950.00		COCH	1									
2950.75		COCH	1									
2951.00		COCH	1									

ANALYSIS PROGRAMME, WELL NOR:34/8-9S (cont'd)

Depth (m)	Lithology	Type	R-Ev	Extr	MPLC	Iatr	SatGC	PyGC	Isot	Biom	Vitr	VisK
2951.75		COCH	1									
2952.00		COCH	1	1	1	1	1		1			
2952.25		COCH	1									
2953.00		COCH	1									
2954.00		COCH	1									
2965.00	SST	SWC	1	1	1	1	1		1			
2978.00	SST	SWC	1	1	1	1	1		1			
3170.75		COCH	1	1	1	1	1		1			
3171.50		COCH	1	1	1	1						
3172.75		COCH	1	1	1	1						
3173.10		COCH	1	1	1	1						
3173.95		COCH	1	1	1	1						
3174.55		COCH	1	1	1	1						
3175.15		COCH	1	1	1	1						
3178.25		COCH	1	1	1	1						
3178.95		COCH	1	1	1	1						
3179.25		COCH	1	1	1	1						
3180.50		COCH	1	1	1	1						
3181.25		COCH	1	1	1	1						
3182.25		COCH	1	1	1	1						
3182.90		COCH	1	1	1	1						
3183.75		COCH	1	1	1	1						
3184.25		COCH	1	1	1	1						
3184.95		COCH	1	1	1	1						
3185.75		COCH	1	1	1	1						
3186.25		COCH	1	1	1	1						
3187.25		COCH	1	1	1	1						
3188.50		COCH	1	1	1	1						
3188.85		COCH	1	1	1	1						
3189.25		COCH	1	1	1	1						
3189.80		COCH	1	1	1	1						
3190.75		COCH	1	1	1	1						
3191.75		COCH	1	1	1	1						

ANALYSIS PROGRAMME, WELL NOR:34/8-9S (cont'd)

Depth (m)	Lithology	Type	R-Ev	Extr	MPLC	Iatr	SatGC	PyGC	Isot	Biom	Vitr	VisK
3192.75		COCH	1		1	1	1	1				

R-Ev = RockEval, MPLC = Separation, SatGC = Saturated GC, Isot = Isotope, Vitr = VRo(ave)%,
Extr = Extraction, Iatr = Iatroscan, PyGC = Pyrolysis GC, Biom = Biomarkers, VisK = Visual Kerogen

TABLE: 2.1

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ROCK EVAL SCREENING DATA, WELL NOR:34/8-9S

Depth (m)	Lithology	Type	Tmax DegC	S1 kg/t	S2 kg/t	TOC %	HI	PI	Analysing Company
2925.00	SST	SWC	412	7.5	0.9	0.8	114	0.89	F-BERGEN
2932.00	SST	SWC	377	1.5	0.7	0.3	213	0.69	F-BERGEN
2936.00		COCH		1.6	0.5	0.3	176	0.76	F-BERGEN
2936.25		COCH		1.4	0.4	0.3	142	0.80	F-BERGEN
2937.00		COCH		2.6	5.8	3.5	169	0.31	F-BERGEN
2937.45		COCH		0.9	0.1	0.2	47	0.92	F-BERGEN
2937.90		COCH		2.4	0.4	0.3	126	0.85	F-BERGEN
2938.00		COCH		2.4	0.6	0.3	165	0.81	F-BERGEN
2938.25		COCH		0.2	0.0	0.2	0		F-BERGEN
2938.90		COCH		1.9	0.3	0.3	118	0.85	F-BERGEN
2939.00		COCH		3.8	0.6	0.4	136	0.86	F-BERGEN
2939.25		COCH		1.4	0.2	0.2	90	0.88	F-BERGEN
2940.00		COCH		2.5	0.5	0.3	163	0.83	F-BERGEN
2940.50		COCH		1.9	0.3	0.3	115	0.86	F-BERGEN
2941.00		COCH		2.7	0.5	0.3	135	0.86	F-BERGEN
2941.75		COCH		2.7	0.3	0.3	100	0.89	F-BERGEN
2942.00		COCH		1.6	0.7			0.70	F-BERGEN
2942.25		COCH		2.6	0.5	0.4	127	0.85	F-BERGEN
2943.00		COCH		1.0	0.8	0.5	150	0.57	F-BERGEN
2943.25		COCH		1.1	0.2	0.3	92	0.82	F-BERGEN
2944.00		COCH		0.3	0.6	0.9	63	0.37	F-BERGEN
2944.25		COCH		0.2	0.0	0.3	0		F-BERGEN
2945.00		COCH	429	1.8	1.1	1.0	104	0.63	F-BERGEN
2946.00		COCH		1.4	0.6			0.69	F-BERGEN
2946.25		COCH	439	1.1	1.0	0.8	132	0.51	F-BERGEN
2947.00		COCH		1.0	0.6	0.5	123	0.62	F-BERGEN
2947.50		COCH		1.6	0.7	0.4	163	0.71	F-BERGEN
2948.50		COCH		4.0	0.7	0.6	109	0.85	F-BERGEN
2948.50		COCH		0.2	0.0	0.2	9		F-BERGEN
2949.00		COCH		1.6	0.7			0.71	F-BERGEN
2950.00		COCH		1.6	0.5	0.3	162	0.77	F-BERGEN
2950.75		COCH		2.0	0.7	0.5	129	0.75	F-BERGEN
2951.00		COCH		2.0	0.8	0.5	167	0.72	F-BERGEN

TABLE: 2.1

ROCK EVAL SCREENING DATA, WELL NOR:34/8-9S (cont'd)

Depth (m)	Lithology	Type	Tmax DegC	S1 kg/t	S2 kg/t	TOC %	HI	PI	Analysing Company
2951.75		COCH		1.2	0.7	0.6	125	0.63	F-BERGEN
2952.00		COCH		2.0	0.4	0.3	154	0.83	F-BERGEN
2952.25		COCH		1.2	0.4	0.3	160	0.76	F-BERGEN
2953.00		COCH		0.2	1.1	0.9	128	0.17	F-BERGEN
2954.00		COCH	439	0.9	7.2	2.8	257	0.12	F-BERGEN
2965.00	SST	SWC	398	1.9	0.5	0.3	192	0.80	F-BERGEN
2978.00	SST	SWC	381	1.9	0.9	0.4	250	0.67	F-BERGEN
3170.75		COCH	440	0.2	1.2	1.5	80	0.16	F-BERGEN
3171.50		COCH		0.0	0.1	0.1	157	0.21	F-BERGEN
3172.75		COCH		0.2	0.2			0.57	F-BERGEN
3173.10		COCH		0.4	0.2	0.3	88	0.66	F-BERGEN
3173.95		COCH		0.0	0.1	0.1	183	0.08	F-BERGEN
3174.55		COCH		0.1	0.1			0.44	F-BERGEN
3175.15		COCH		0.2	0.1	0.0	0	0.64	F-BERGEN
3178.25		COCH		0.6	0.2	0.1	189	0.77	F-BERGEN
3178.95		COCH	519	0.2	0.4	0.1	444	0.31	F-BERGEN
3179.25		COCH		0.3	0.2	0.3	80	0.58	F-BERGEN
3180.50		COCH		0.5	0.4	0.3	150	0.58	F-BERGEN
3181.25		COCH		0.2	0.2			0.52	F-BERGEN
3182.25		COCH		0.2	0.4			0.29	F-BERGEN
3182.90		COCH	463	0.0	0.2	0.1	340	0.00	F-BERGEN
3183.75		COCH		0.1	0.3			0.25	F-BERGEN
3184.25		COCH		0.1	0.2			0.20	F-BERGEN
3184.95		COCH		0.3	0.2			0.63	F-BERGEN
3185.75		COCH		0.2	0.2			0.55	F-BERGEN
3186.25		COCH		0.5	0.4			0.54	F-BERGEN
3187.25		COCH	500	0.0	0.6	0.1	725	0.00	F-BERGEN
3188.50		COCH		0.6	0.4			0.60	F-BERGEN
3188.85		COCH		0.8	0.5			0.61	F-BERGEN
3189.25		COCH		0.4	0.5			0.45	F-BERGEN
3189.80		COCH		0.3	0.3			0.50	F-BERGEN
3190.75		COCH		0.2	0.3			0.41	F-BERGEN
3191.75		COCH	514	0.3	1.1	0.1	831	0.24	F-BERGEN

TABLE: 2.1

ROCK EVAL SCREENING DATA, WELL NOR:34/8-9S (cont'd)

Depth (m)	Lithology	Type	Tmax DegC	S1 kg/t	S2 kg/t	TOC %	HI	PI	Analysing Company
3192.75		COCH		0.3	0.4			0.39	F-BERGEN

TABLE: 2.3

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SEDIMENT EXTRACTION PERCENTAGES (GRAVIMETRIC), WELL NOR:34/8-9S

Depth (m)	Lithology	Type	EOM (mg)	EOM (%)	Hydrocarbons(%) SAT	ARO	TOTAL	Non Hydrocarbons(%) POL	ASP	TOTAL
2925.00	SST	SWC	71.1	1.20	56.7	17.7	74.4	11.2	14.5	25.6
2932.00	SST	SWC	30.1	0.43	18.5	12.3	30.8	12.3	56.8	69.2
2936.00		COCH	17.9	0.42	25.1	11.0	36.1	8.0	55.9	63.9
2939.00		COCH	48.6	0.68	42.9	17.7	60.7	12.6	26.7	39.3
2942.00		COCH	39.8	0.40	37.9	19.2	57.1	12.8	30.2	42.9
2945.00		COCH	10.7	0.31	51.1	23.8	75.0	14.8	10.3	25.0
2946.00		COCH	18.7	0.43					48.7	48.7
2948.50		COCH	54.1	0.67	54.3	27.2	81.5	9.3	9.2	18.5
2952.00		COCH	56.2	0.52	32.7	29.7	62.4	22.1	15.5	37.6
2965.00	SST	SWC	35.0	0.52	30.9	13.1	44.0	6.3	49.7	56.0
2978.00	SST	SWC	40.5	0.58	25.8	11.2	37.0	6.2	56.8	63.0
3170.75		COCH	29.8	0.15	5.6	15.6	21.2	18.1	60.7	78.8
3171.50		COCH	10.2	0.05	2.6	2.6	5.2	10.5	84.3	94.8
3172.75		COCH	36.5	0.19	2.0	8.1	10.1	28.3	61.6	89.9
3173.10		COCH	57.7	0.35	0.9	7.1	8.0	16.1	75.9	92.0
3173.95		COCH	2.8	0.02	10.2	5.1	15.3	20.4	64.3	84.7
3174.55		COCH	6.2	0.03	3.5	10.4	13.8	10.4	75.8	86.2
3175.15		COCH	21.1	0.12	2.4	1.6	3.9	5.5	90.5	96.1
3178.25		COCH	26.6	0.16	0.8	3.0	3.8	6.8	89.5	96.2
3178.95		COCH	27.2	0.16	4.1	1.0	5.1	5.1	89.7	94.9
3179.25		COCH	29.6	0.19	1.4	5.2	6.6	6.6	86.8	93.4
3180.50		COCH	39.0	0.23	1.0	2.9	3.8	6.2	90.0	96.2
3181.25		COCH	16.7	0.11	18.3	7.3	25.7	3.7	70.7	74.3
3182.25		COCH	5.8	0.03	5.2	5.2	10.3	5.2	84.5	89.7
3182.90		COCH	7.3	0.04	5.1	1.7	6.8	13.7	79.5	93.2
3183.75		COCH	11.3	0.06	5.3	1.8	7.1	8.8	84.1	92.9
3184.25		COCH	10.5	0.05	2.5	1.3	3.8	7.6	88.6	96.2
3184.95		COCH	9.1	0.05	4.8	2.4	7.1	7.1	85.7	92.9
3185.75		COCH	11.4	0.07	2.3	2.3	4.6	6.8	88.6	95.4
3186.25		COCH	22.7	0.14	1.4	4.1	5.5	6.9	87.7	94.5
3187.25		COCH	29.3	0.14	1.4	1.4	2.8	8.4	88.7	97.2
3188.50		COCH	27.7	0.18	3.8	0.8	4.6	7.7	87.7	95.4
3188.85		COCH	27.6	0.16	1.5	1.5	3.0	6.0	90.9	97.0

TABLE: 2.3

SEDIMENT EXTRACTION PERCENTAGES (GRAVIMETRIC), WELL NOR:34/8-9S (cont'd)

Depth (m)	Lithology	Type	EOM (mg)	EOM (%)	Hydrocarbons(%) SAT	ARO	TOTAL	Non Hydrocarbons(%) POL	ASP	TOTAL
3189.25		COCH	30.5	0.14	2.9	0.5	3.4	9.1	87.5	96.6
3189.80		COCH	22.5	0.10	1.2	2.4	3.6	4.8	91.6	96.4
3190.75		COCH	17.2	0.08	1.8	1.8	3.7	7.4	89.0	96.3
3191.75		COCH	21.0	0.15	1.7	1.7	3.5	7.0	89.5	96.5
3192.75		COCH	27.0	0.14	1.1	1.1	2.1	6.4	91.5	97.9

TABLE: 2.4

SEDIMENT EXTRACTION PERCENTAGES (IATROSCAN), WELL NOR:34/8-9S

Depth (m)	Lithology	Type	Hydrocarbons (%) SAT	ARO	TOTAL	Non Hydrocarbons (%) POL	ASP	TOTAL	Analysing Company
2925.00	SST	SWC	47.5	40.0	87.5	9.5	3.0	12.5	F-BERGEN
2932.00	SST	SWC	35.0	21.5	56.5	28.5	15.0	43.5	F-BERGEN
2936.00		COCH							F-BERGEN
2939.00		COCH							F-BERGEN
2942.00		COCH							F-BERGEN
2945.00		COCH							F-BERGEN
2948.50		COCH							F-BERGEN
2952.00		COCH							F-BERGEN
2965.00	SST	SWC	47.5	26.5	74.0	17.0	9.0	26.0	F-BERGEN
2978.00	SST	SWC	46.0	25.0	71.0	24.0	5.0	29.0	F-BERGEN
3170.75		COCH	2.0	11.0	13.0	61.0	26.0	87.0	F-BERGEN
3171.50		COCH	1.0	3.0	4.0	56.0	40.0	96.0	F-BERGEN
3172.75		COCH	1.0	0.5	1.5	42.5	56.0	98.5	F-BERGEN
3173.10		COCH	0.5	5.0	5.5	58.0	36.5	94.5	F-BERGEN
3173.95		COCH	2.0	2.5	4.5	53.0	42.5	95.5	F-BERGEN
3174.55		COCH	0.5	0.5	1.0	57.0	42.0	99.0	F-BERGEN
3175.15		COCH	1.0	0.5	1.5	61.5	37.0	98.5	F-BERGEN
3178.25		COCH	0.5	1.0	1.5	71.5	27.0	98.5	F-BERGEN
3178.95		COCH	0.5	1.0	1.5	64.0	34.5	98.5	F-BERGEN
3179.25		COCH	0.5	3.5	4.0	59.0	37.0	96.0	F-BERGEN
3180.50		COCH	0.5	4.0	4.5	64.5	31.0	95.5	F-BERGEN
3181.25		COCH	0.5	1.5	2.0	62.0	36.0	98.0	F-BERGEN
3182.25		COCH	2.0	6.5	8.5	47.5	44.0	91.5	F-BERGEN
3182.90		COCH	1.5	5.0	6.5	43.5	50.0	93.5	F-BERGEN
3183.75		COCH	0.5	0.5	1.0	64.0	35.0	99.0	F-BERGEN
3184.25		COCH	0.5	0.5	1.0	55.5	43.5	99.0	F-BERGEN
3184.95		COCH	1.5	1.5	3.0	57.0	40.0	97.0	F-BERGEN
3185.75		COCH	1.0	1.0	2.0	70.0	28.0	98.0	F-BERGEN
3186.25		COCH	0.5	0.5	1.0	71.5	27.5	99.0	F-BERGEN
3187.25		COCH	0.5	0.5	1.0	68.5	30.5	99.0	F-BERGEN
3188.50		COCH	0.5	0.5	1.0	52.5	46.5	99.0	F-BERGEN
3188.85		COCH	0.5	0.5	1.0	51.0	48.0	99.0	F-BERGEN
3189.25		COCH	0.5	1.0	1.5	72.0	26.5	98.5	F-BERGEN

TABLE: 2.4

SEDIMENT EXTRACTION PERCENTAGES (IATROSCAN), WELL NOR:34/8-9S (cont'd)

Depth (m)	Lithology	Type	Hydrocarbons (%) SAT	ARO	TOTAL	Non Hydrocarbons (%) POL	ASP	TOTAL	Analysing Company
3189.80		COCH	0.5	1.0	1.5	70.0	28.5	98.5	F-BERGEN
3190.75		COCH	1.0	3.0	4.0	59.0	37.0	96.0	F-BERGEN
3191.75		COCH	0.5	1.0	1.5	77.0	21.5	98.5	F-BERGEN
3192.75		COCH	0.5	2.0	2.5	68.5	29.0	97.5	F-BERGEN

TABLE: 2.5

SEDIMENT EXTRACTION RATIOS (IATROSCAN), WELL NOR:34/8-9S

Depth (m)	Lithology	Type	TOC (%)	EOM/TOC (%)	SAT/TOC (%)	SAT/ARO (%)	HC/Non HC (%)
2925.00	SST	SWC	0.8		61.7	1.2	7.0
2932.00	SST	SWC	0.3		109.4	1.6	1.3
2936.00		COCH	0.3				
2939.00		COCH	0.4				
2942.00		COCH	0.4				
2945.00		COCH	1.0				
2948.50		COCH	0.2				
2952.00		COCH	0.3				
2965.00	SST	SWC	0.3		182.7	1.8	2.8
2978.00	SST	SWC	0.4		121.1	1.8	2.4
3170.75		COCH	1.5		1.4	0.2	0.1
3171.50		COCH	1.5		0.7	0.3	0.0
3172.75		COCH	1.5		0.7	2.0	0.0
3173.10		COCH	0.3		1.9	0.1	0.1
3173.95		COCH	0.3		7.7	0.8	0.0
3174.55		COCH	0.3		1.9	1.0	0.0
3175.15		COCH				2.0	0.0
3178.25		COCH				0.5	0.0
3178.95		COCH				0.5	0.0
3179.25		COCH	0.3		2.0	0.1	0.0
3180.50		COCH	0.3		1.9	0.1	0.0
3181.25		COCH	0.3		1.9	0.3	0.0
3182.25		COCH	0.3		7.7	0.3	0.1
3182.90		COCH	0.3		5.8	0.3	0.1
3183.75		COCH	0.3		1.9	1.0	0.0
3184.25		COCH	0.3		1.9	1.0	0.0
3184.95		COCH	0.3		5.8	1.0	0.0
3185.75		COCH	0.3		3.8	1.0	0.0
3186.25		COCH	0.3		1.9	1.0	0.0
3187.25		COCH	0.3		1.9	1.0	0.0
3188.50		COCH	0.3		1.9	1.0	0.0
3188.85		COCH	0.3		1.9	1.0	0.0
3189.25		COCH	0.3		1.9	0.5	0.0

TABLE: 2.5

SEDIMENT EXTRACTION RATIOS (IATROSCAN), WELL NOR:34/8-9S (cont'd)

Depth (m)	Lithology	Type	TOC (%)	EOM/TOC (%)	SAT/TOC (%)	SAT/ARO (%)	HC/Non HC (%)
3189.80		COCH	0.3		1.9	0.5	0.0
3190.75		COCH	0.3		3.8	0.3	0.0
3191.75		COCH	0.3		1.9	0.5	0.0
3192.75		COCH	0.3		1.9	0.3	0.0

TABLE: 2.6

SATURATED FRACTION MOLECULAR RATIOS (SEDIMENT SAMPLES), WELL NOR:34/8-9S

Depth (m)	Lithology	Type	Pristane/ nC17	Pristane/ Phytane	CPI-I	CPI-II	nC17/ nC17+nC27	Analysing Company
2925.00	SST	SWC	0.7	1.3	1.0	1.0		F-BERGEN
2932.00	SST	SWC	0.7	1.2	1.1	1.0		F-BERGEN
2936.00		COCH	0.6	1.4	1.1	0.9		F-BERGEN
2939.00		COCH	0.7	1.5	1.1	0.9		F-BERGEN
2942.00		COCH	0.7	1.5	1.1	0.9		F-BERGEN
2945.00		COCH	0.6	1.3	1.1	0.9		F-BERGEN
2948.50		COCH	0.6	1.5	1.0	0.9		F-BERGEN
2952.00		COCH	0.6	1.4	1.1	1.0		F-BERGEN
2965.00	SST	SWC	0.6	1.4	1.1	1.1		F-BERGEN
2978.00	SST	SWC	0.6	1.4	1.0	1.0		F-BERGEN
3170.75		COCH	7.3	6.9	1.8	1.5		F-BERGEN

Table 2.7 Molecular ratios, aromatic hydrocarbons.

Depth	Type	MPI-1	F1	Predicted Ro
2925,00	SWC	0,72	0,43	0,80
2926,30	OIL	0,77	0,45	0,84
2932,00	SWC	0,83	0,45	0,84
2936,00	COCH	0,78	0,44	0,82
2942,00	COCH	0,75	0,46	0,87
2945,00	COCH	0,51	0,42	0,78
2948,50	COCH	0,64	0,40	0,73
2952,00	COCH	0,68	0,46	0,87
2965,00	SWC	0,92	0,48	0,91
2978,00	SWC	0,90	0,47	0,89
3170,75	COCH	0,70	0,48	0,91

Table 2.8 Biomarker ratios of Steranes.

Depth	Type	%27	%28	%29	%30	%29aaS	%29bb
2925,00	SWC	30	29	31	10	45	65
2926,30	OIL	28	28	32	11	46	61
2932,00	SWC	31	29	30	9	50	66
2936,00	COCH	30	29	31	10	44	64
2942,00	COCH	29	30	31	10	51	62
2945,00	COCH	29	29	31	11	47	66
2948,50	COCH	31	29	31	10	47	64
2952,00	COCH	30	28	32	10	47	65
2965,00	SWC	32	29	29	10	50	64
2978,00	SWC	30	28	32	11	46	64
3170,75	COCH	NDP	NDP	NDP	NDP	48	43

Table 2.9 Biomarker ratios of Triterpanes.

Depth	Type	27Ts/27Tm	%29Ts	%25nor30ab	%28ab	%30d	%29ab	%30ba	%32abS
2925,00	SWC	2,5	17	4	10	14	27	9	57
2926,30	OIL	2,6	19	4	11	14	26	11	55
2932,00	SWC	2,5	18	3	9	15	25	9	60
2936,00	COCH	2,5	17	3	8	15	28	9	57
2942,00	COCH	2,4	19	5	11	14	24	10	58
2945,00	COCH	2,6	19	4	10	17	28	10	58
2948,50	COCH	2,8	19	4	9	15	26	10	62
2952,00	COCH	2,4	20	4	9	15	27	10	60
2965,00	SWC	3,0	19	4	10	17	25	10	57
2978,00	SWC	2,8	18	3	10	15	27	10	59
3170,75	COCH	0,0	7	6	12	9	33	18	61

TABLE: 2.10

ISOTOPE ANALYSIS RESULTS (SEDIMENT SAMPLES), WELL NOR:34/8-9S

Depth (m)	Lithology	Type	d13C Extr	d13C SAT	d13C ARO	d13C POL	d13C ASP	d13C Kero	Analysing Company
2925.00	SST	SWC		-29.59	-28.69	-28.47	-28.00		GEOLABNOR
2932.00	SST	SWC		-29.62	-28.86	-28.32	-28.13		GEOLABNOR
2942.00		COCH		-29.57	-28.67	-28.42	-28.17		GEOLABNOR
2952.00		COCH		-29.55	-28.64	-27.95	-27.91		GEOLABNOR
2965.00	SST	SWC		-29.66	-28.82	-28.47	-28.67		GEOLABNOR
2978.00	SST	SWC		-29.58	-28.89	-28.44	-28.85		GEOLABNOR
3170.75		COCH		-31.10	-27.43	-26.47	-25.82		GEOLABNOR

TABLE: 3.1

Petroleum Geochemistry Group
Research Centre Bergen
HYDRO

OIL COMPOSITION RATIOS (IATROSCAN), WELL NOR:34/8-9S

St.Depth (m)	En.Depth (m)	Name	Hydrocarbons (%) SAT	ARO	TOTAL	Non Hydrocarbons (%) POL	ASP	TOTAL	SAT/ ARO	HC/ Non-HC
2926.30	2926.30		40.0	31.5	71.5	7.5	21.0	28.5	1.3	2.5

TABLE: 3.2

Petroleum Geochemistry Group
Research Centre Bergen
HYDRO

SATURATED FRACTION MOLECULAR RATIOS (OIL SAMPLES), WELL NOR:34/8-9S

St.Depth (m)	En.Depth (m)	Name	Pristane/ nC17	Pristane/ Phytane	CPI-I	CPI-II	nC17/ nC17+nC27	Analysing Company
2926.30	2926.30		0.6	1.6	1.1	1.0		F-BERGEN

TABLE: 3.3

ISOTOPE ANALYSIS RESULTS (OIL SAMPLES), WELL NOR:34/8-9S

St.Depth (m)	En.Depth (m)	Name	d13C Oil	d13C Sat	d13C Aro	d13C Pol	d13C Asp	Analysing Company
2926.30	2926.30			-29.76	-28.91	-28.54	-27.77	GEOLABNOR

Table 4.1 Biomarker ratios, Visund oils.

Well	Test		28ab/30ab	30d/30ab
34/8-1	DST 2		0,11	0,23
34/8-3	RFT 2		0,09	0,24
34/8-3A	DST 1A		0,07	0,25
34/8-4S	DST 3		0,16	0,32
34/8-4A	DST3		0,18	0,2
34/8-9S	RFT		0,12	0,16

TABLE: 4.2

ISOTOPE ANALYSIS RESULTS (OIL SAMPLES), WELL NOR:34/8-1

St.Depth (m)	En.Depth (m)	Name	d13C Oil	d13C Sat	d13C Aro	d13C Pol	d13C Asp	Analysing Company
2767.90	2806.90	DST # 3	-29.53	-28.35	-27.53	-29.30		GEOLABNOR
2854.10	2857.11	DST # 2	-29.30	-29.69	-28.73	-28.73	-28.28	GEOLABNOR

TABLE: 4.2

Petroleum Geochemistry Group
Research Centre Bergen
HYDRO

ISOTOPE ANALYSIS RESULTS (OIL SAMPLES), WELL NOR:34/8-3

St.Depth (m)	En.Depth (m)	Name	d13C Oil	d13C Sat	d13C Aro	d13C Pol	d13C Asp	Analysing Company
2935.00	2947.00	DST # 1	-29.12	-29.50	-28.65	-28.14	-28.74	GEOLABNOR

TABLE: 4.2

Petroleum Geochemistry Group
Research Centre Bergen
HYDRO

ISOTOPE ANALYSIS RESULTS (OIL SAMPLES), WELL NOR:34/8-3A

St.Depth (m)	En.Depth (m)	Name	d13C Oil	d13C Sat	d13C Aro	d13C Pol	d13C Asp	Analysing Company
3087.00	3093.00	DST # 1A	-28.75	-29.13	-28.06	-27.13	-27.04	GEOLABNOR

TABLE: 4.2

ISOTOPE ANALYSIS RESULTS (OIL SAMPLES), WELL NOR:34/8-4S

St.Depth (m)	En.Depth (m)	Name	d13C Oil	d13C Sat	d13C Aro	d13C Pol	d13C Asp	Analysing Company
2903.00	2917.00	DST # 4	-28.69	-28.89	-26.83			GEOLABNOR
3000.00	3017.00	DST # 3	-29.08	-29.34	-27.96			GEOLABNOR
3132.00	3142.00	DST # 2A	-28.96	-29.26	-27.86			GEOLABNOR
3220.00	3242.00	DST # 1	-28.73	-29.27	-27.75			GEOLABNOR

TABLE: 4.2

ISOTOPE ANALYSIS RESULTS (OIL SAMPLES), WELL NOR:34/8-4A

St.Depth (m)	En.Depth (m)	Name	d13C Oil	d13C Sat	d13C Aro	d13C Pol	d13C Asp	Analysing Company
2988.50	3019.50	DST # 5		-29.70	-28.38	-27.79		GEOLABNOR
3056.00	3108.00	DST # 4		-29.69	-28.23	-27.99		GEOLABNOR
3161.00	3185.00	DST # 3		-29.40	-28.04	-27.78		GEOLABNOR
3214.00	3228.00	DST # 2		-29.54	-28.23	-28.18		GEOLABNOR
3324.00	3342.00	DST # 1		-29.59	-28.45	-28.29		GEOLABNOR

TABLE: 4.2

ISOTOPE ANALYSIS RESULTS (OIL SAMPLES), WELL NOR:34/8-9S

St.Depth (m)	En.Depth (m)	Name	d13C Oil	d13C Sat	d13C Aro	d13C Pol	d13C Asp	Analysing Company
2926.30	2926.30			-29.76	-28.91	-28.54	-27.77	GEOLABNOR

APPENDIX I

Gas chromatograms of saturated hydrocarbons.

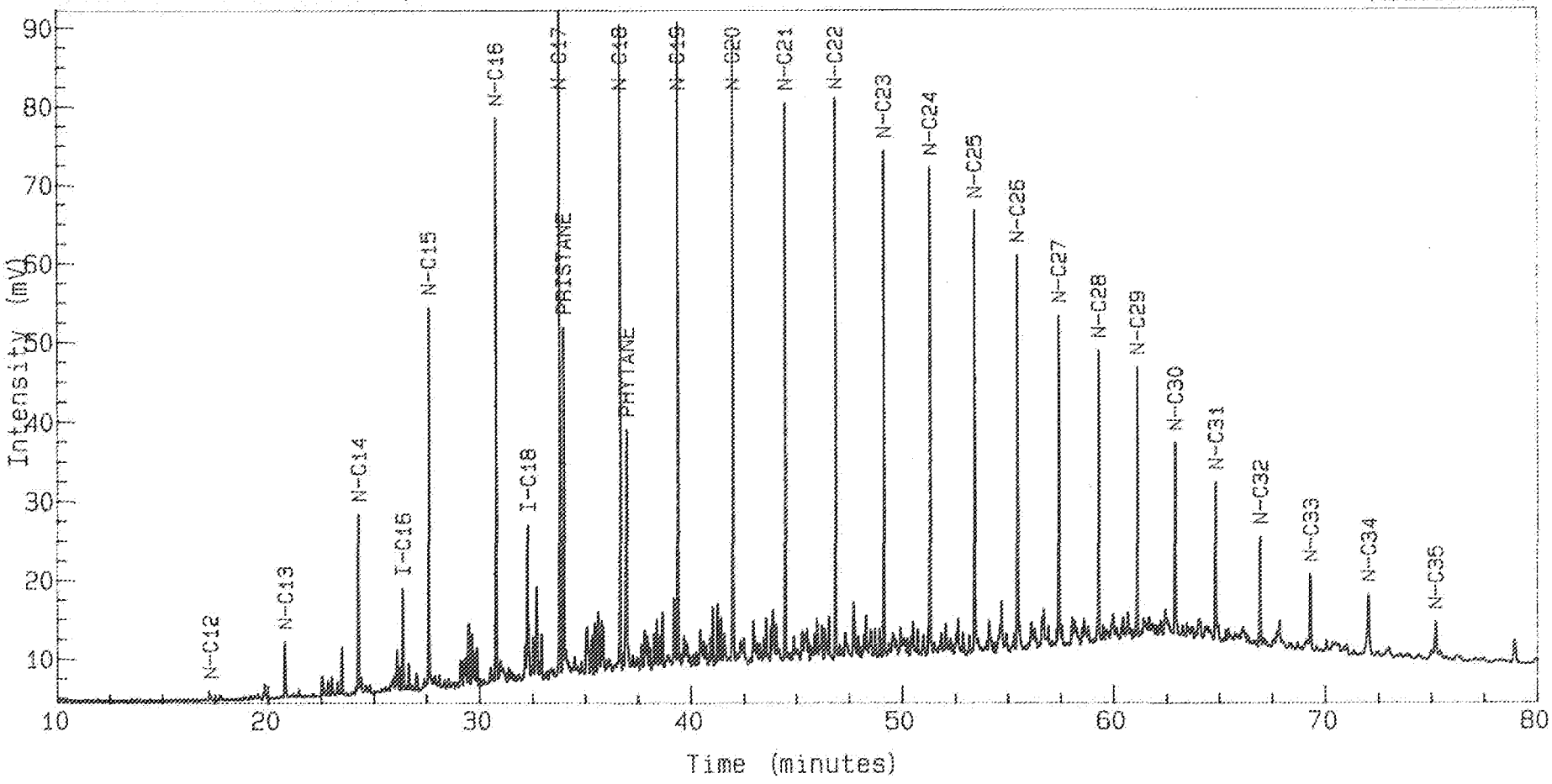
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 E340809S_S, 3, 1.

34/8-9s, 2925

SATURATED HYDROCARBONS DB-1, 80-4-310

Multichrom



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 17-MAR-1993 at 12:55
Reported on 18-MAR-1993 at 08:47

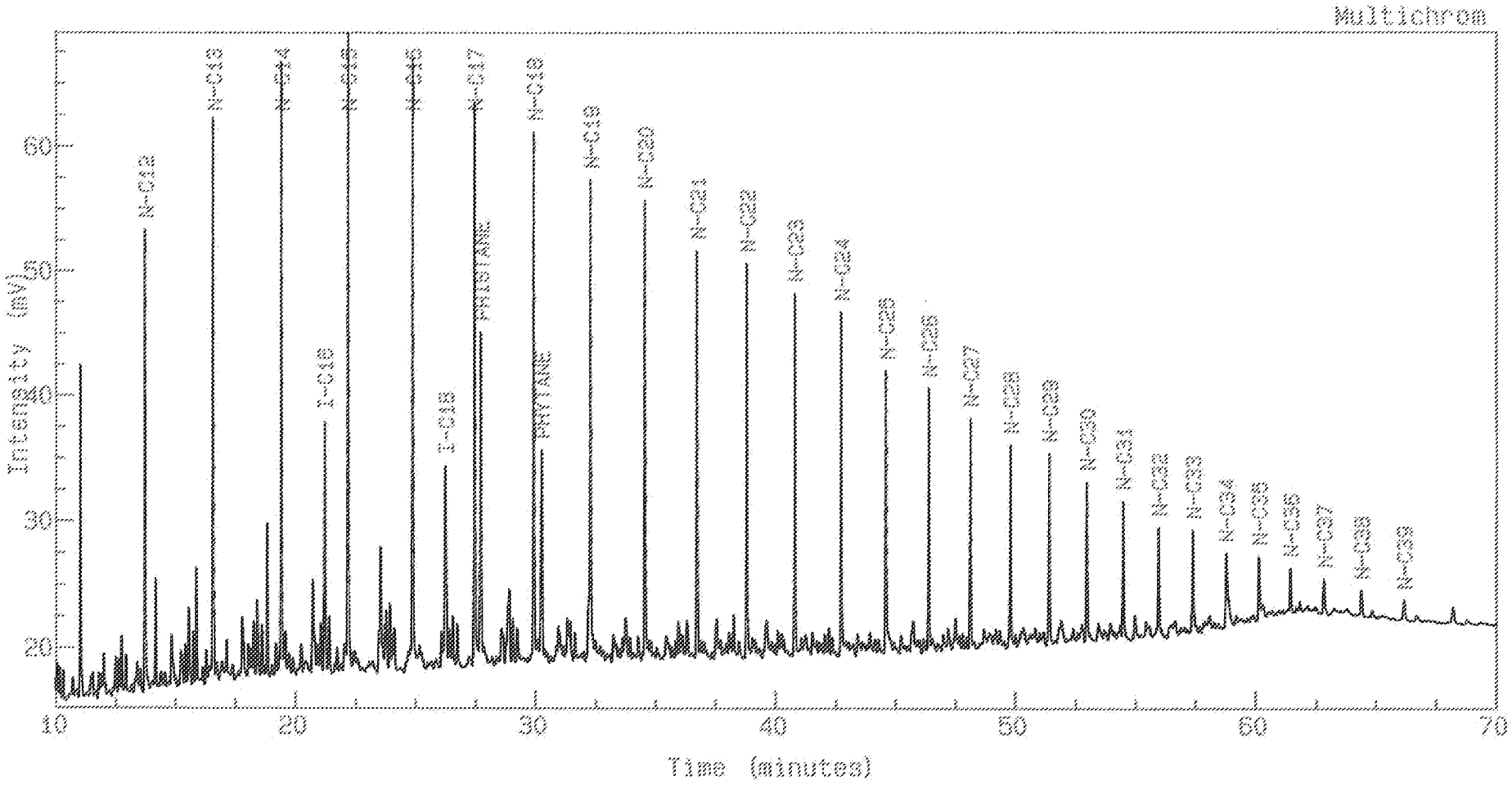
Method : SAT
Calibration : SAT
Run Sequence : SAT

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 AOIL340809SS.2.1.

2926.30

Multichrom



Instrument : HP5890
Channel Title : HP MSD
Lims ID :
Acquired on 18-DEC-1992 at 13:39
Reported on 21-DEC-1992 at 09:20

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

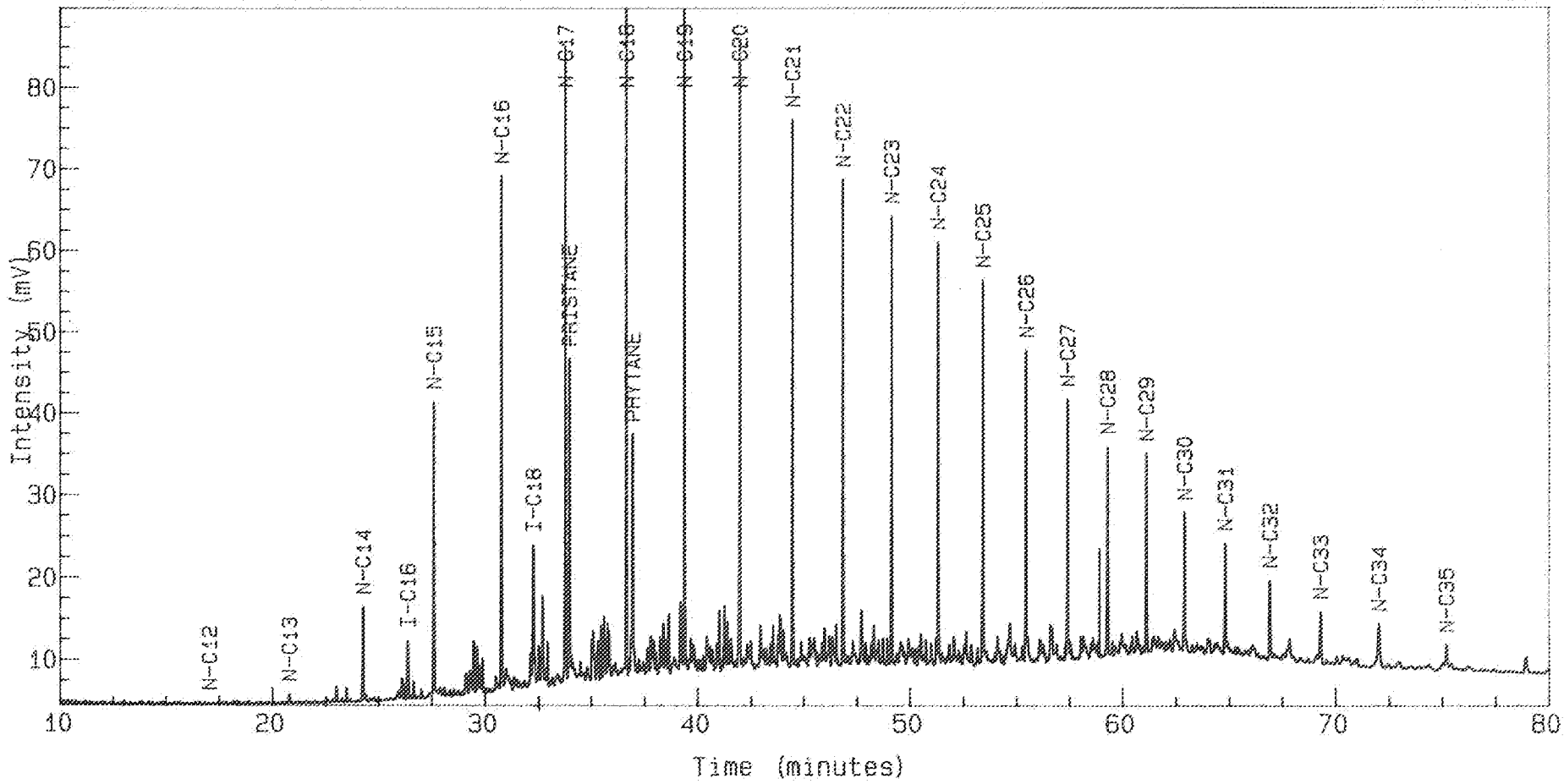
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 E340809S_S, 4, 1.

34/8-9s, 2932

SATURATED HYDROCARBONS DB-1, 80-4-310

Multichrom

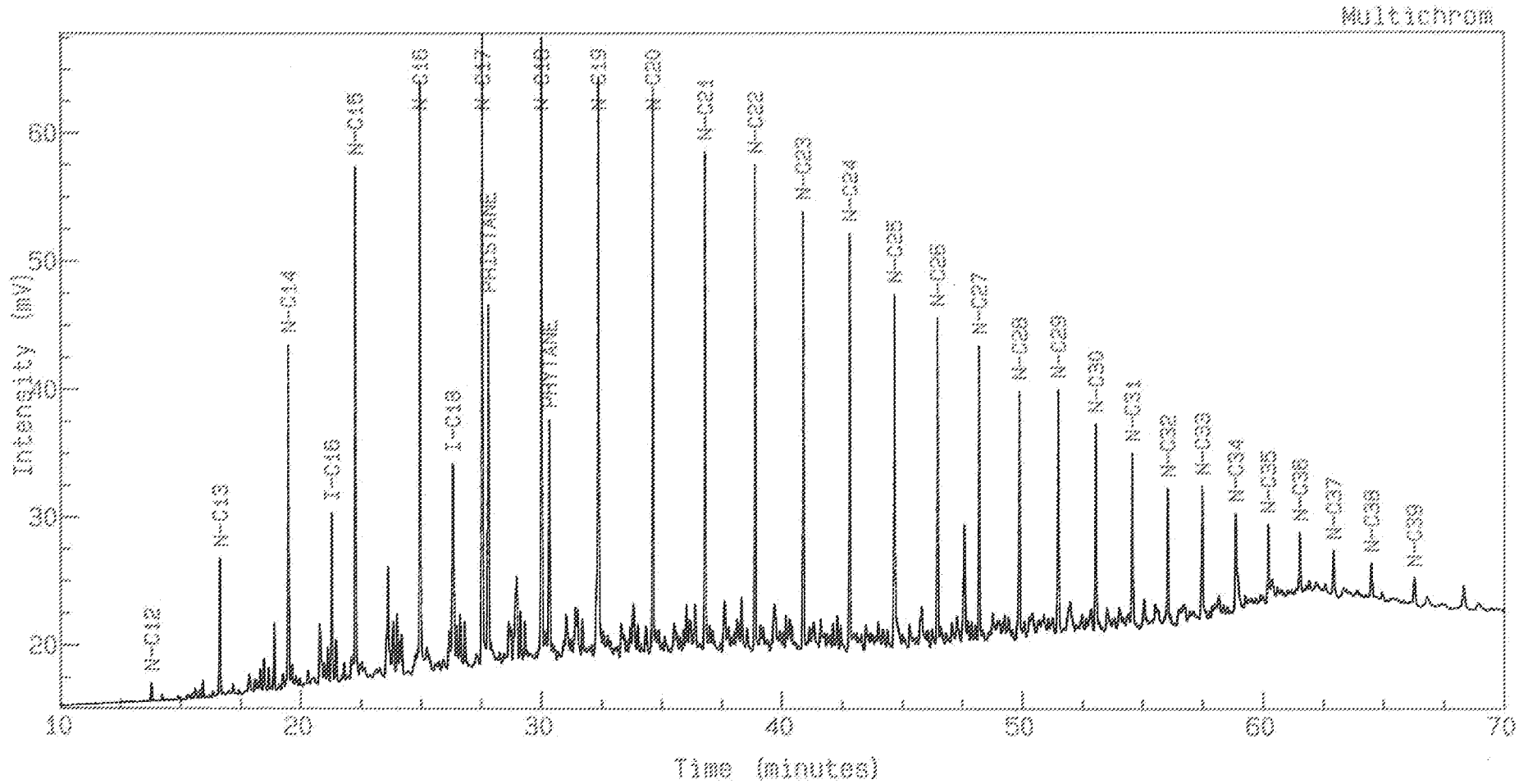


Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 17-MAR-1993 at 14:33
Reported on 18-MAR-1993 at 08:48

Method : SAT
Calibration : SAT
Run Sequence : SAT

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 C71280601S,6,1.
34/8-9S, 2906



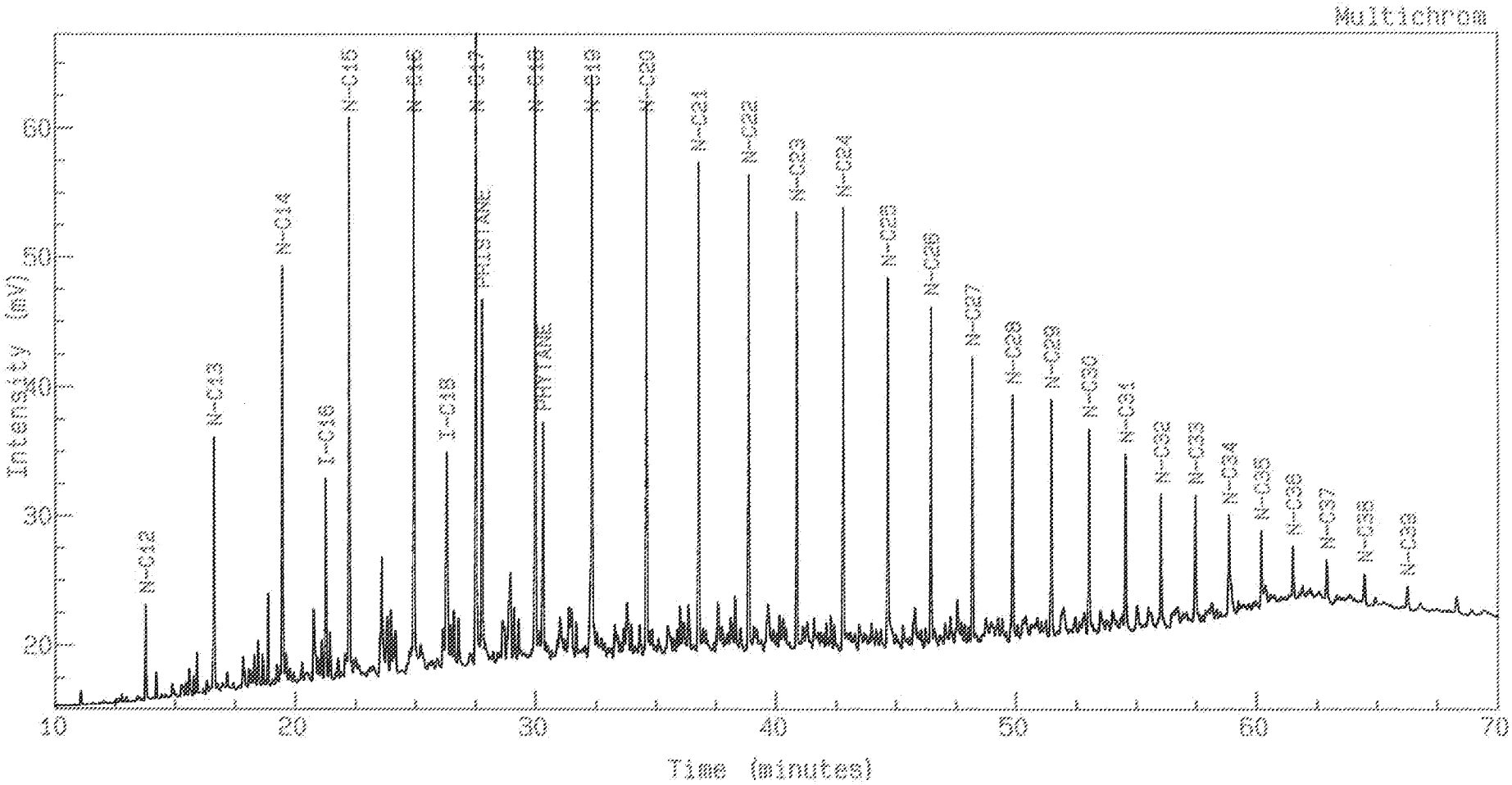
Instrument : HP5890
Channel Title : HP MSD
Lims ID :
Acquired on 4-DEC-1992 at 18:44
Reported on 7-DEC-1992 at 12:49

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 C71280601S,7,1.

34/8-9S, 2839



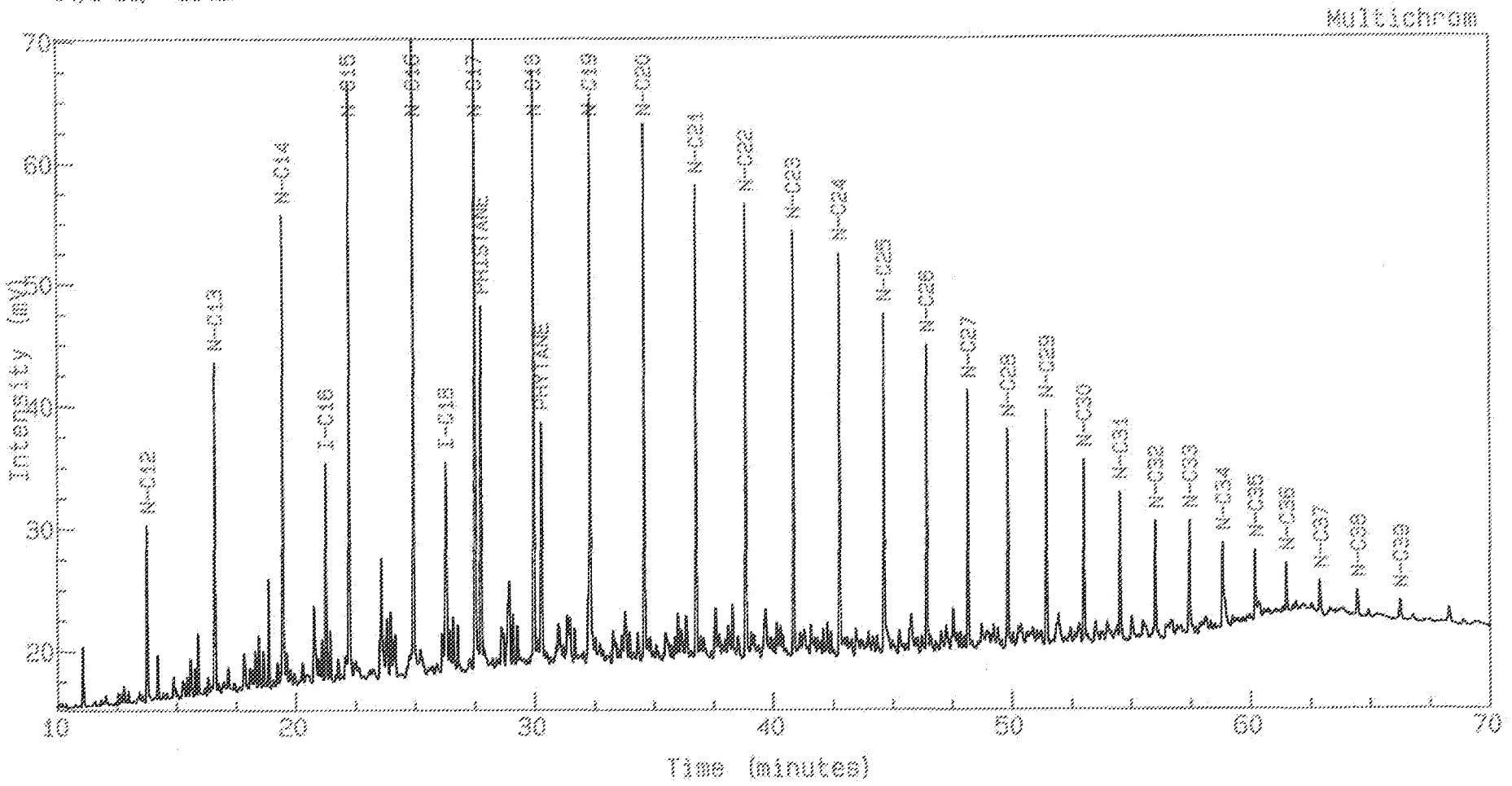
Instrument : HP6890
Channel Title : HP MSD
Lims ID :
Acquired on 4-DEC-1992 at 20:13
Reported on 7-DEC-1992 at 12:50

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 C71280601S,8,1.

34/8-9S, 2942

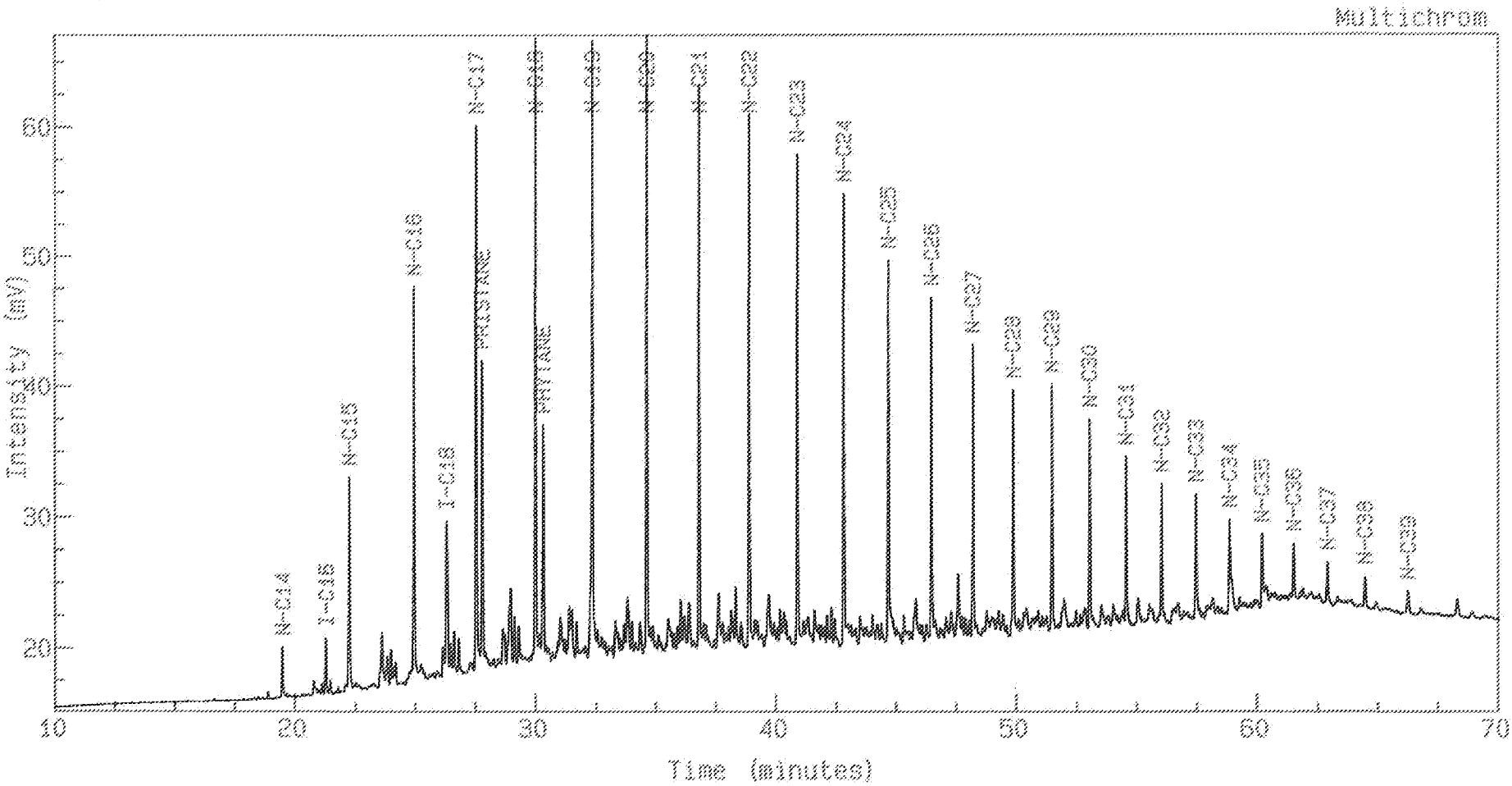


Instrument : HP5890
Channel Title : HP MSD
Lims ID :
Acquired on 4-DEC-1992 at 21:42
Reported on 7-DEC-1992 at 12:50

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 A3408095, 2, 1.
34/8-92, 2945



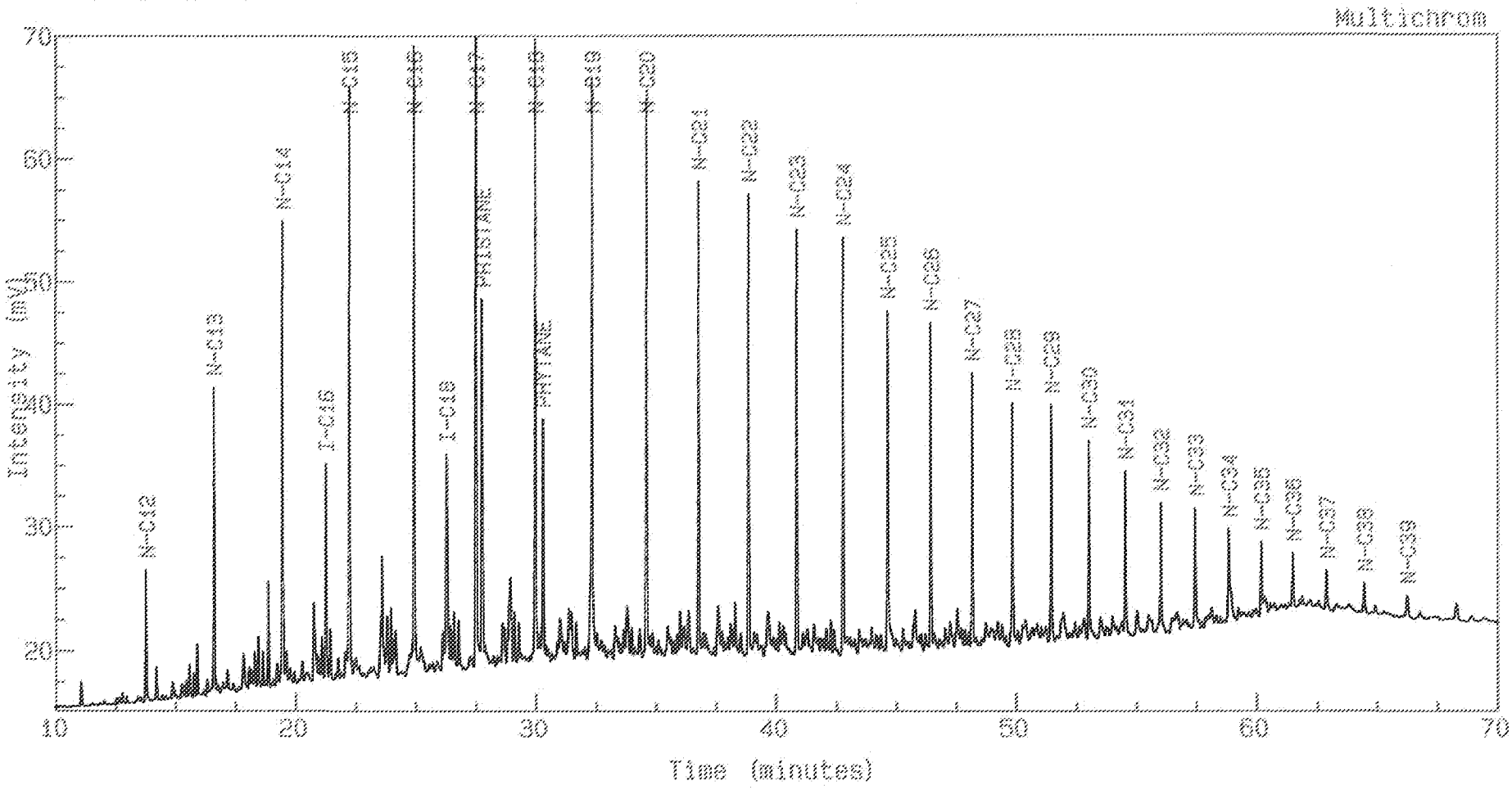
Instrument : HP5890
Channel Title : HP MSD
Lims ID :
Acquired on 7-DEC-1992 at 11:12
Reported on 7-DEC-1992 at 13:45

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 C71280601S,9,1.

34/8-9S, 2948.50



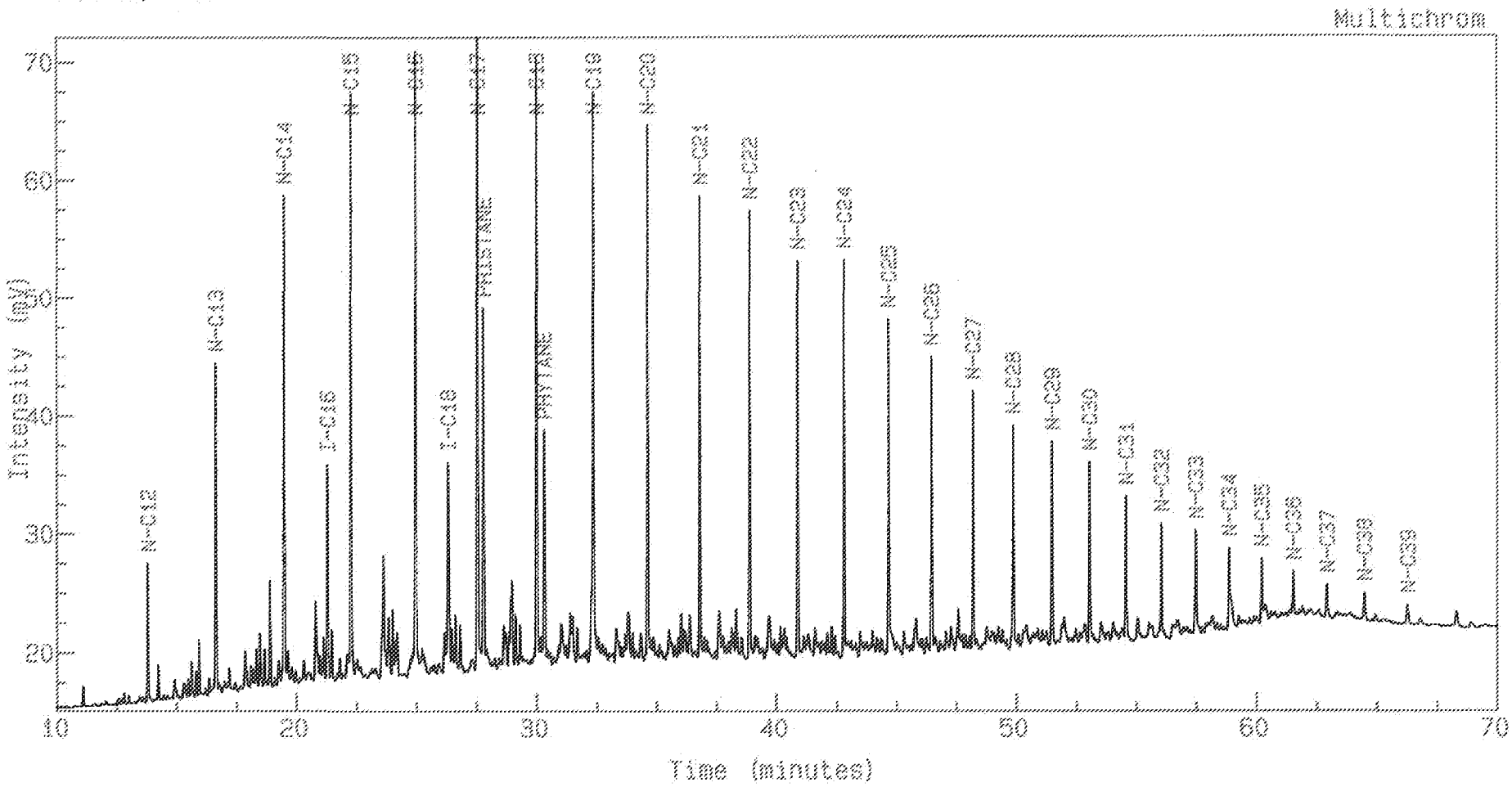
Instrument : HP5890
Channel Title : HP MSD
Lims ID :
Acquired on 4-DEC-1992 at 23:10
Reported on 7-DEC-1992 at 12:50

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 C71280601S,11,1.

34/8-9S, 2952



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Channel Title : HP MSD
Lims ID :
Acquired on 5-DEC-1992 at 02:08
Reported on 7-DEC-1992 at 12:51

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

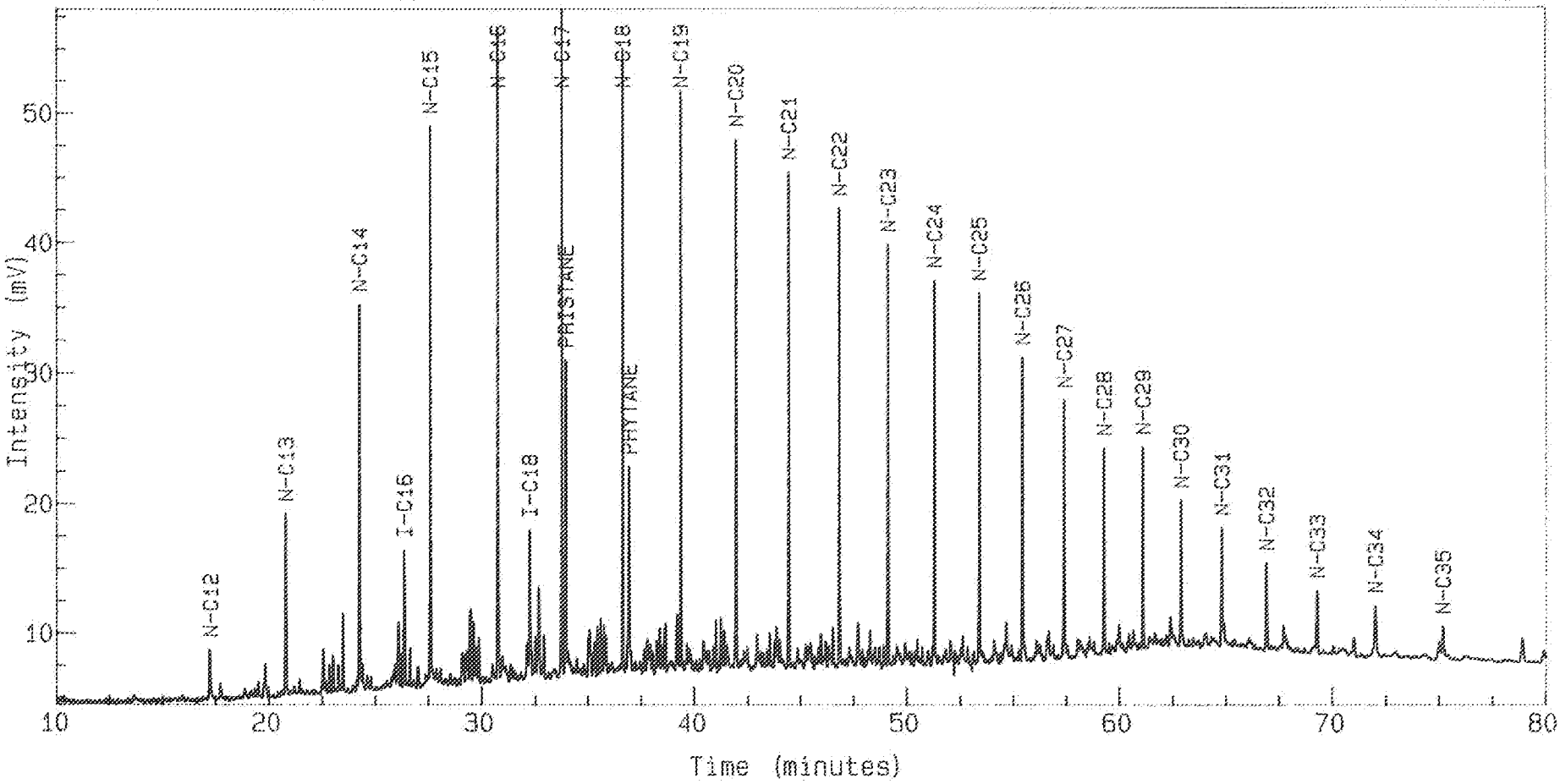
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 E340809S_S, 5, 1.

34/8-9s, 2965

SATURATED HYDROCARBONS DB-1, 60-4-310

Multichrom



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 17-MAR-1993 at 16:11
Reported on 18-MAR-1993 at 08:48

Method : SAT
Calibration : SAT
Run Sequence : SAT

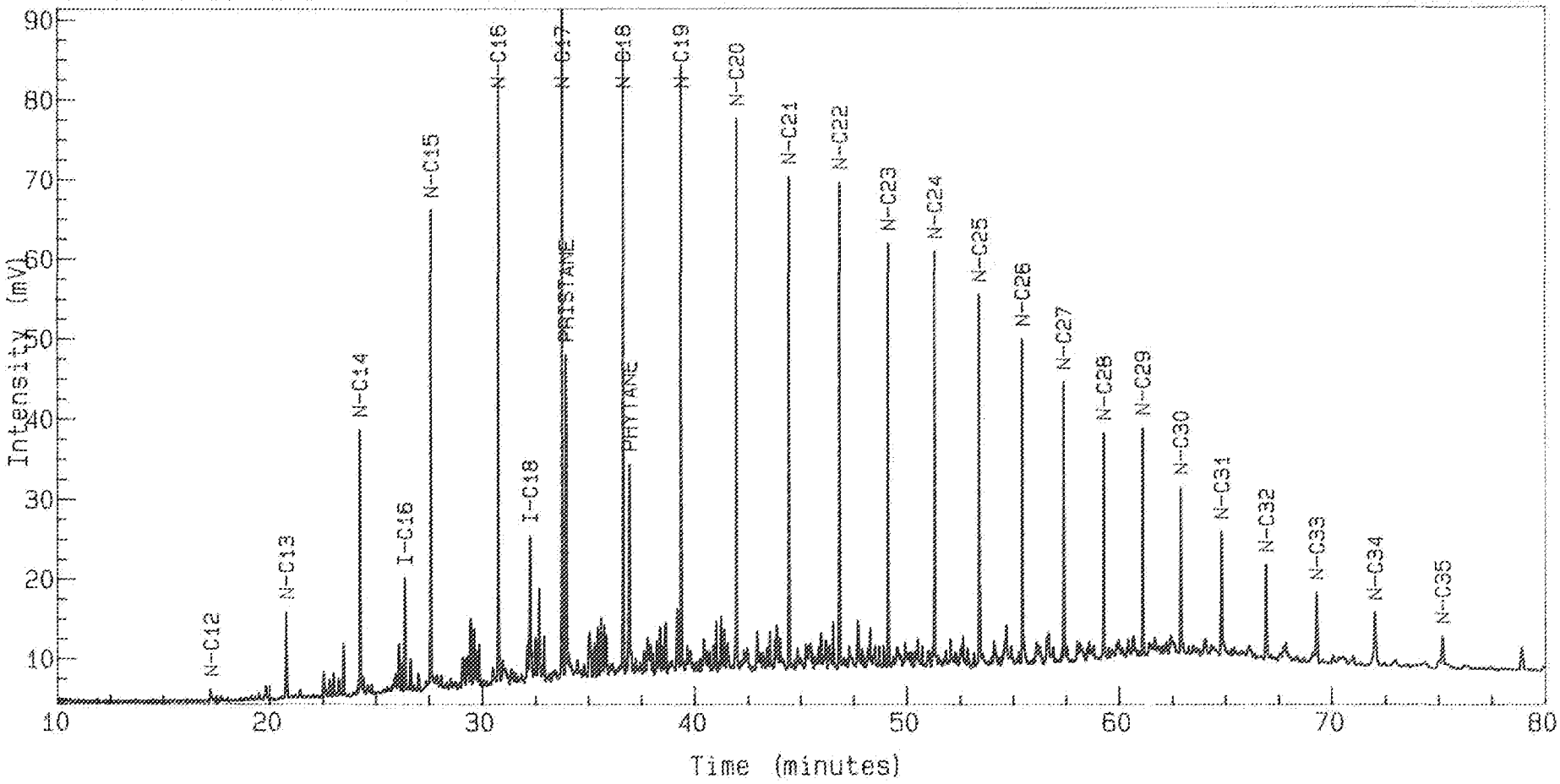
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 E340809S_S, 6, 1.

34/8-9s, 2978

SATURATED HYDROCARBONS DB-1, 80-4-310

Multichrom

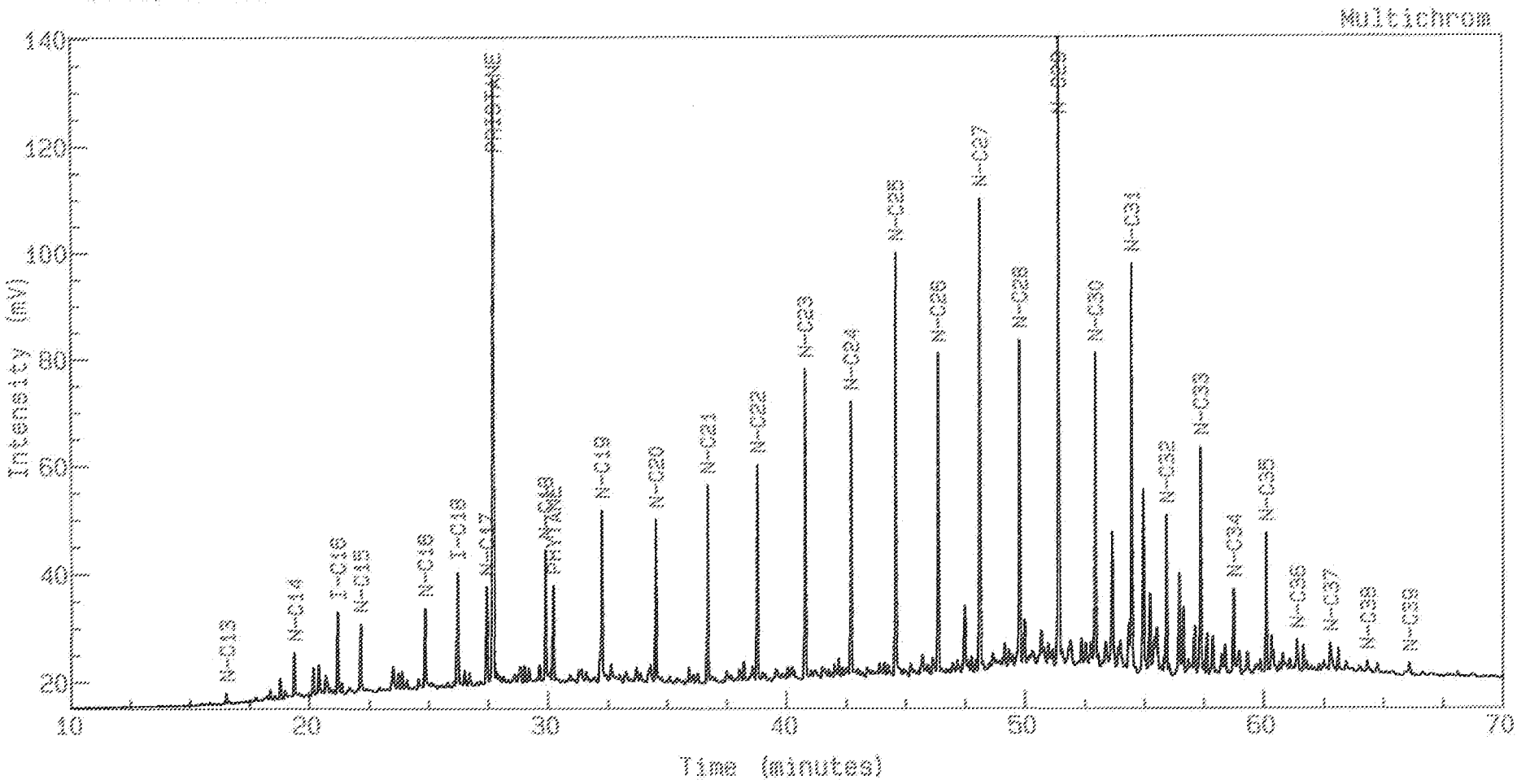


Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 17-MAR-1993 at 17:48
Reported on 18-MAR-1993 at 08:49

Method : SAT
Calibration : SAT
Run Sequence : SAT

Norsk Hydro Research Centre

Analysis Name : [PETRO] 7 A340809SSAT.2.1.
34/8-9S, 3170.75



Instrument : HP5890
Channel Title : HP MSD
Lims ID :
Acquired on 4-FEB-1993 at 14:13
Reported on 15-FEB-1993 at 10:18

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

APPENDIX II

Gas chromatograms of aromatic hydrocarbons.

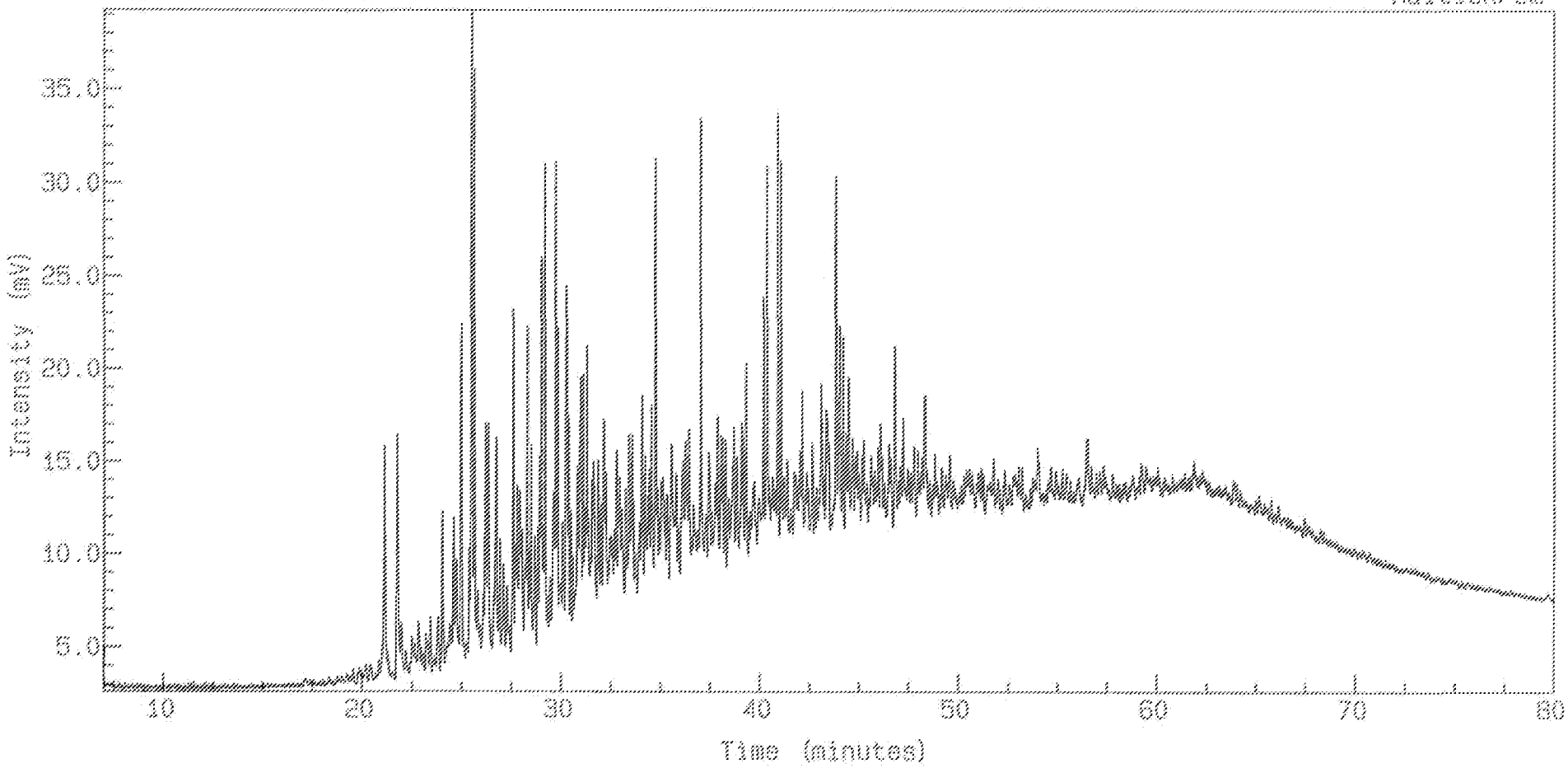
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 D340809SA, 3, 1,

34/8-9S 2925 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 1-MAR-1993 at 12:20
Reported on 3-MAR-1993 at 12:29

Method : ARO
Calibration : ARO
Run Sequence : ARO

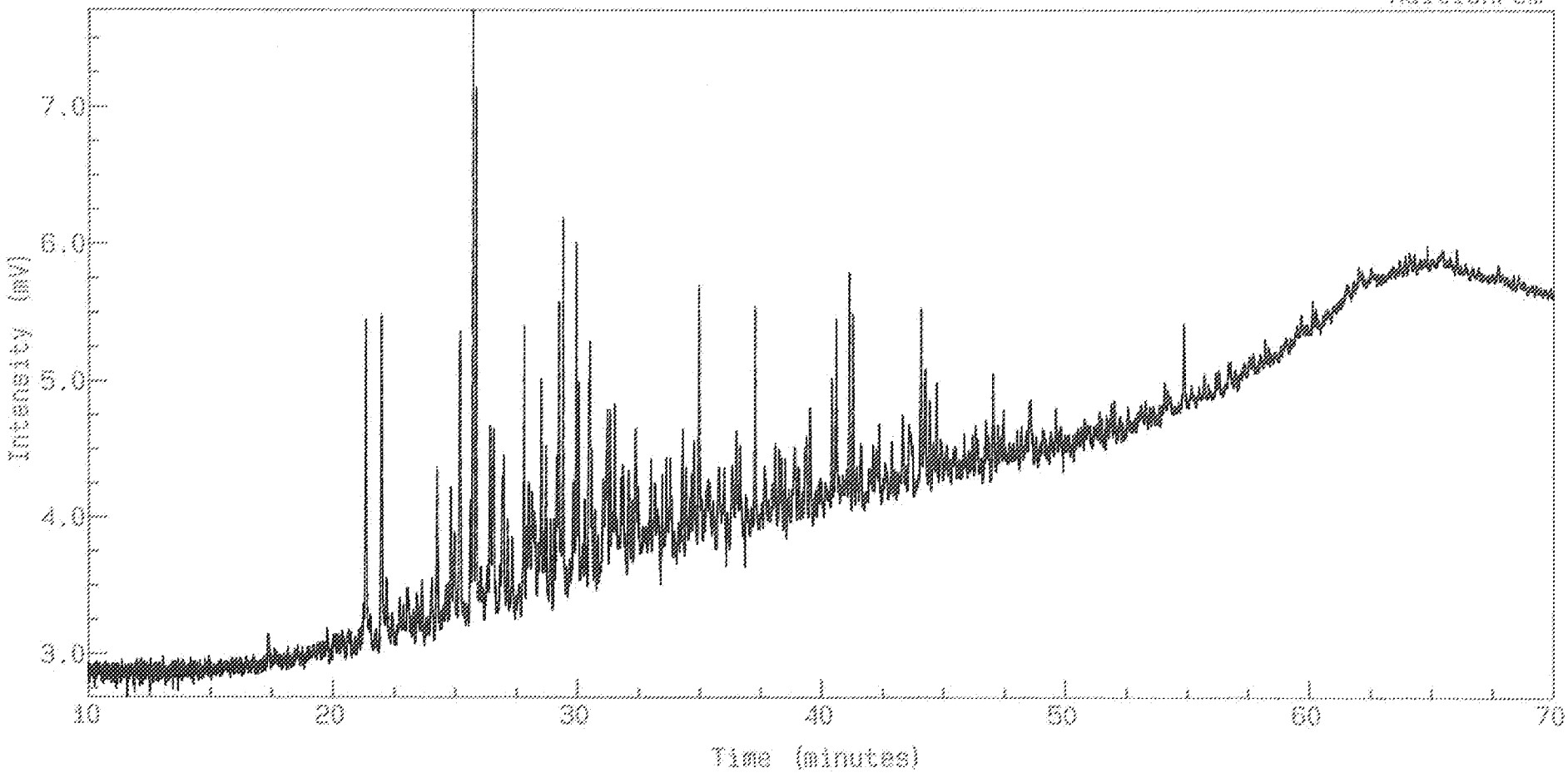
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 AOIL340809SA, 3, 1.

34/8-9S, 2926.30 m Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 18-DEC-1992 at 13:48
Reported on 21-DEC-1992 at 09:22

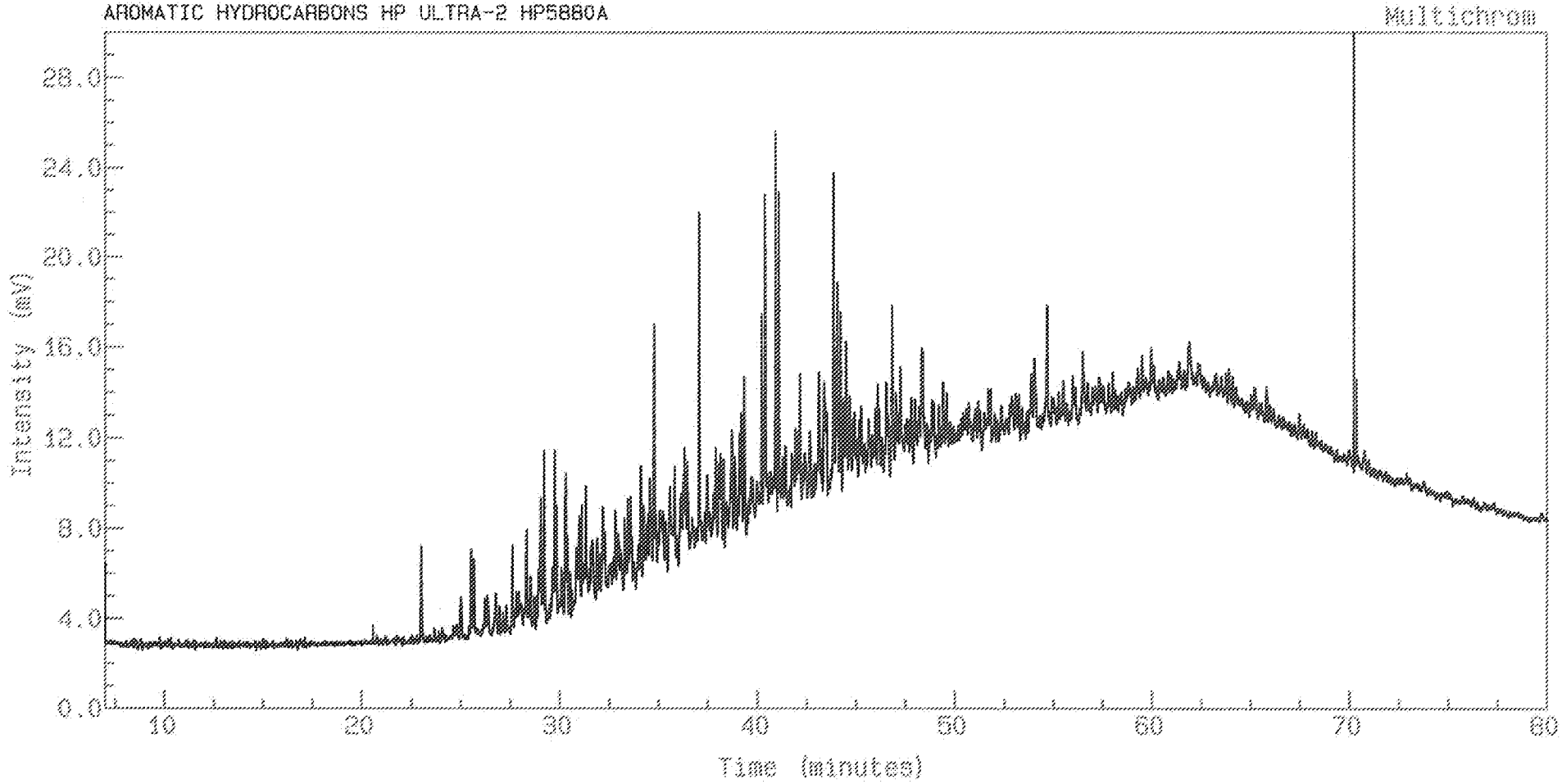
Method : ARO
Calibration : ARO
Run Sequence : ARO

Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 D340809SA, 4, 1.

34/8-9S 2932 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 1-MAR-1993 at 13:57
Reported on 5-MAR-1993 at 10:36

Method : ARO
Calibration : ARO
Run Sequence : ARO

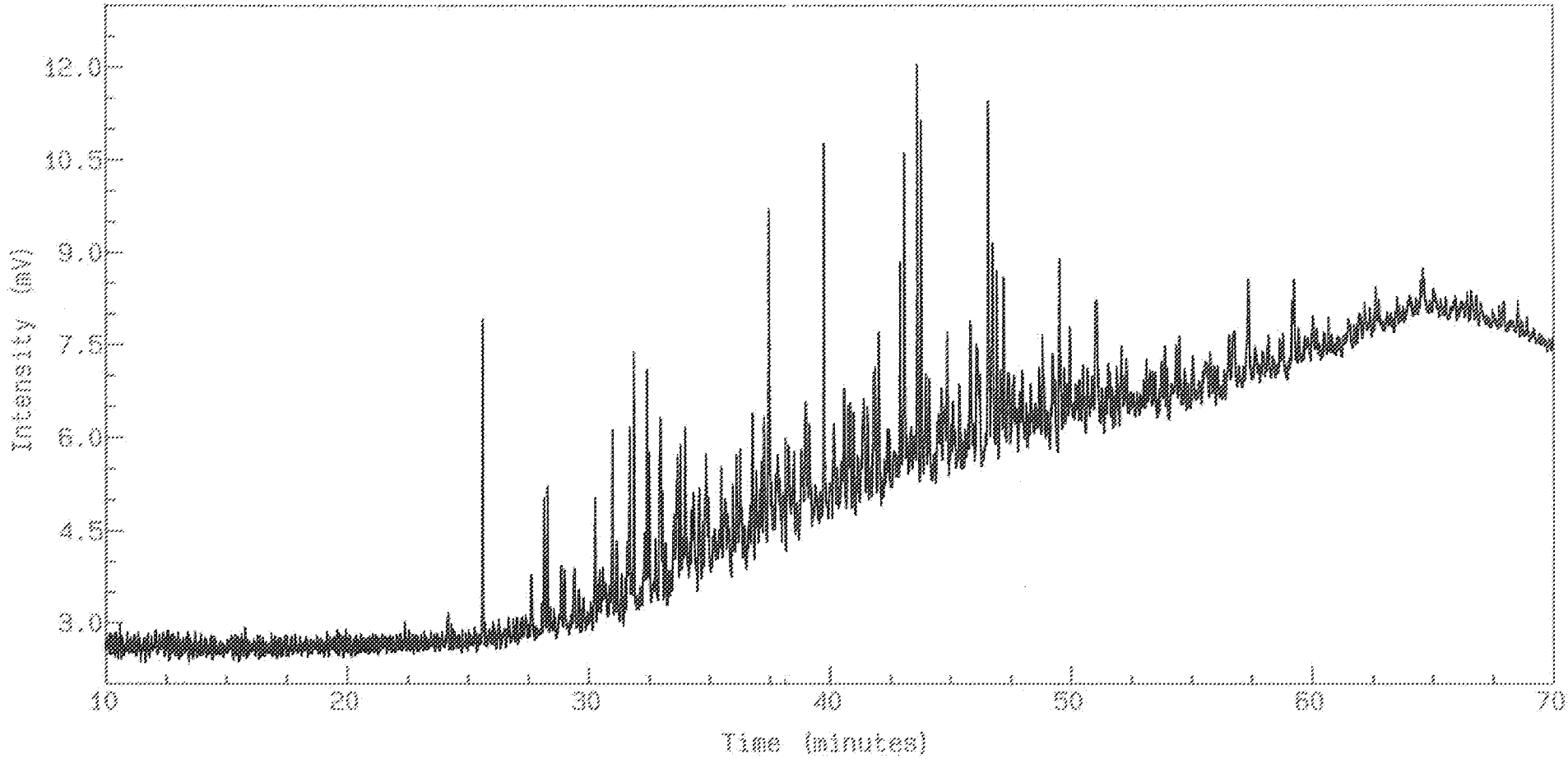
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 A340809S, 4, 1.

34/8-9S, 2936 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 7-DEC-1992 at 00:19
Reported on 7-DEC-1992 at 09:01

Method : ARO
Calibration : ARO
Run Sequence : ARO

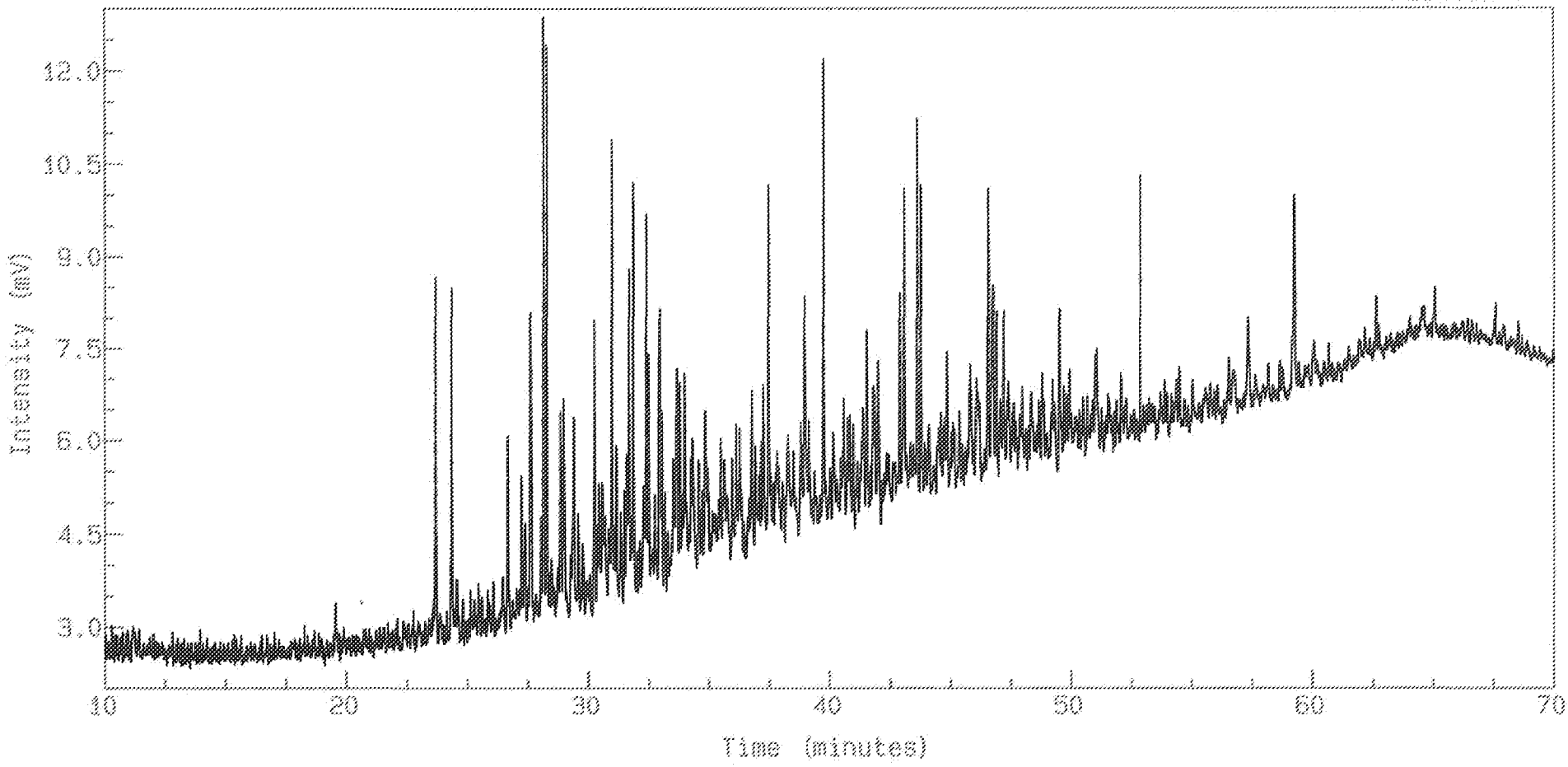
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 A340809S, 5, 1.

34/8-9S, 2939 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 7-DEC-1992 at 02:00
Reported on 7-DEC-1992 at 09:02

Method : ARO
Calibration : ARO
Run Sequence : ARO

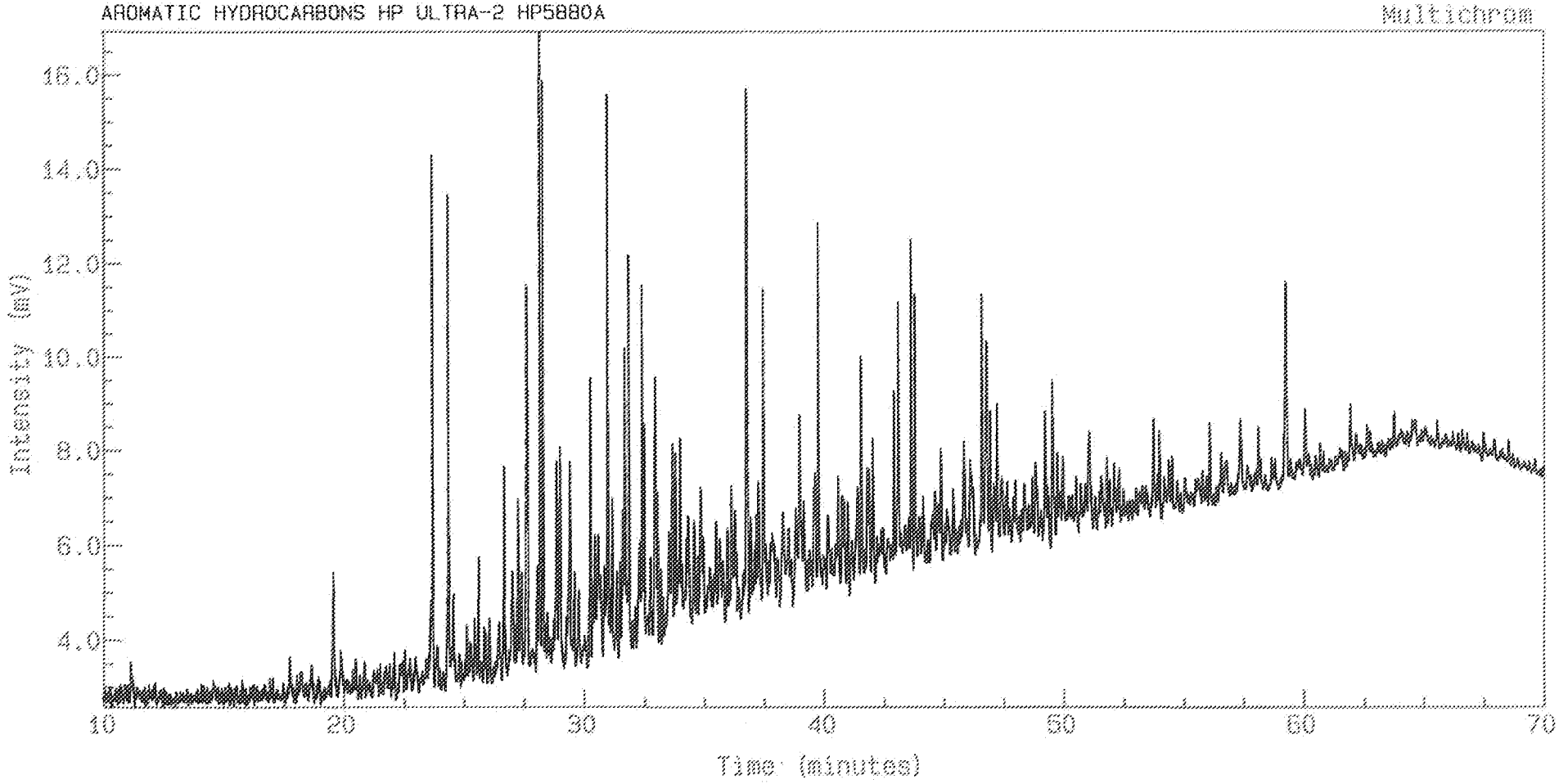
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 A340809S, 6, 1.

34/8-9S, 2942 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5890A
Channel Title : HP5890A GC
Lims ID :
Acquired on 7-DEC-1992 at 03:40
Reported on 7-DEC-1992 at 10:00

Method : ARO
Calibration : ARO
Run Sequence : ARO

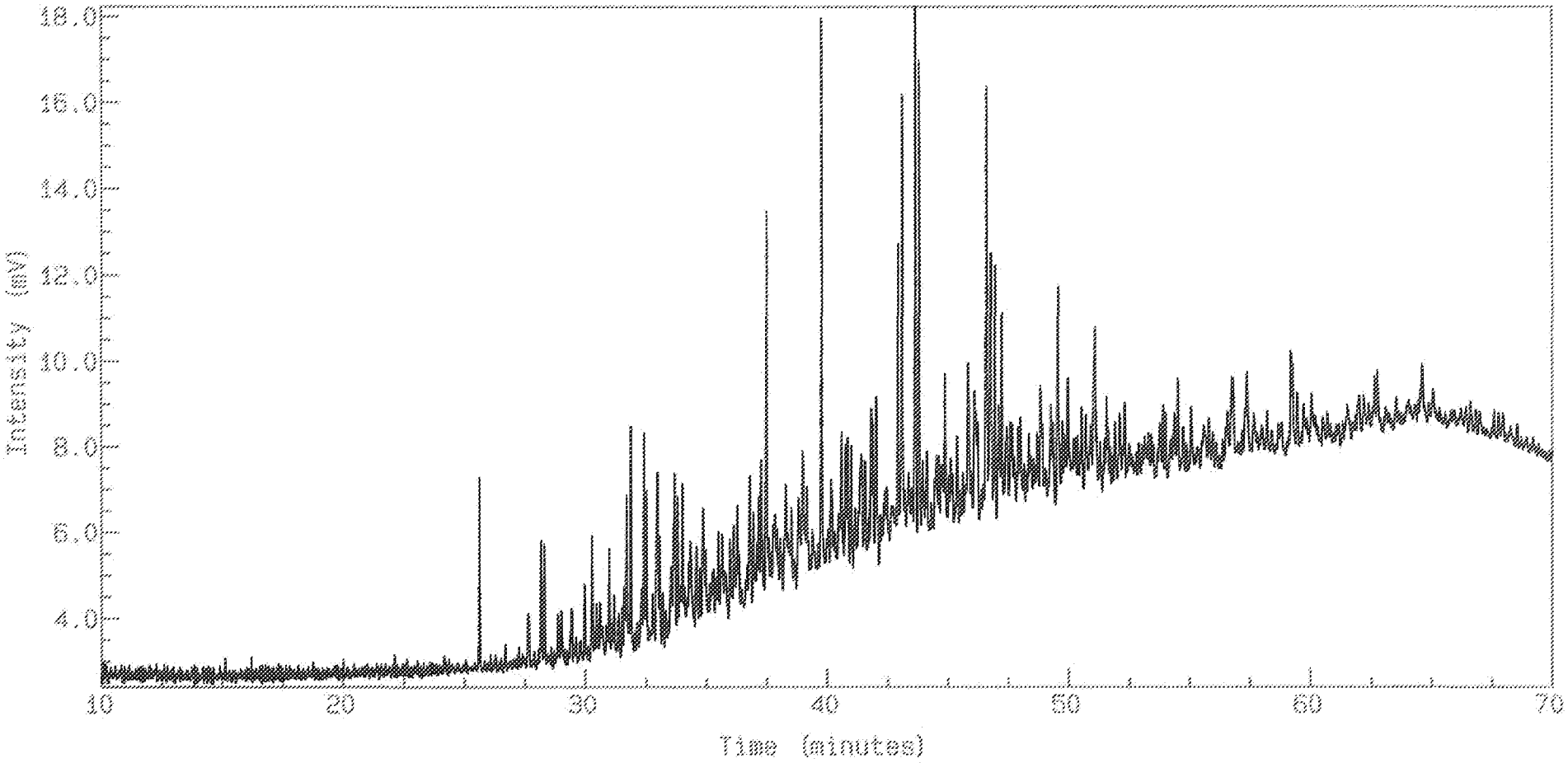
Norsk Hydro Research Centre

Analysis Name : [PETRO] 1 B340809S, 2, 1.

34/8-9S, 2945 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



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Channel Title : HP5890A GC
Lims ID :
Acquired on 7-DEC-1992 at 12:10
Reported on 7-DEC-1992 at 13:44

Method : ARO
Calibration : ARO
Run Sequence : ARO

APPENDIX III

Mass chromatograms of biomarkers.

NAME	PREVIOUS CODE	NEW CODE
TRITERPANES (m/z 177, 191)		
$C_{23}H_{42}$ tricyclic terpane	P	23/3
$C_{24}H_{44}$ tricyclic terpane	Q	24/3
$C_{25}H_{46}$ tricyclic terpane	R	25/3
$C_{24}H_{42}$ tetracyclic terpane	S	24/4
$C_{26}H_{48}$ tricyclic terpane	T	26/3
18α(H)-22,29,30-trisnorneohopane	27A	27Ts
17α(H)-22,29,30-trisnorhopane	27B	27Tm
17α(H), 21β(H)-28,30-bisnorhopane	28A	28αβ
18α(H)-30-norneohopane		29Ts
17α(H), 21β(H)-30-norhopane	C29A	29αβ
17β(H), 21α(H)-30-norhopane	C29B	29βα
15α-methyl-17α(H)-27-norhopane (TtX)	X	30d
18α(H)-oleanane		30O
17α(H), 21β(H)-hopane	C30A	30αβ
17β(H), 21α(H)-hopane (moretane)	C30B	30βα
Gammacerane		30G
17α(H), 21β(H), 22(S)-homohopane	C31S	31αβS
17α(H), 21β(H), 22(R)-homohopane	C31R	31αβR
17α(H), 21β(H), 22(S)-bishomohopane	C32S	32αβS
17α(H), 21β(H), 22(R)-bishomohopane	C32R	32αβR
17α(H), 21β(H), 22(S)-trishomohopane	C33S	33αβS
17α(H), 21β(H), 22(R)-trishomohopane	C33R	33αβR
17α(H), 21β(H), 22(S)-tetrakishomohopane	C34S	34αβS
17α(H), 21β(H), 22(R)-tetrakishomohopane	C34R	34αβR
17α(H), 21β(H), 22(S)-pentakishomohopane	C35S	35αβS
17α(H), 21β(H), 22(R)-pentakishomohopane	C35R	35αβR
17α(H), 21β(H)-25,28,30-trisnorhopane		25nor28αβ
17α(H), 21β(H)-25-norhopane		25nor30αβ

NAME	PREVIOUS CODE	NEW CODE
STERANES (m/z 217, 218)		
13α(H), 17β(H), 20(S)-cholestane (diasterane)	27a	27dαS
13α(H), 17β(H), 20(R)-cholestane (diasterane)	27b	27dαR
13β(H), 17α(H), 20(S)-cholestane (diasterane)	27c	27dβS
13β(H), 17α(H), 20(R)-cholestane (diasterane)	27d	27dβR
5α(H), 14α(H), 17α(H), 20(S)-cholestane	27e	27ααS
5α(H), 14β(H), 17β(H), 20(R)-cholestane	27f	27ββR
5α(H), 14β(H), 17β(H), 20(S)-cholestane	27g	27ββS
5α(H), 14α(H), 17α(H), 20(R)-cholestane	27h	27ααR
24-methyl-13α(H), 17β(H), 20(S)-cholestane (diasterane)	28a	28dαS
24-methyl-13α(H), 17β(H), 20(R)-cholestane (diasterane)	28b	28dαR
24-methyl-13β(H), 17α(H), 20(S)-cholestane (diasterane)	28c	28dβS
24-methyl-13β(H), 17α(H), 20(R)-cholestane (diasterane)	28d	28dβR
24-methyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane	28e	28ααS
24-methyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane	28f	28ββR
24-methyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane	28g	28ββS
24-ethyl-13α(H), 17β(H), 20(S)-cholestane (diasterane)	29a	29dαS
24-ethyl-13α(H), 17β(H), 20(R)-cholestane (diasterane)	29b	29dαR
24-ethyl-13β(H), 17α(H), 20(S)-cholestane (diasterane)	29c	29dβS
24-ethyl-13β(H), 17α(H), 20(R)-cholestane (diasterane)	29d	29dβR
24-ethyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane	29e	29ααS
24-ethyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane	29f	29ββR
24-ethyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane	29g	29ββS
24-ethyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane	29h	29ααR
24-propyl-5α(H), 14α(H), 17α(H), 20(S)-cholestane	30e	30ααS
24-propyl-5α(H), 14β(H), 17β(H), 20(R)-cholestane	30f	30ββR
24-propyl-5α(H), 14β(H), 17β(H), 20(S)-cholestane	30g	30ββS
24-propyl-5α(H), 14α(H), 17α(H), 20(R)-cholestane	30h	30ααR
4-methyl-14α(H), 17α(H)-cholestanes*		M28αα
4,24-dimethyl-14α(H), 17α(H)-cholestanes*		M29αα

STERANES cont.

4-methyl-24-ethyl-14α(H), 17α(H)-cholestanes*	M30αα
4,23,24-trimethyl-14α(H), 17α(H)-cholestanes# (dinosteranes)	M30D

x various possible isomers at 4,5,20 positions

* various possible isomers at 4,5,20,24 positions

various possible isomers at 4,5,20,23,24 positions

Typical mass fragmentograms for m/z 177, 191, 217 and 218, with components marked, from analysis of a saturates fraction are shown in Fig. 6a-d.

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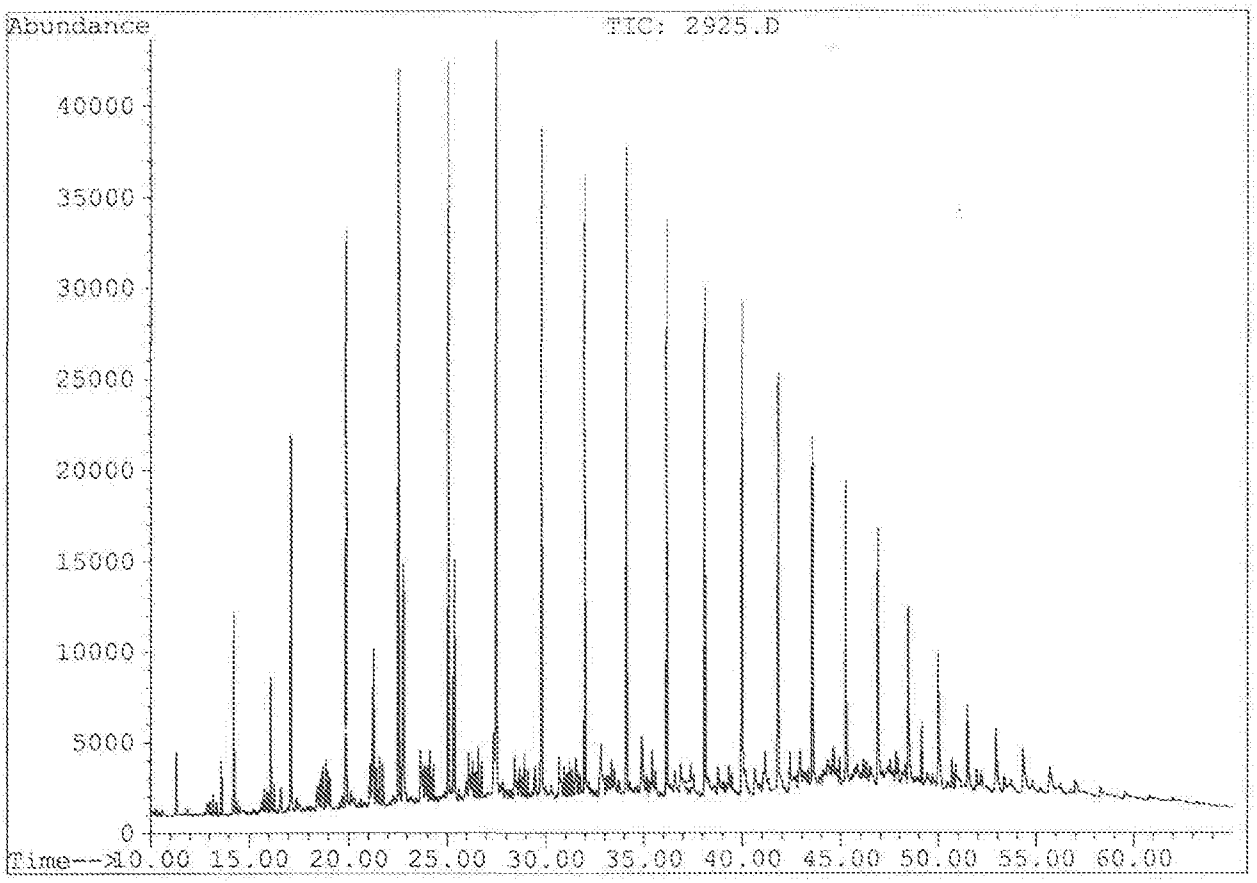
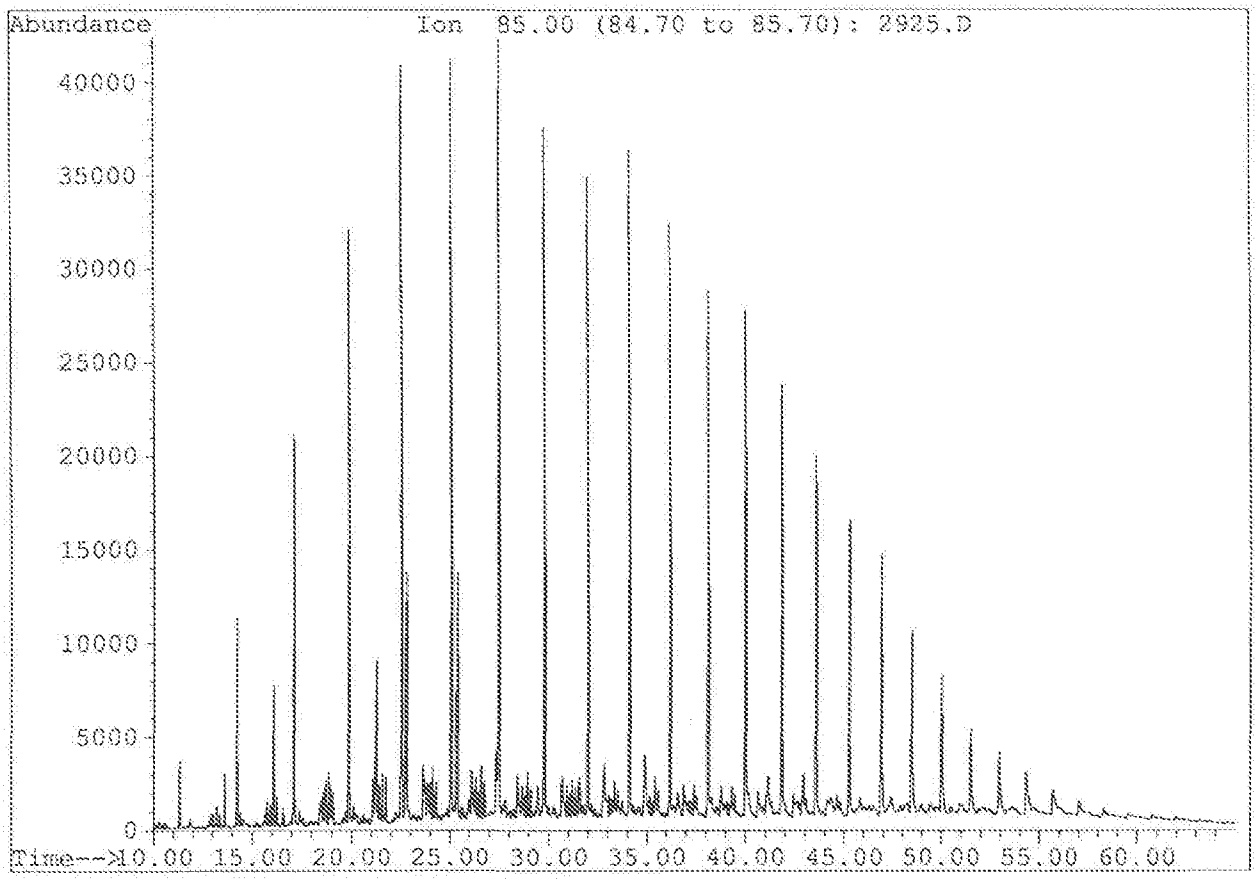
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





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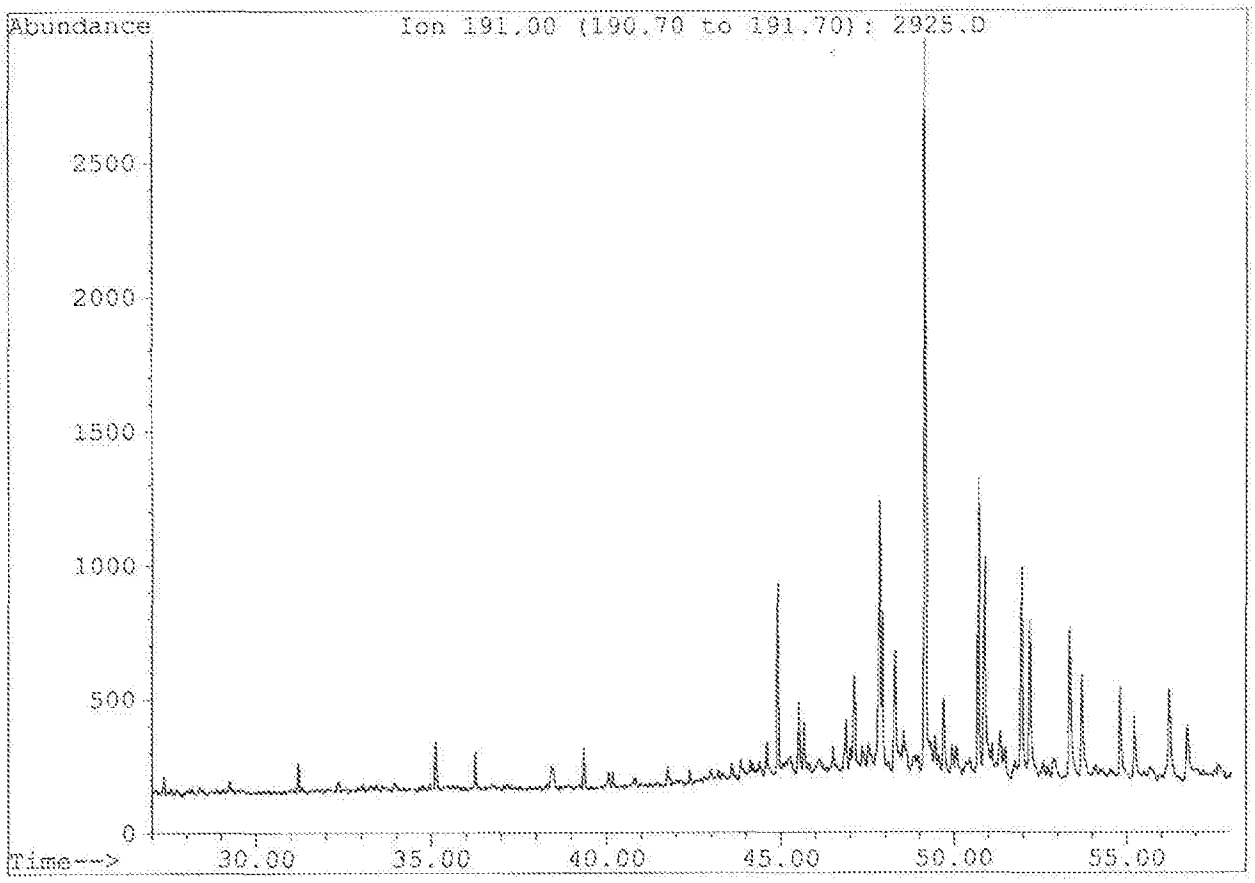

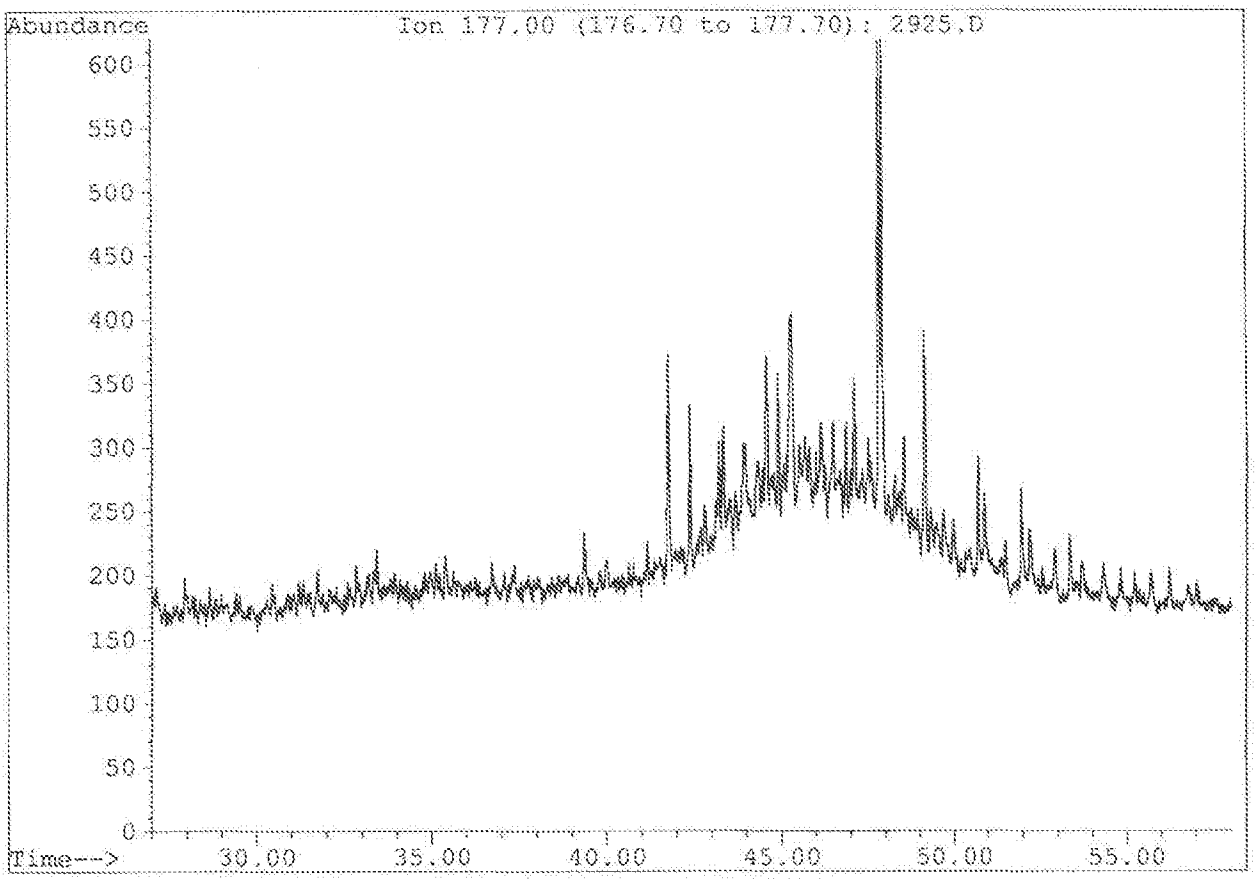

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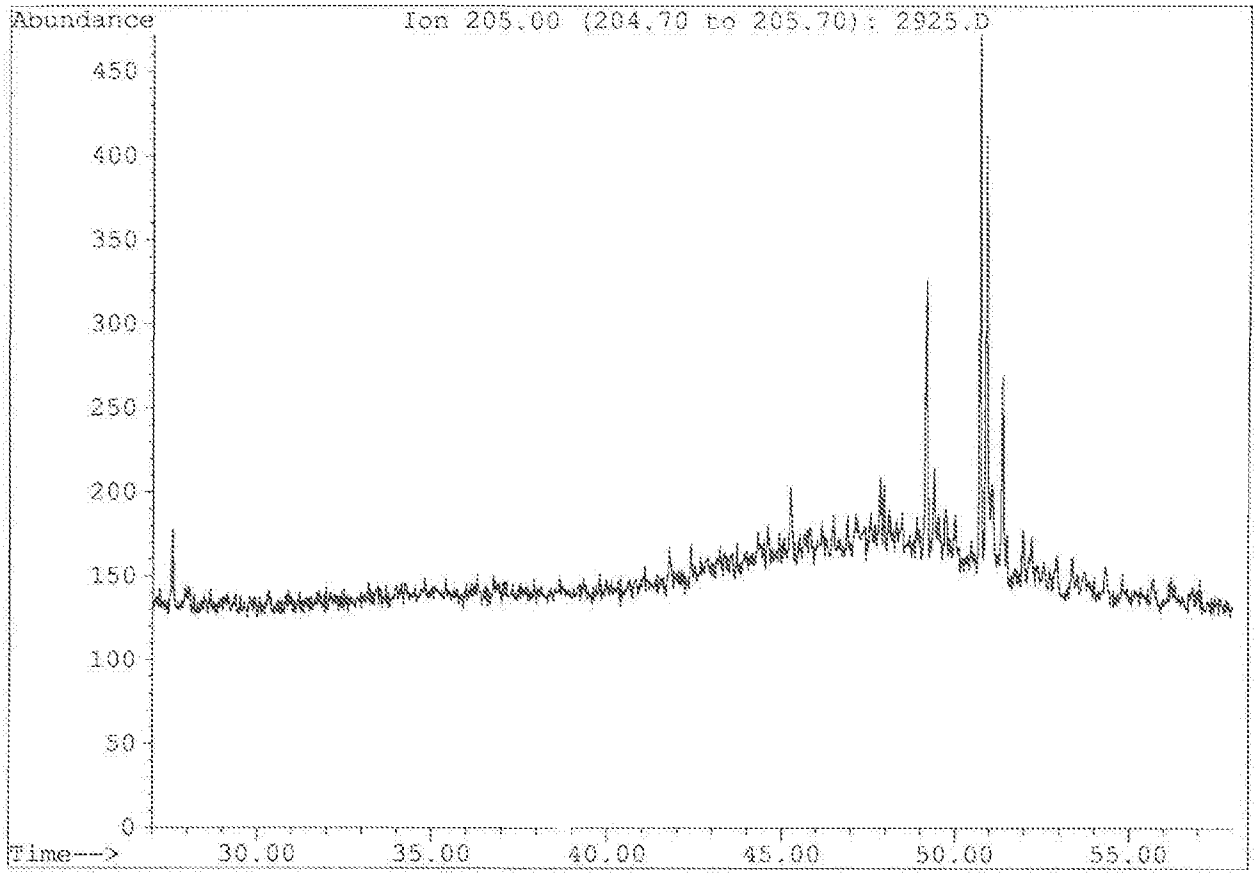

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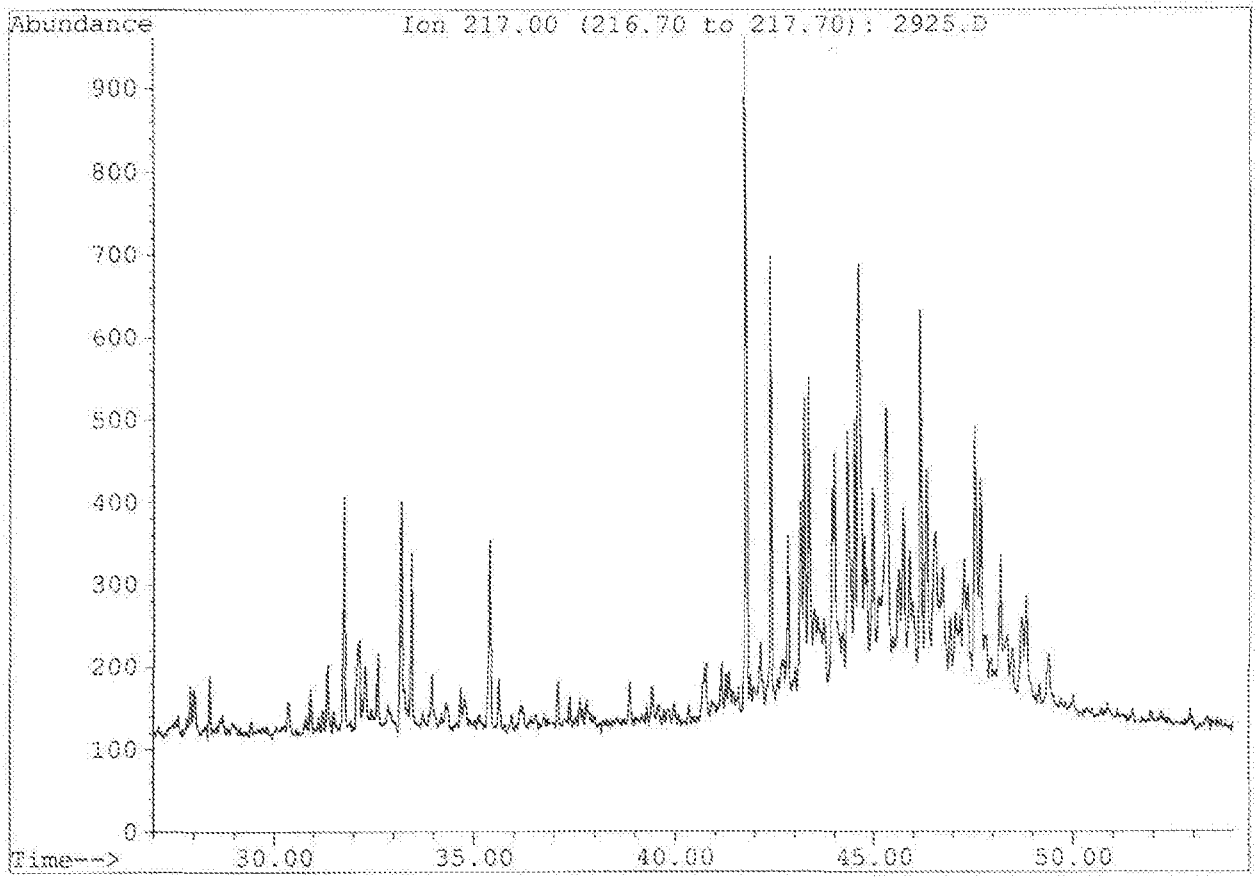

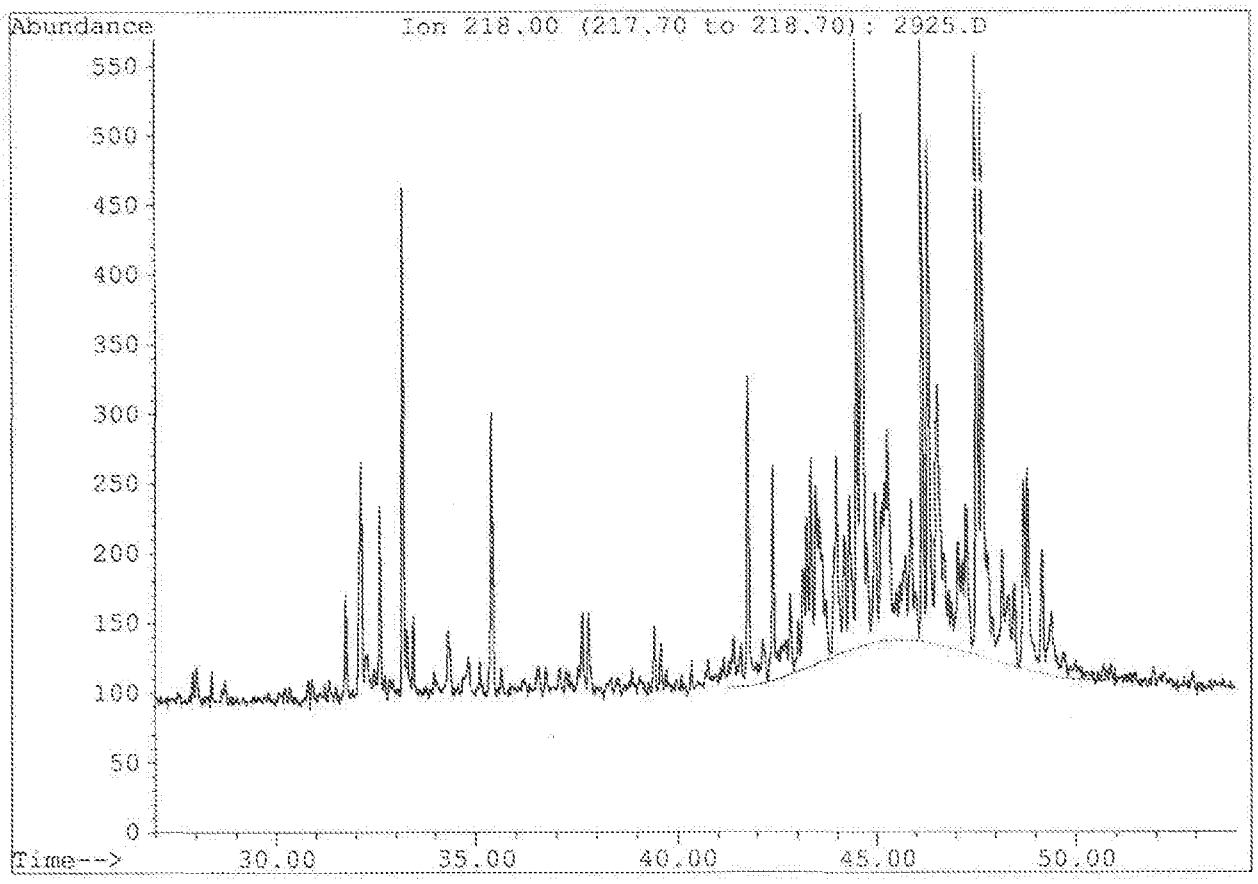

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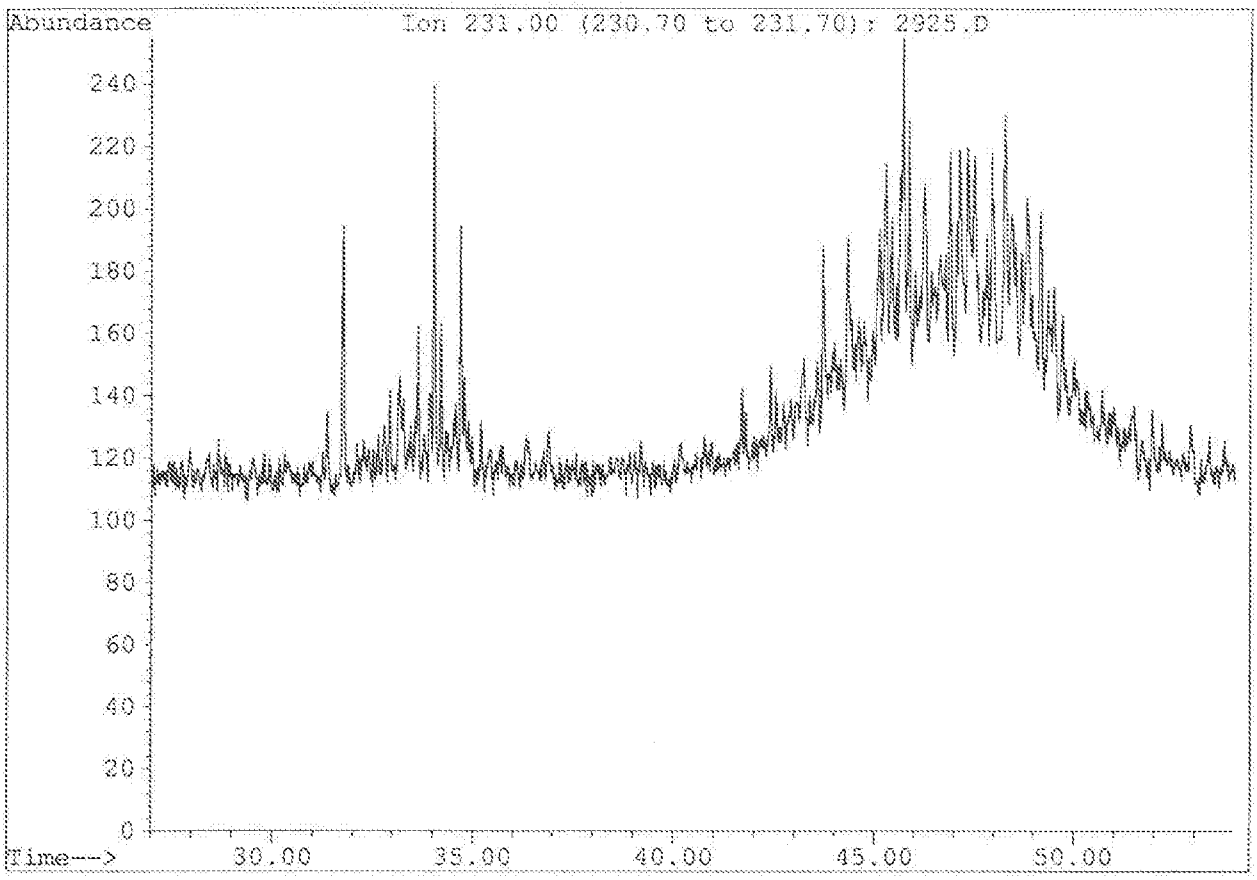

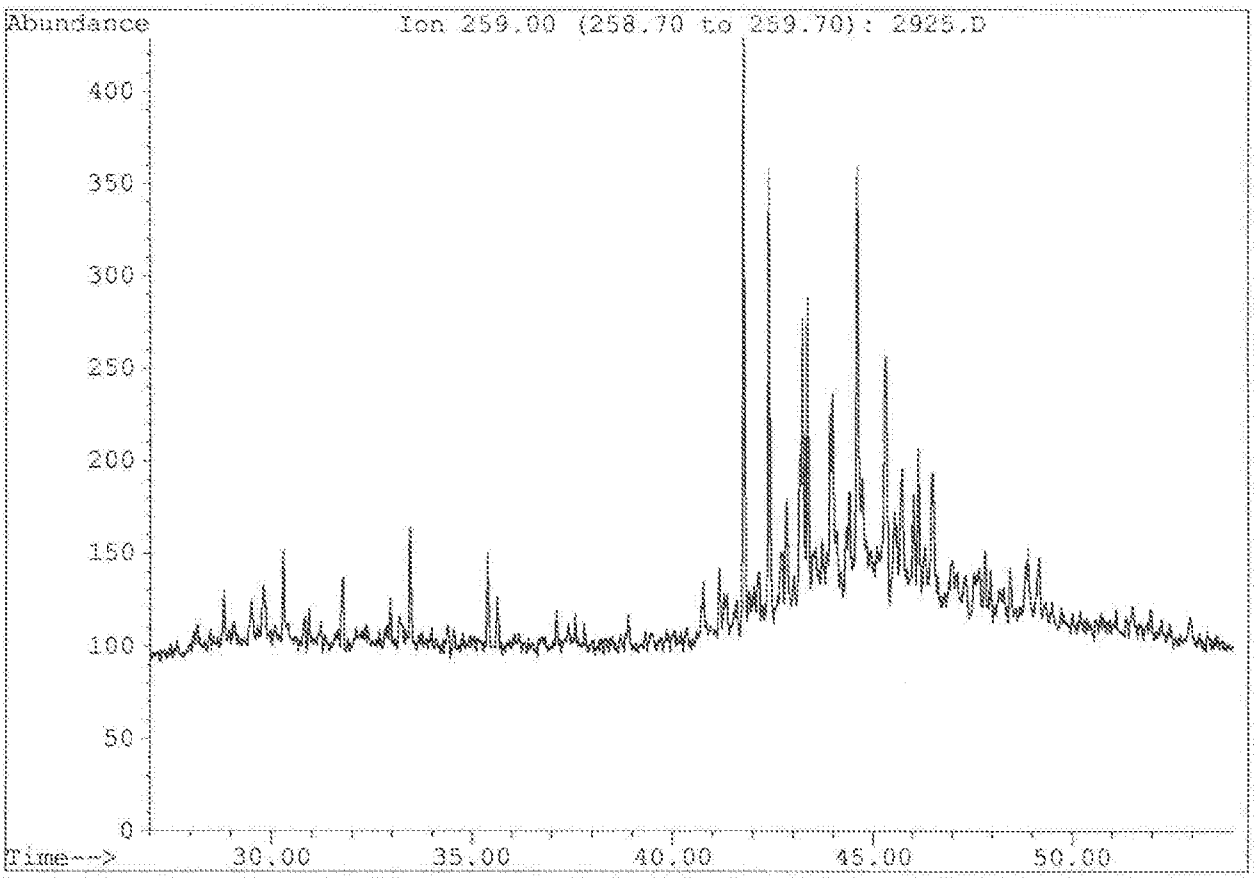

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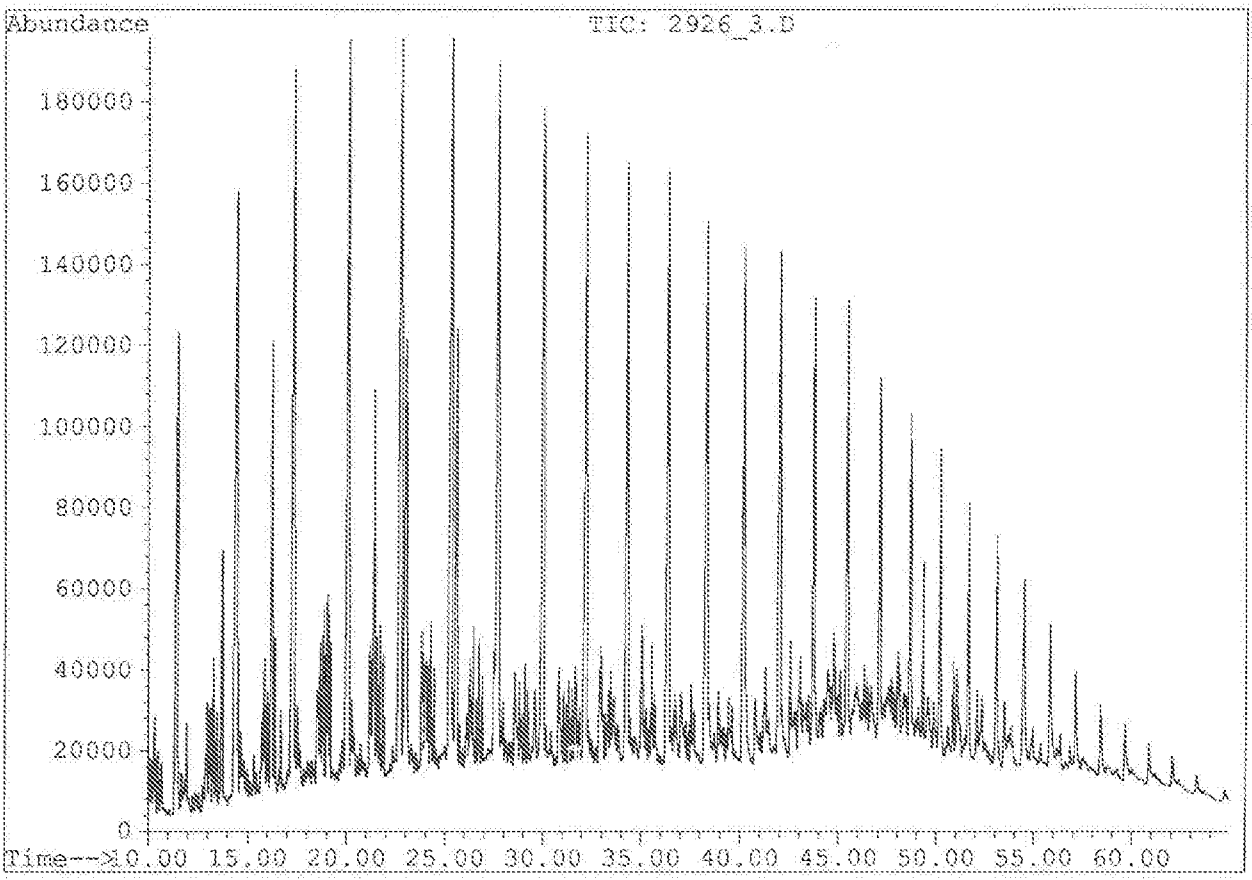

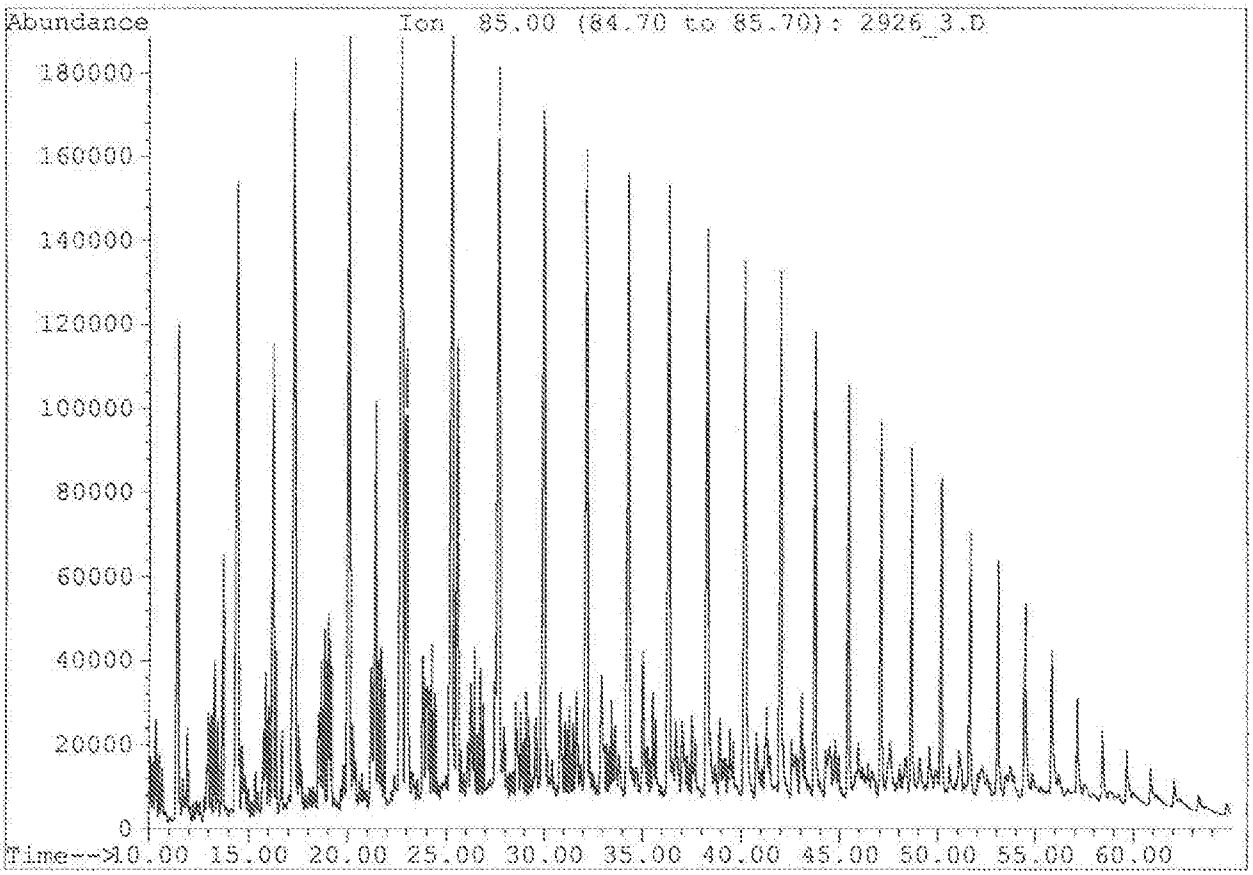

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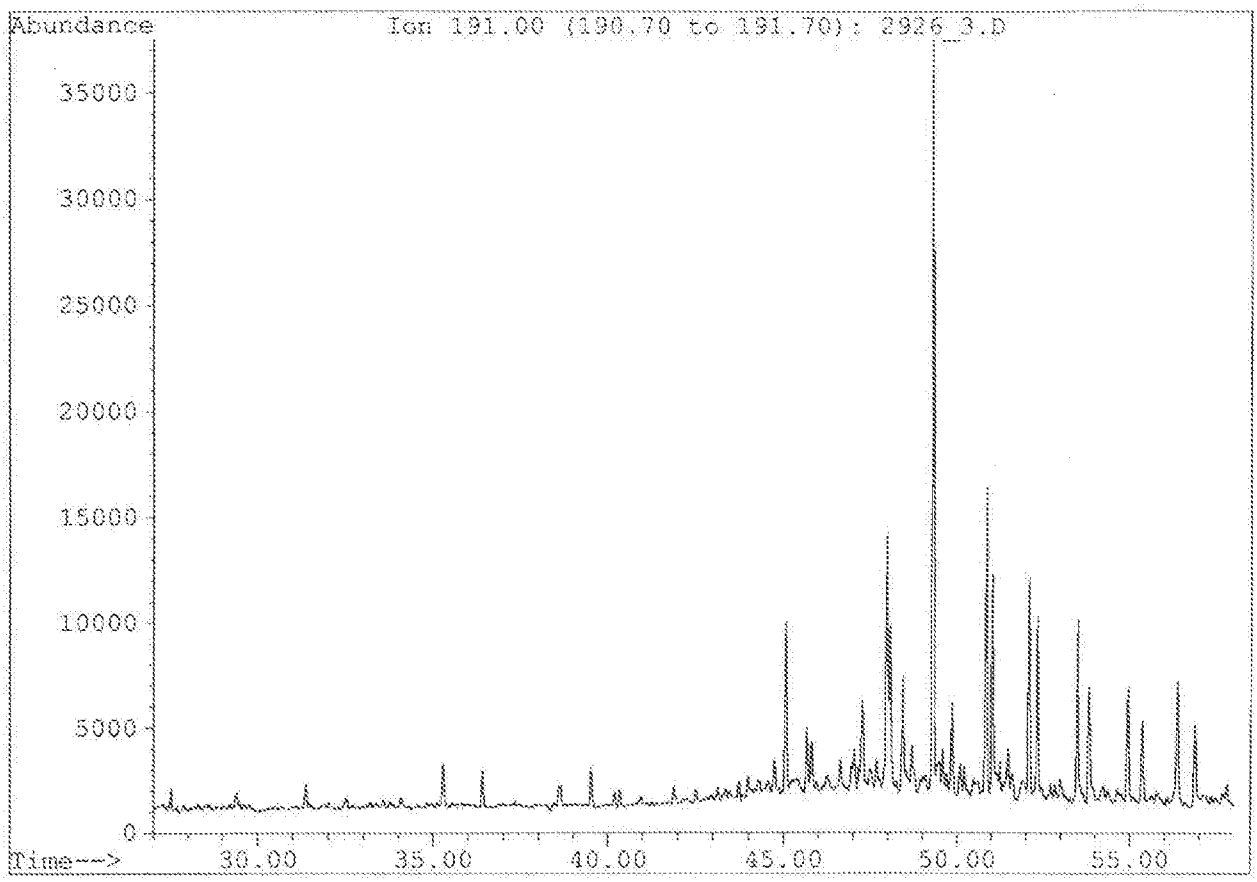

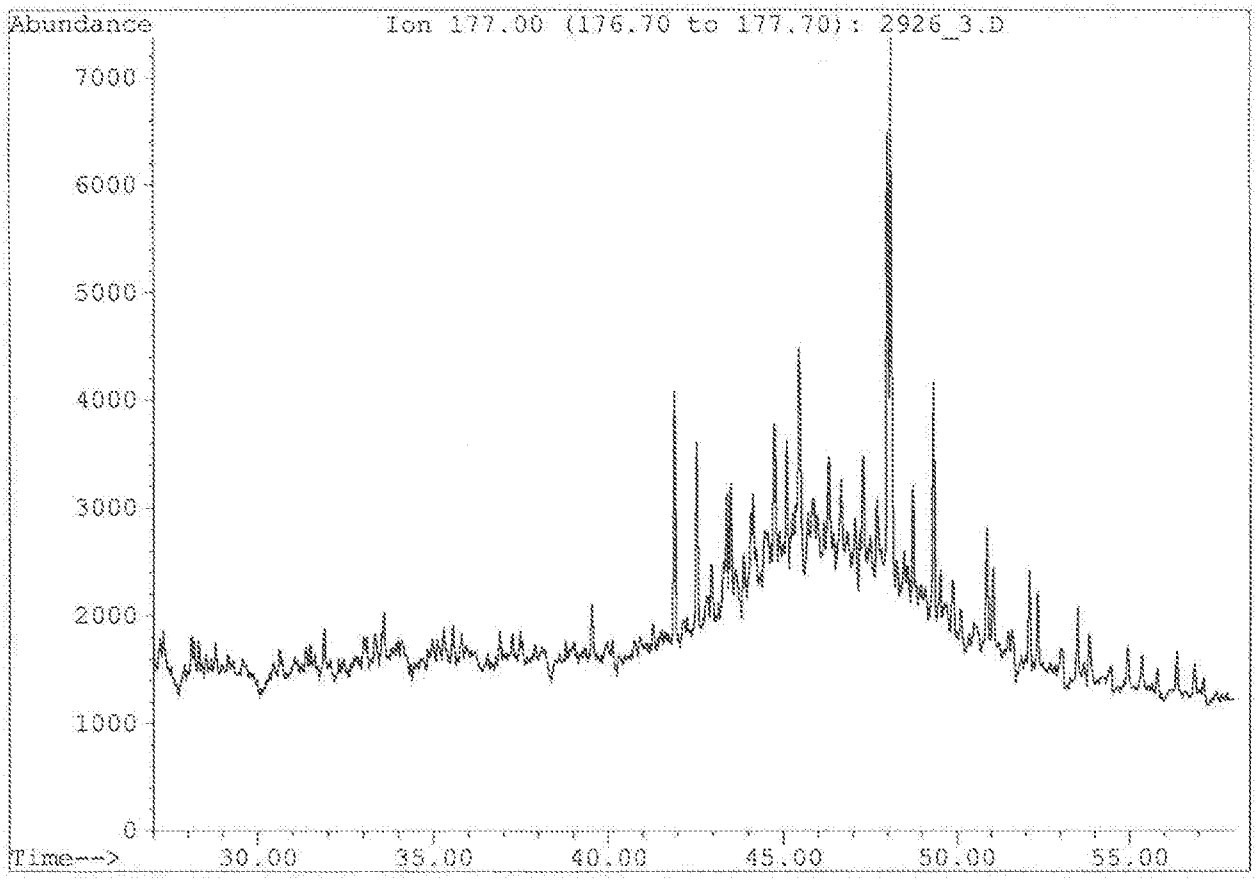

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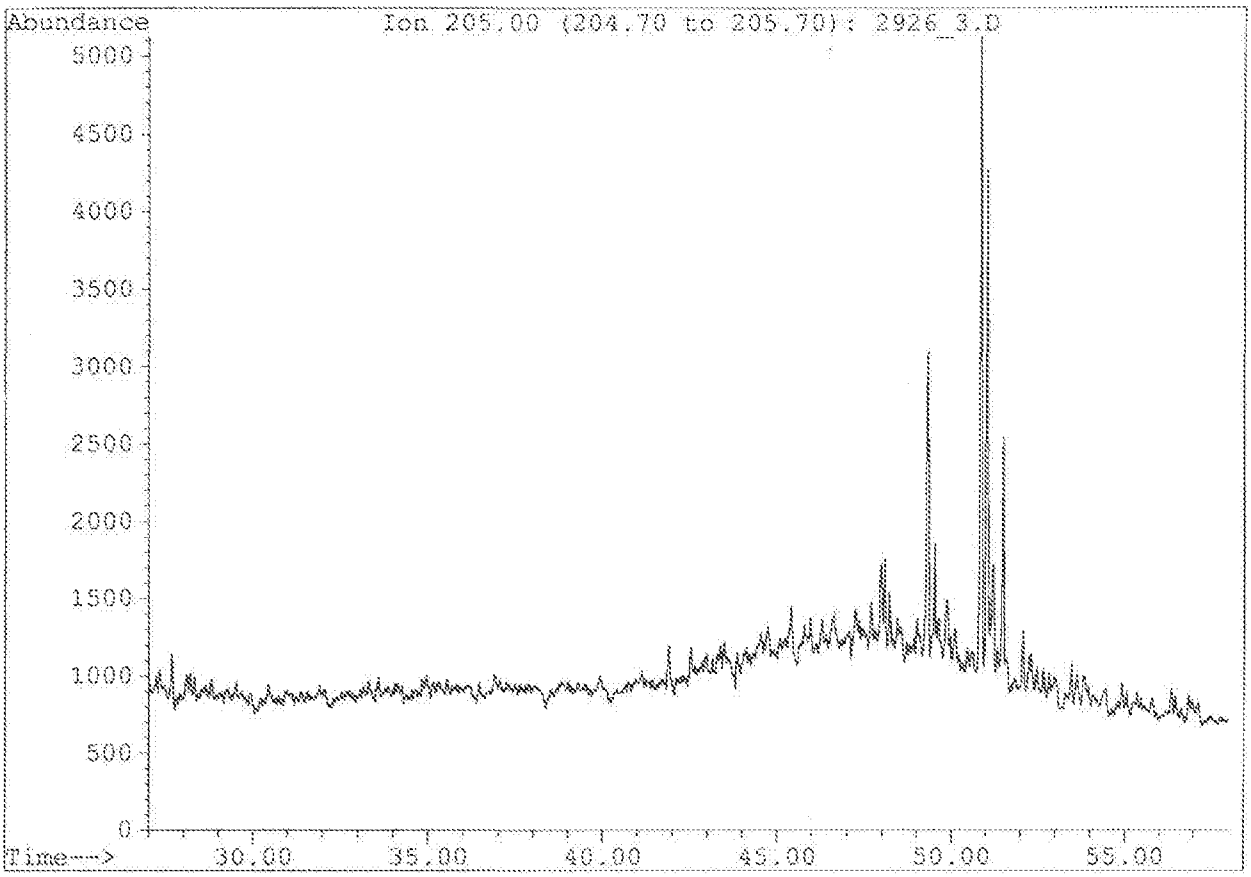

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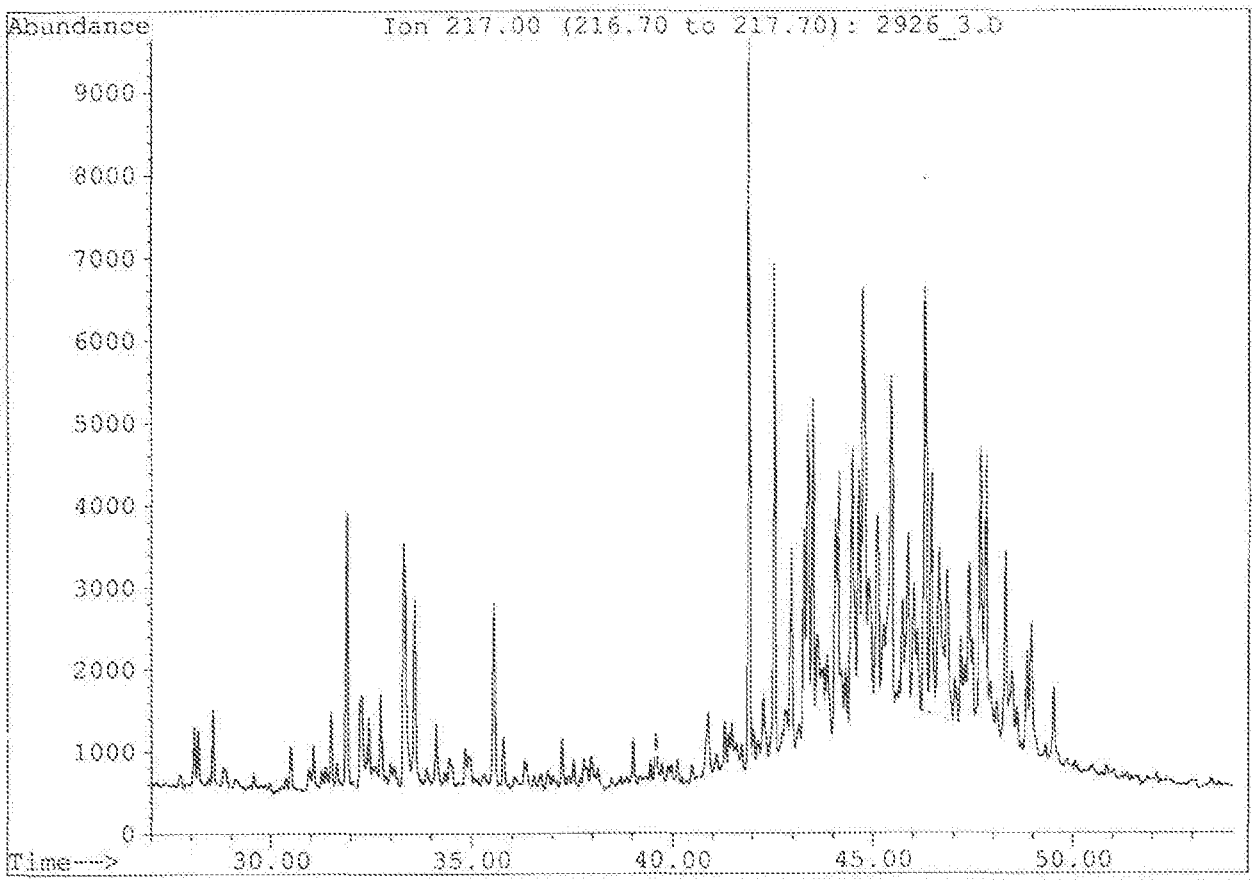

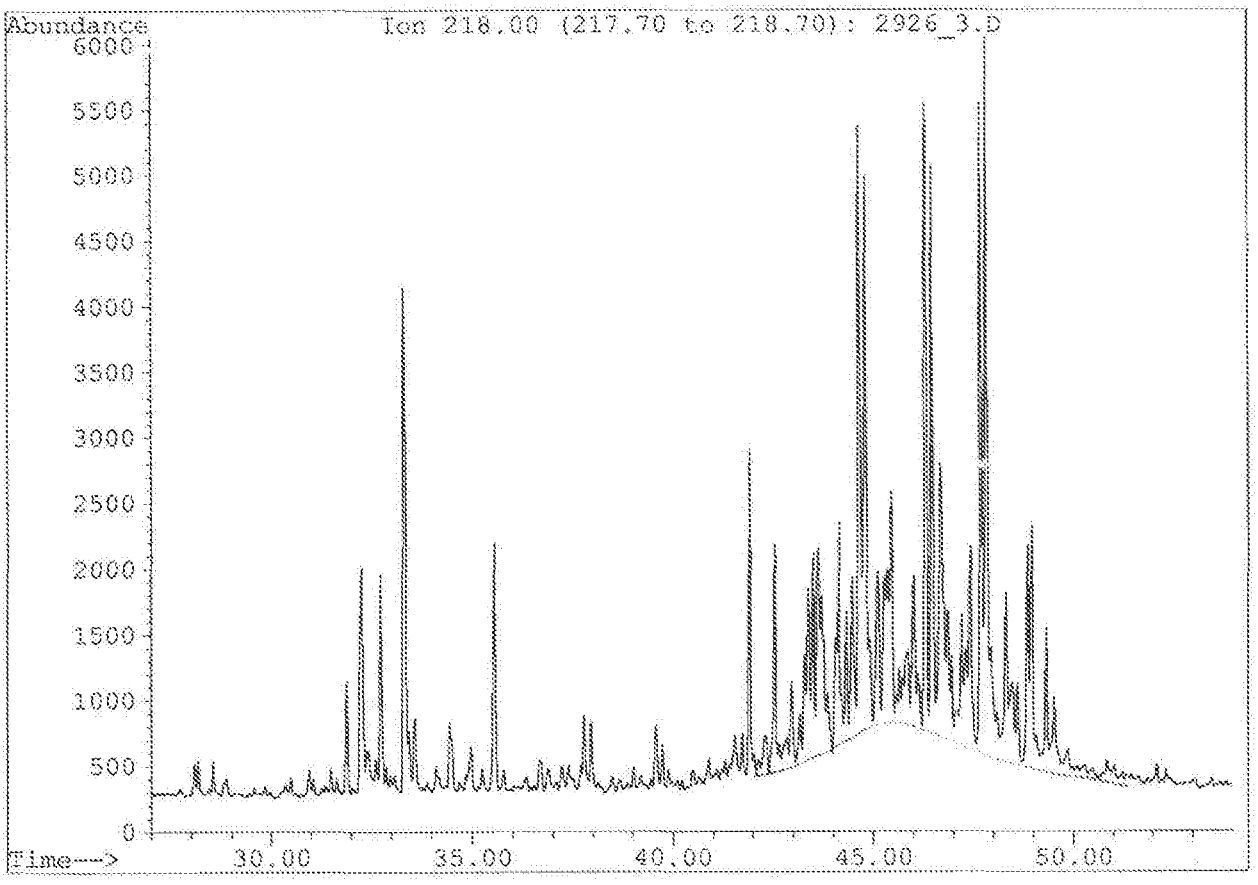

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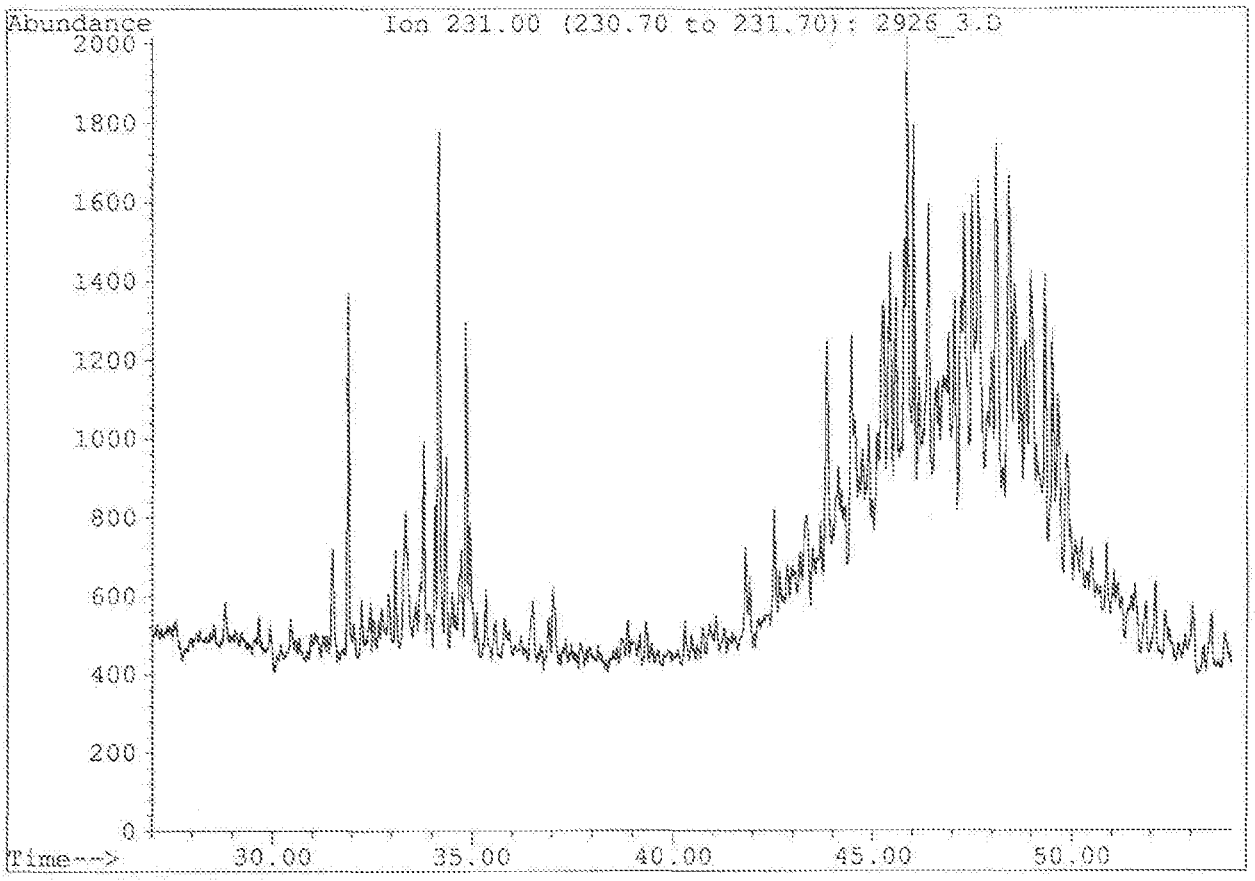

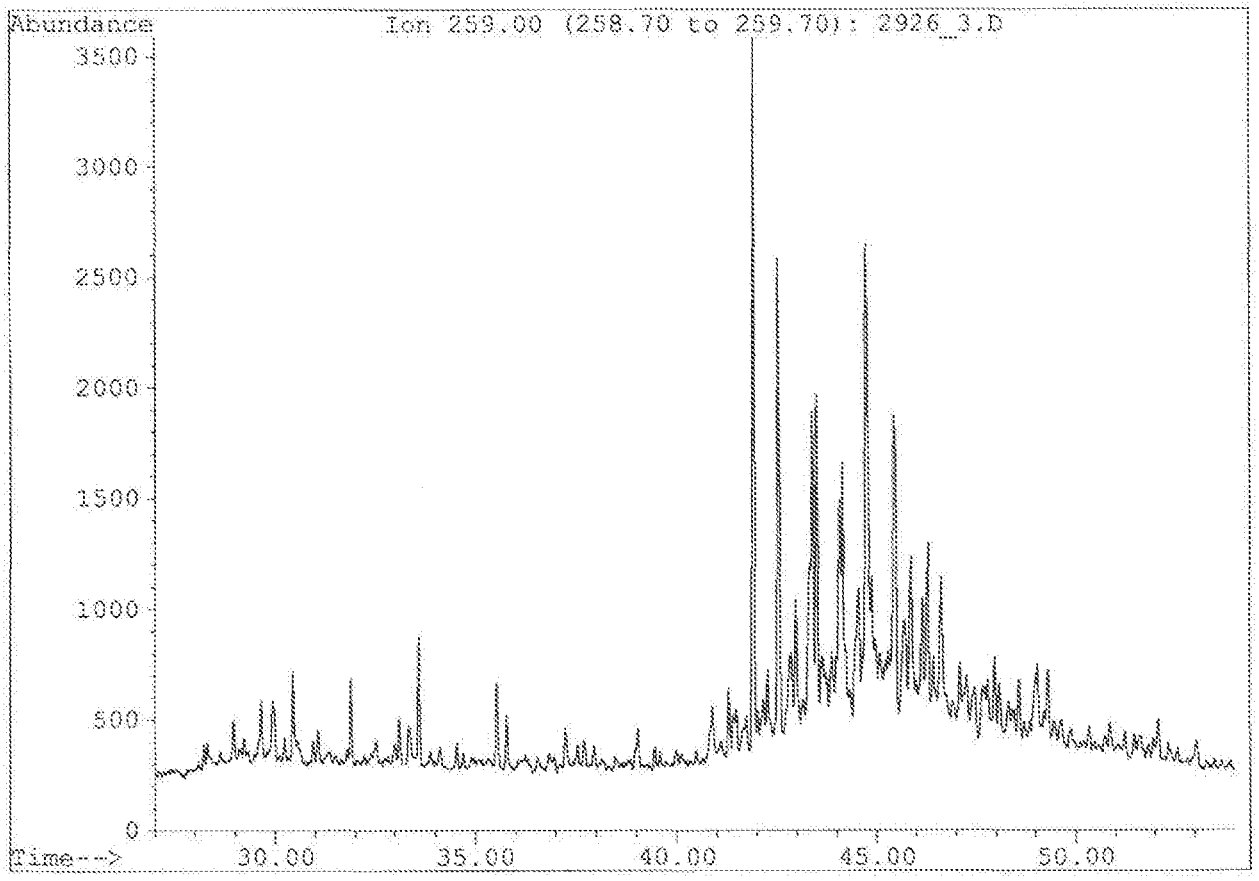

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Quantitation database: SATURATE BIOMARKERS
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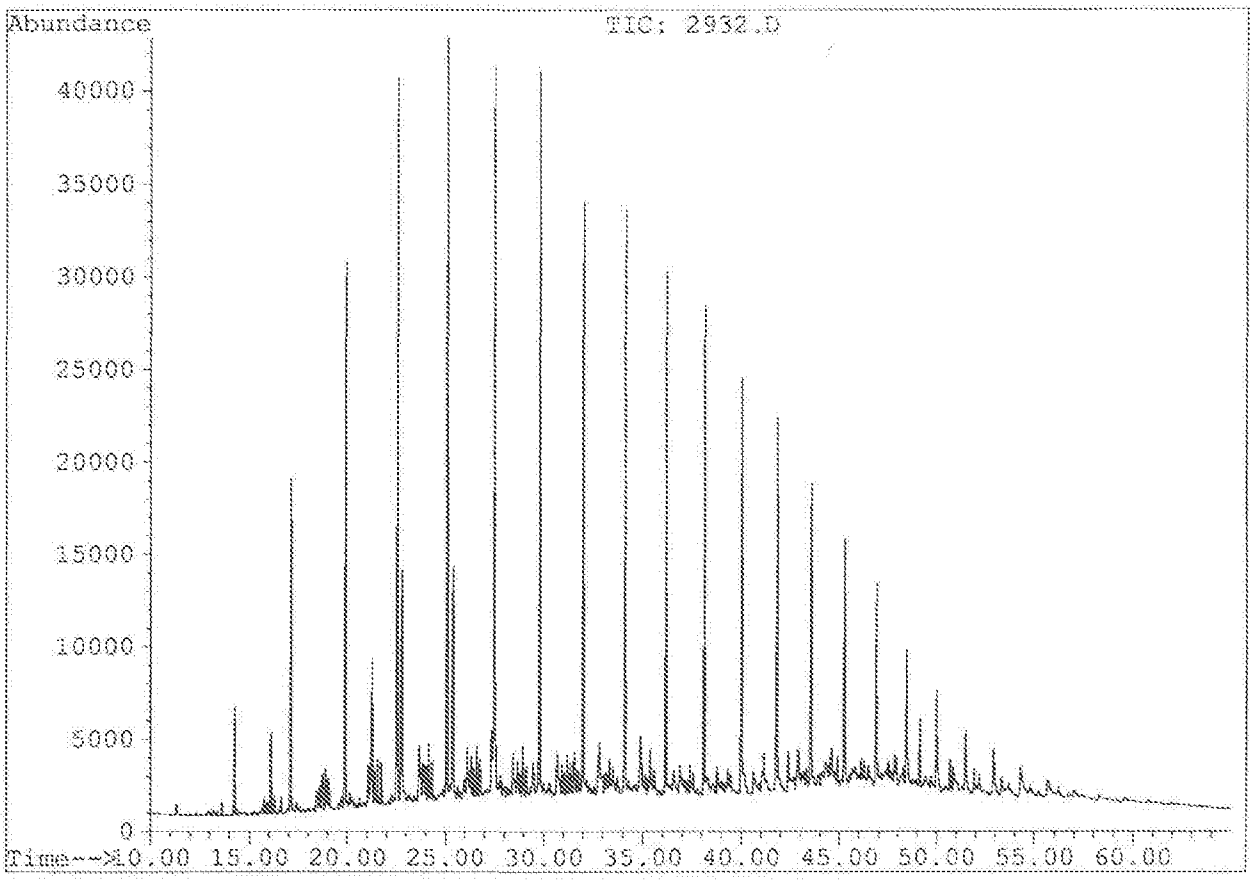

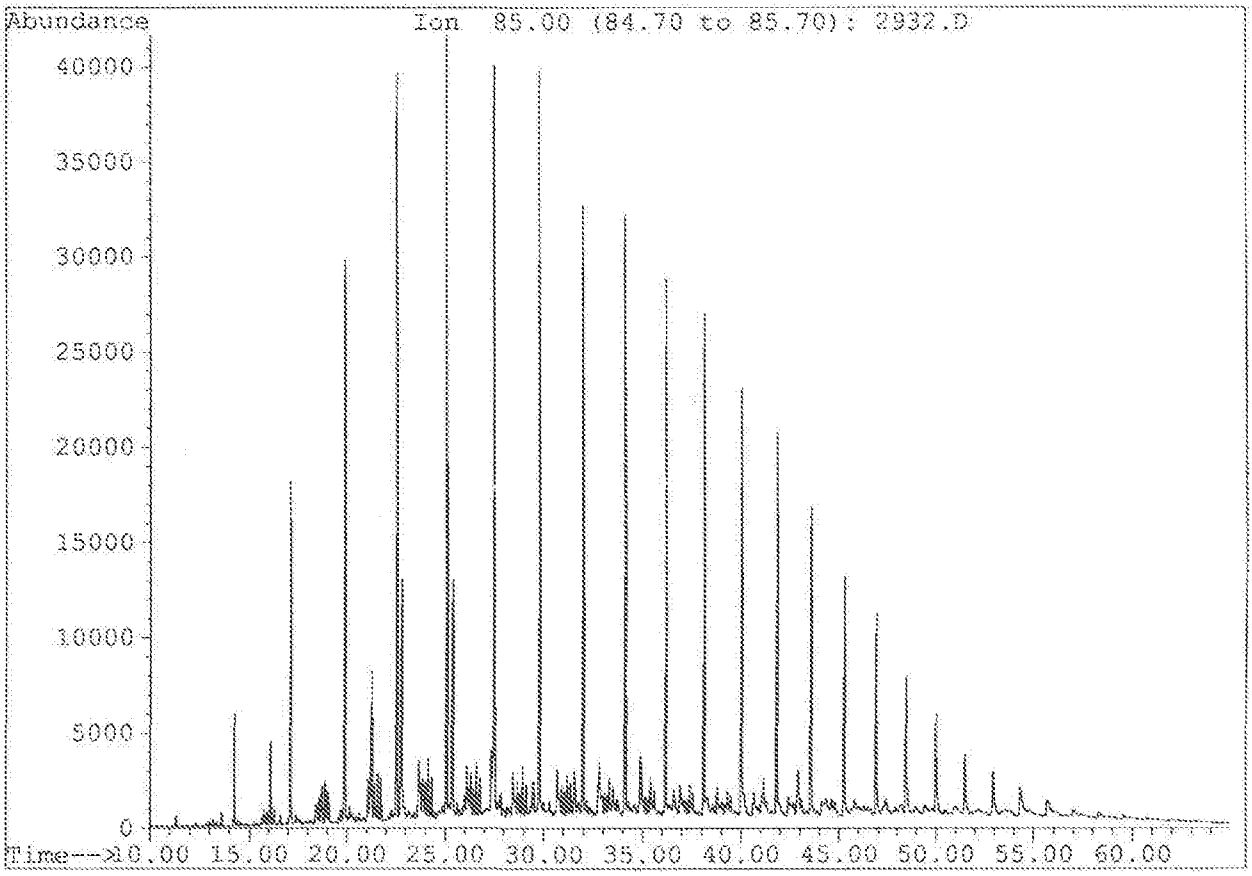

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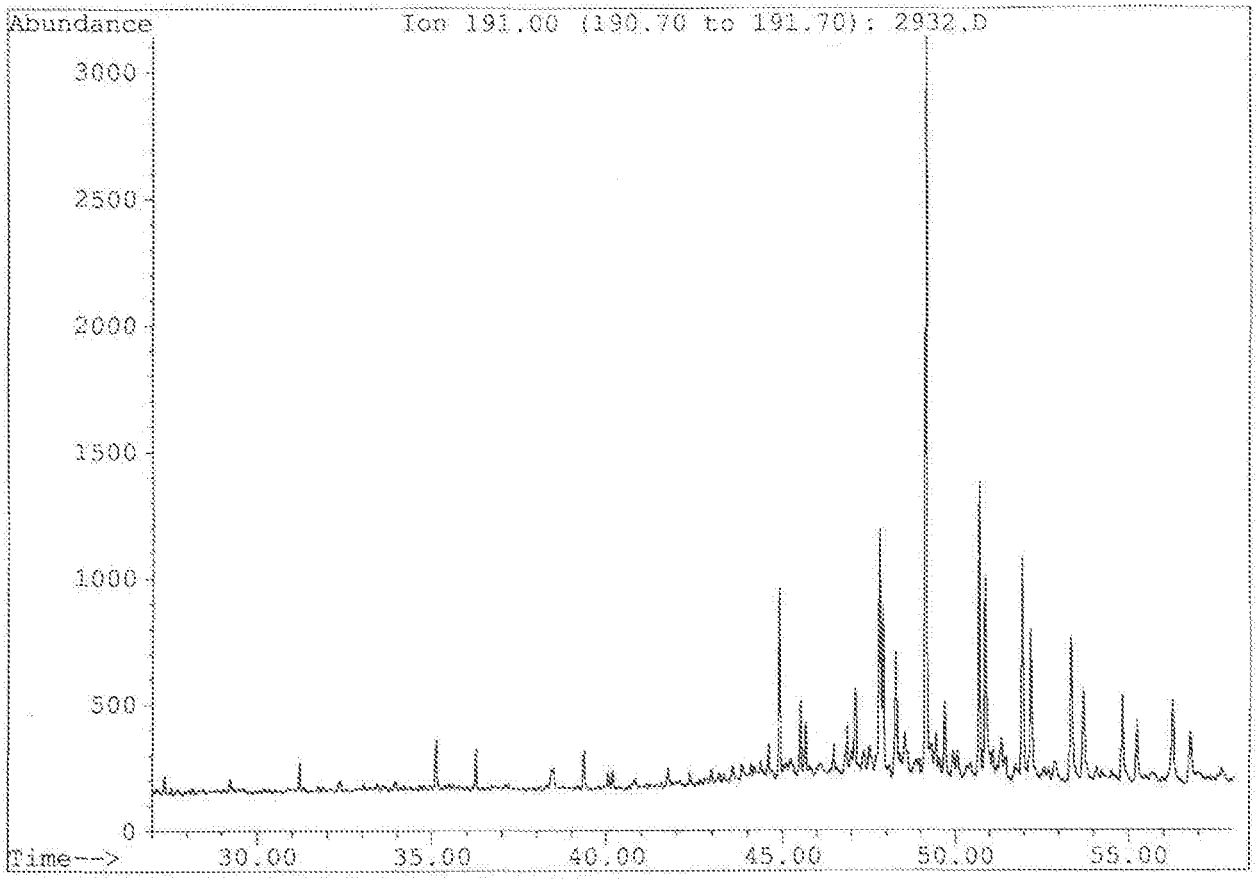

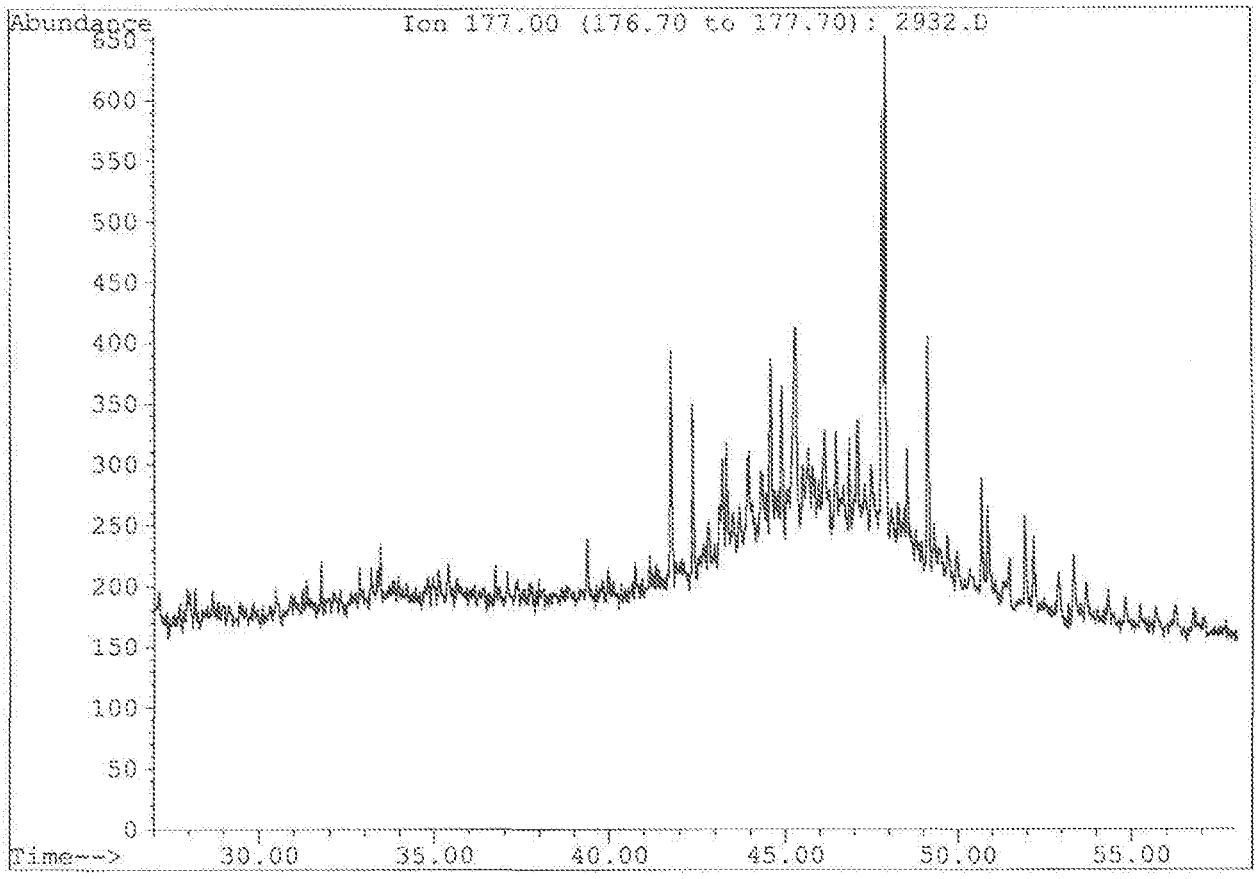

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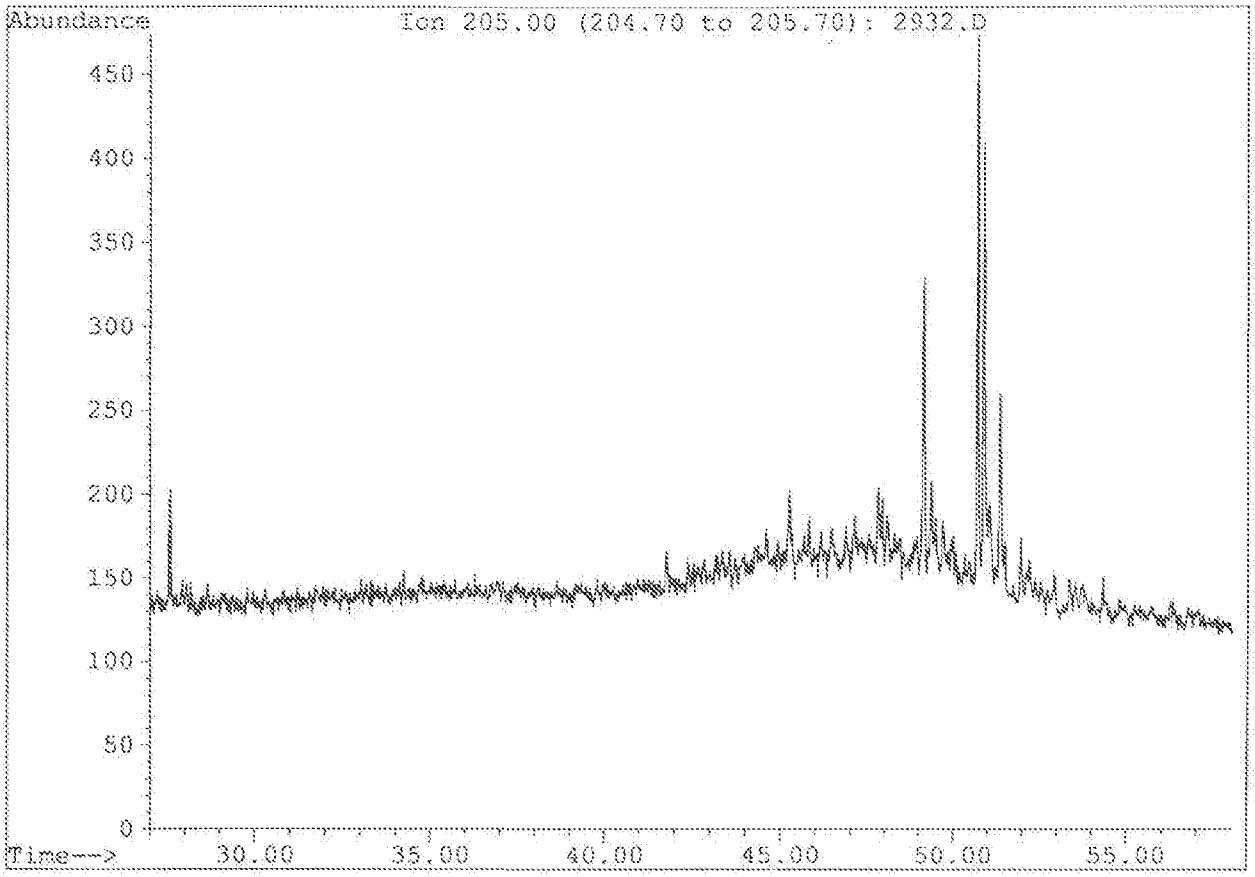

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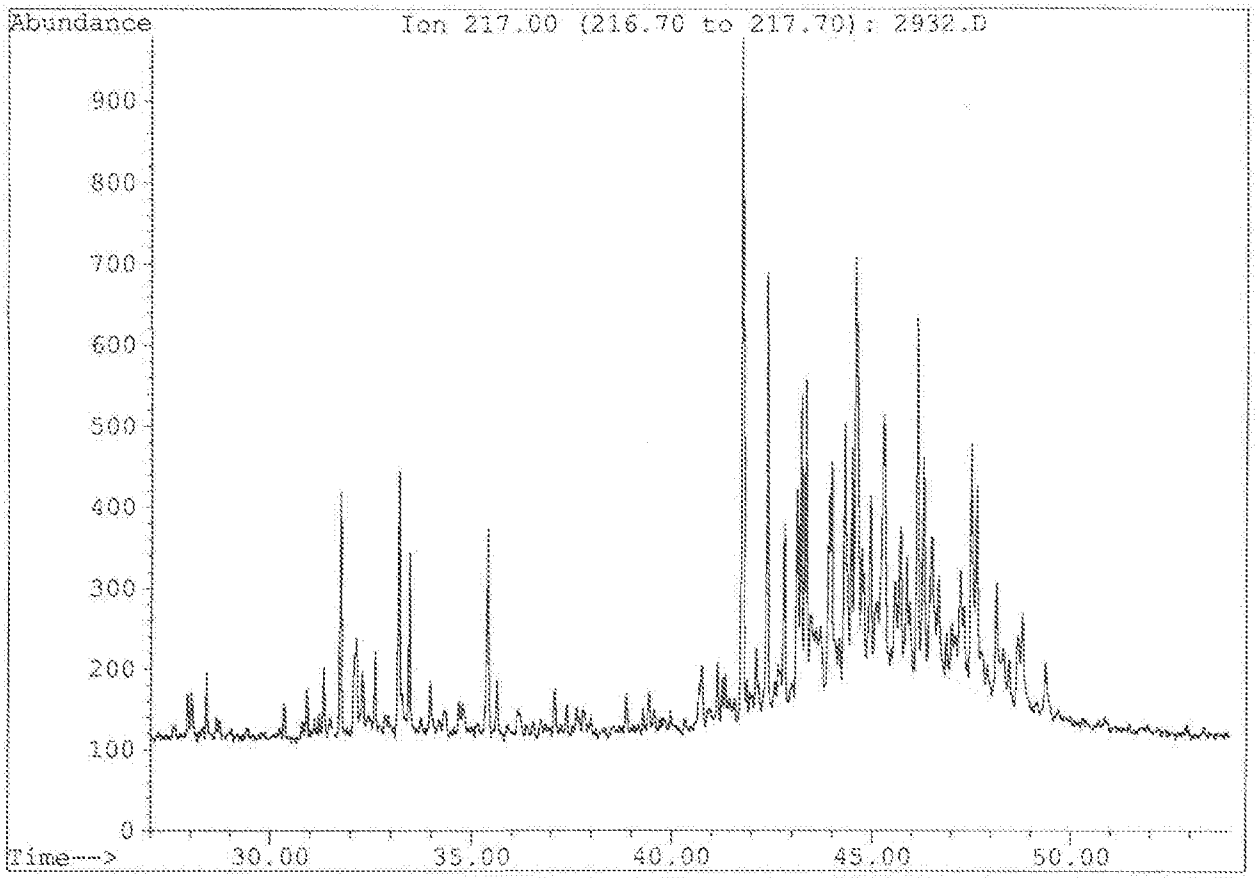

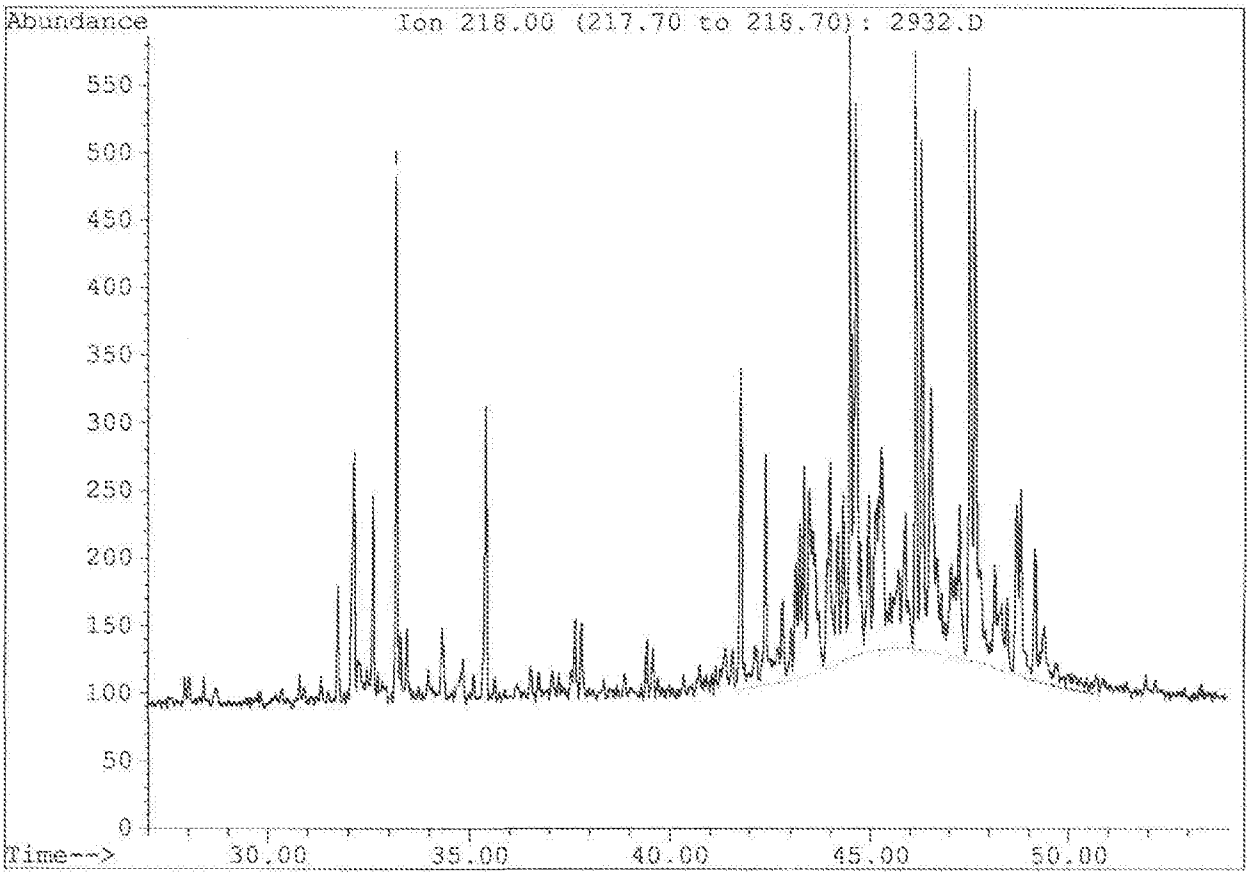

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Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
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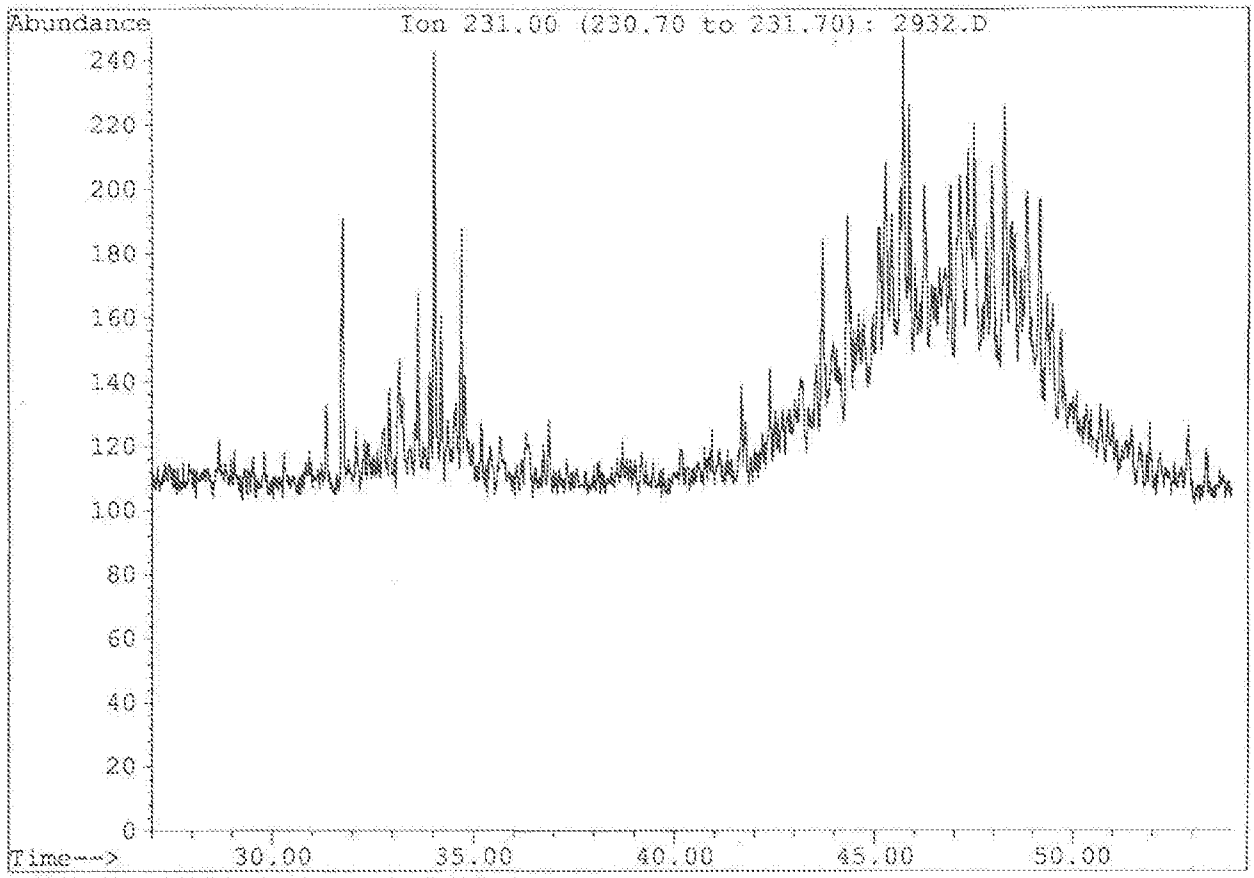

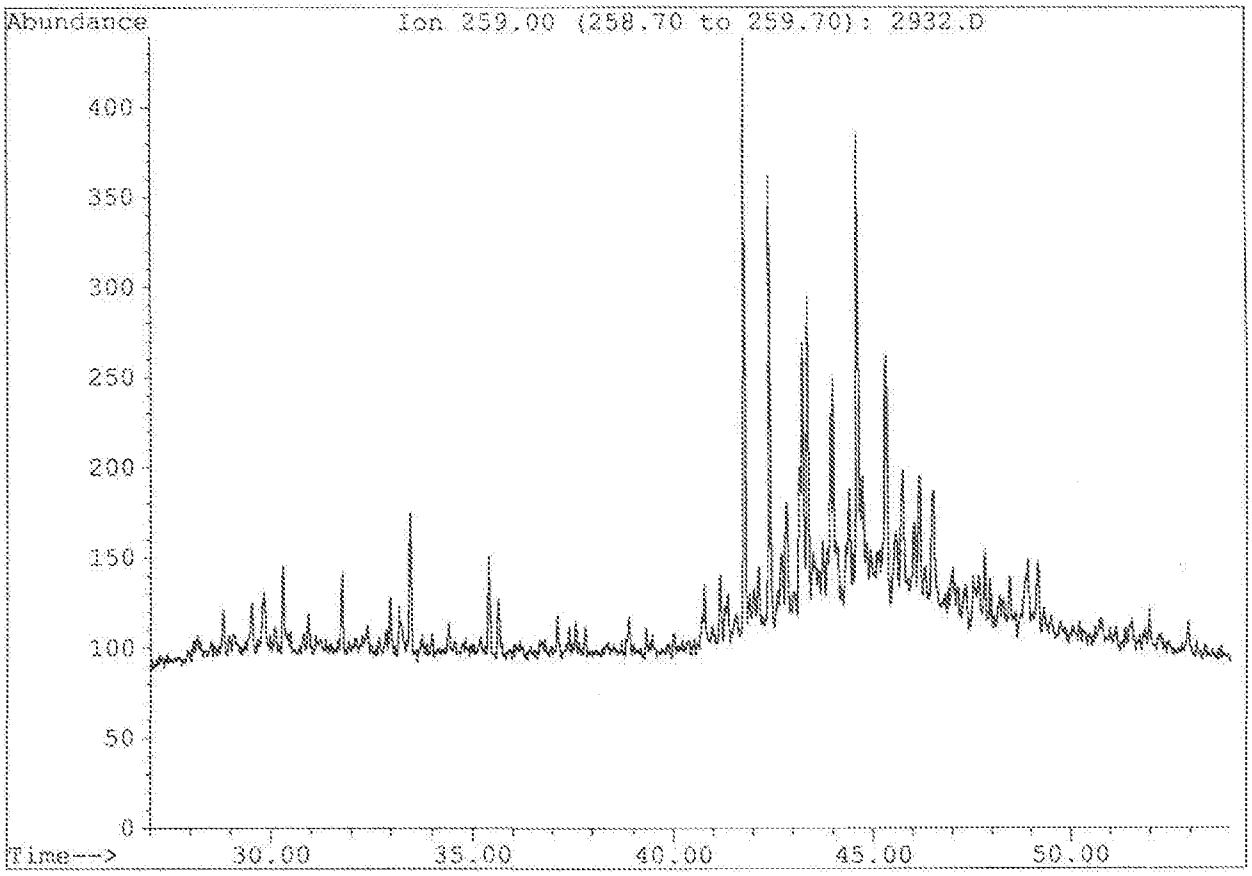

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Misc:

Method: MSDS.M
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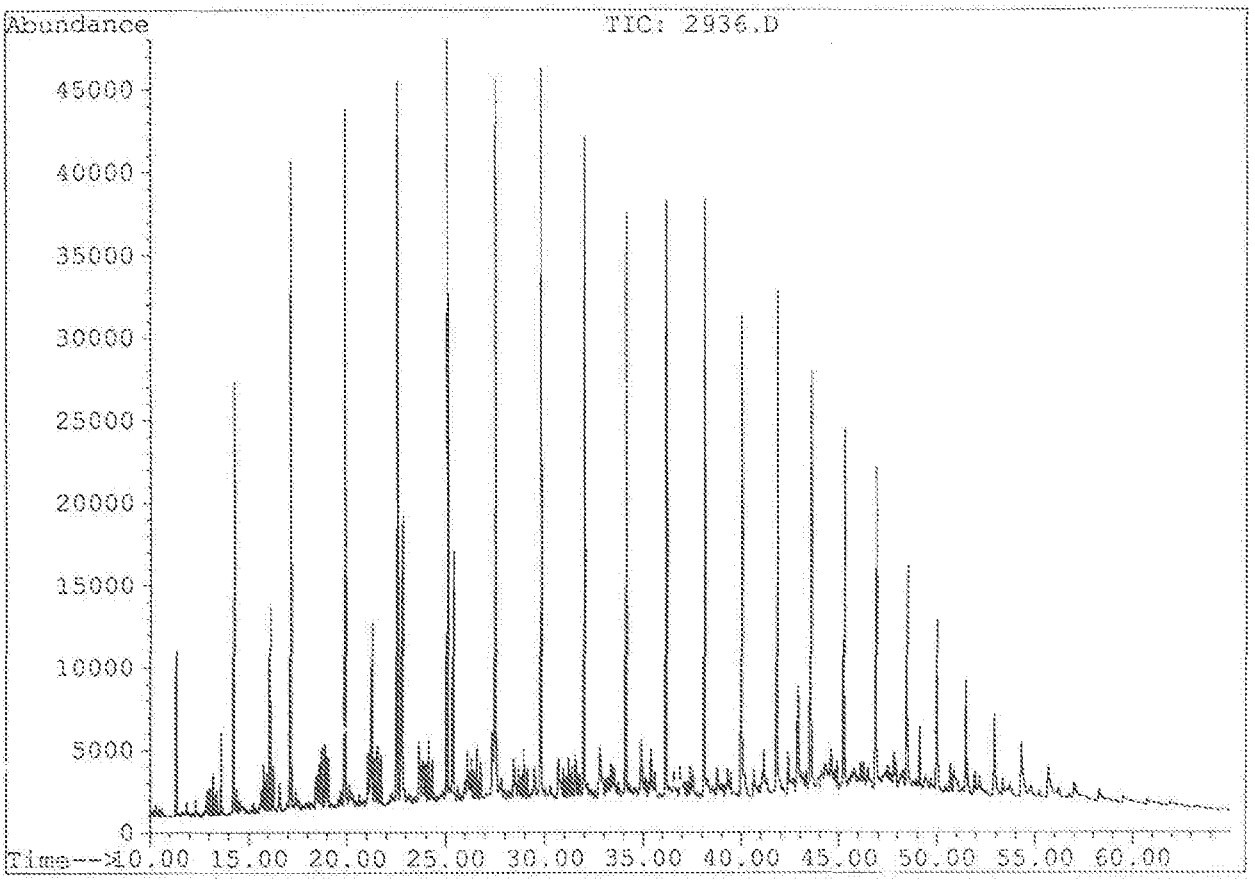
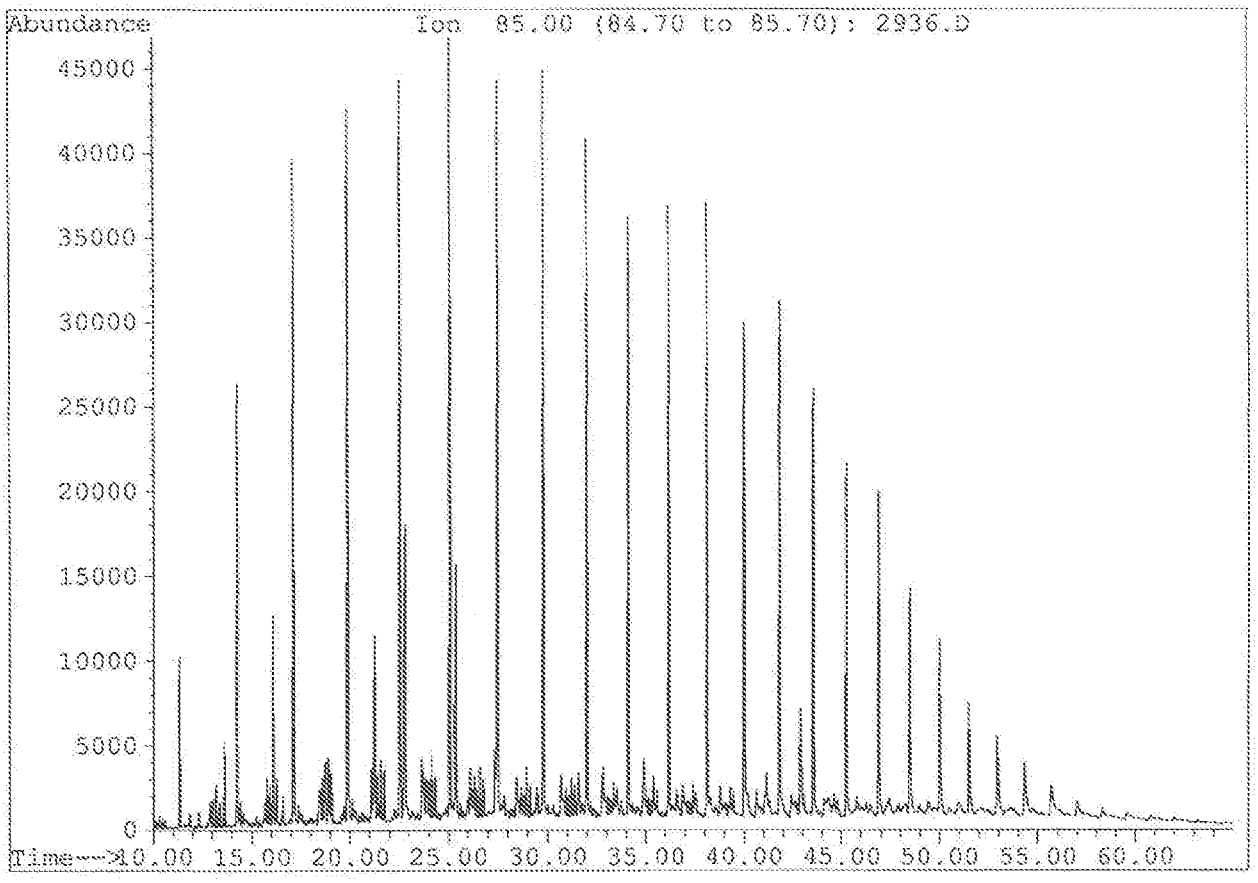
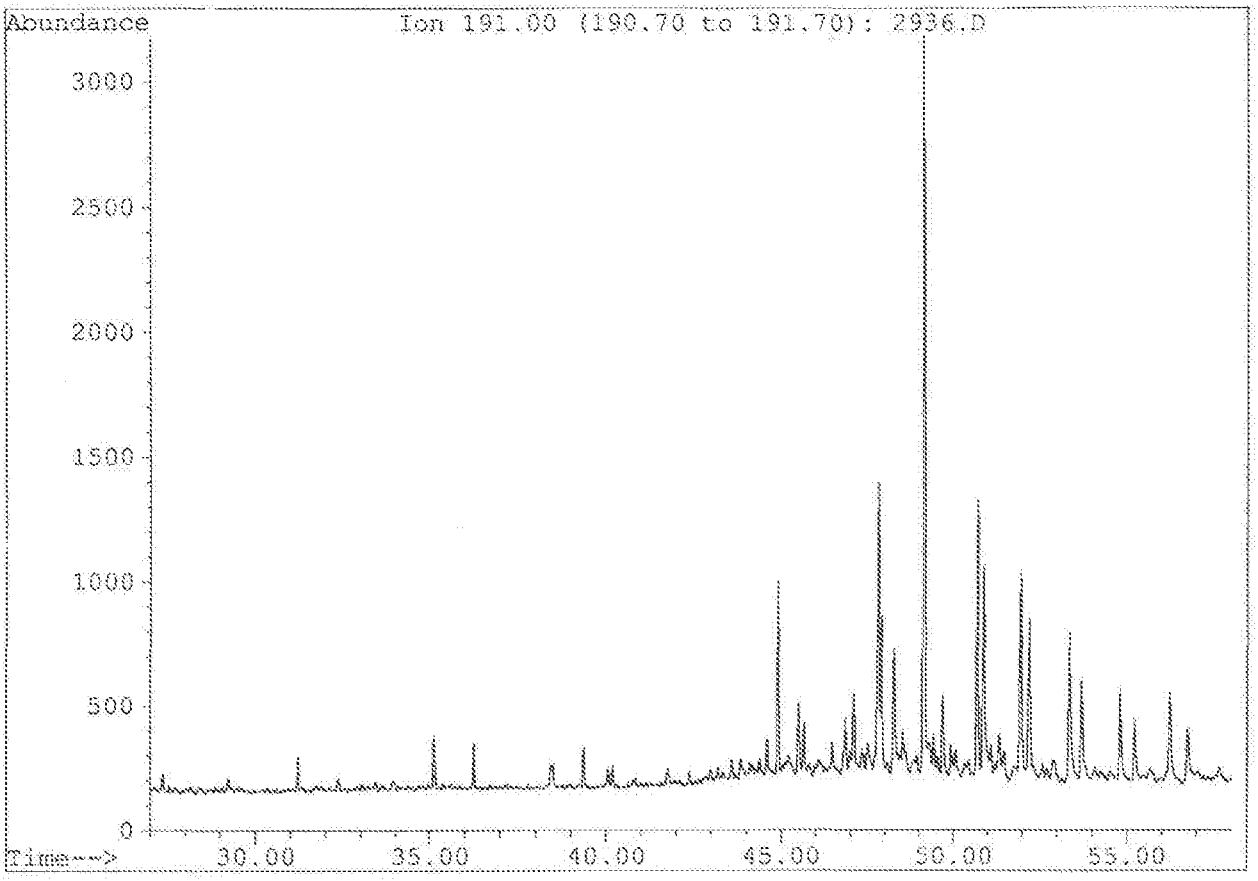
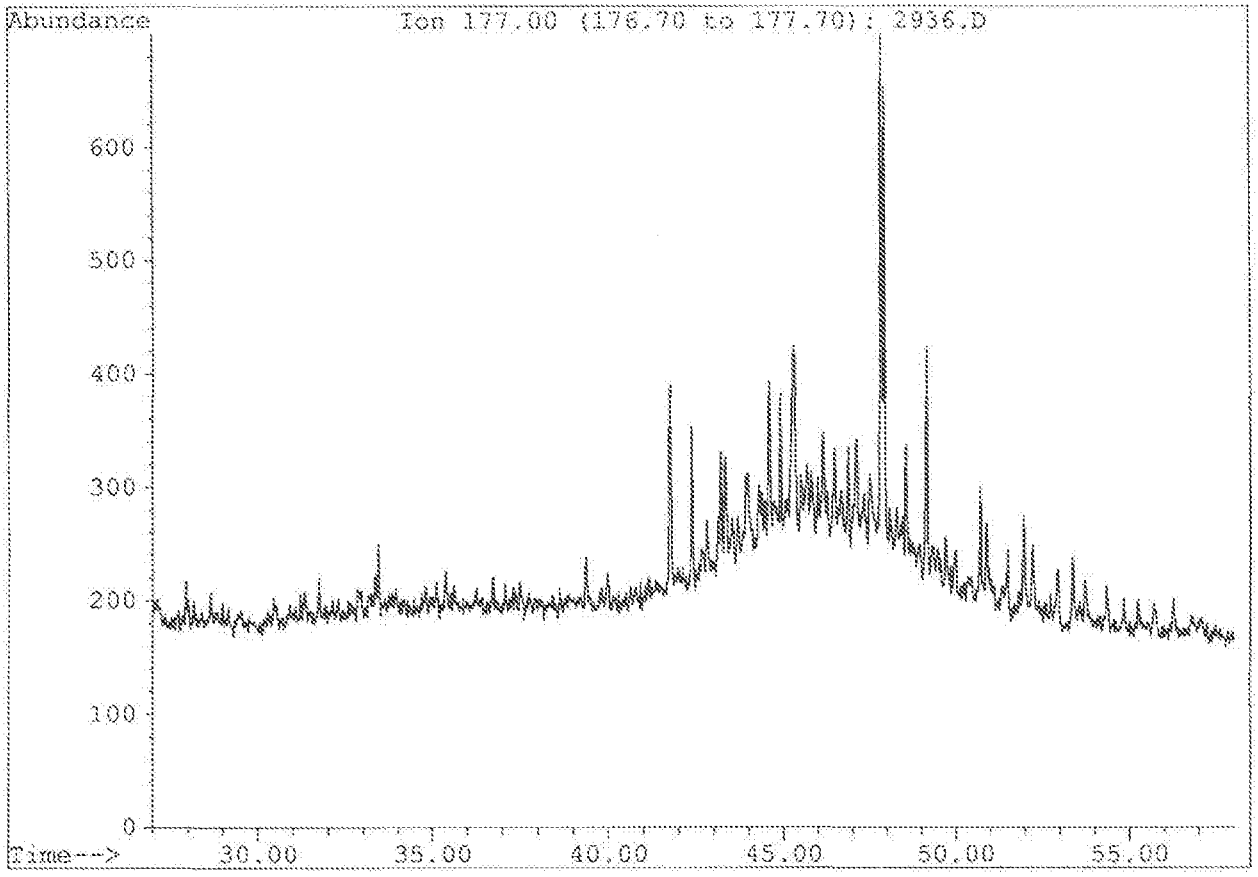




Data File: C:\HPCHEM\1\DATA\B3408095\2936.D
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B3408095\2936.D
Name: sample 1
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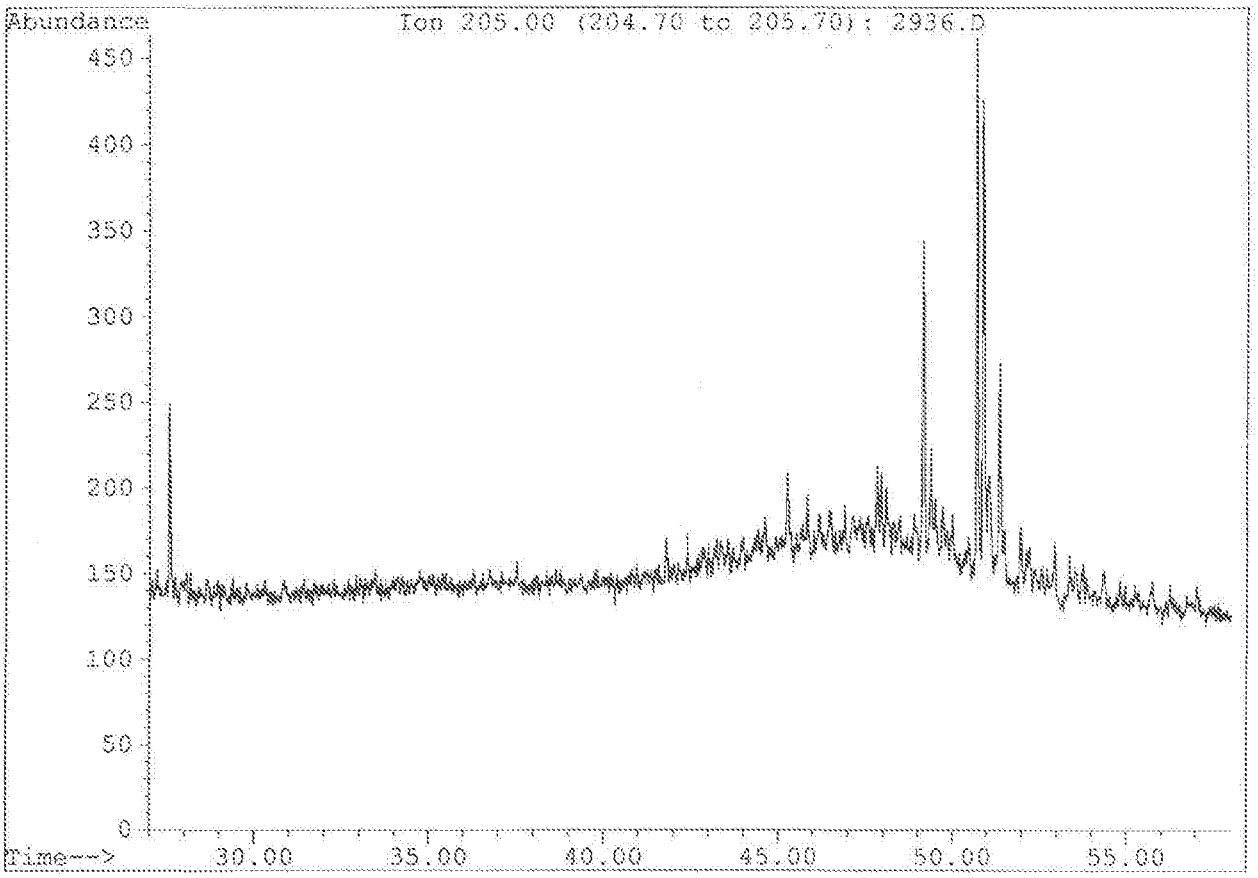
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993



Data File: C:\HPCHEM\1\DATA\B340809S\2936.D
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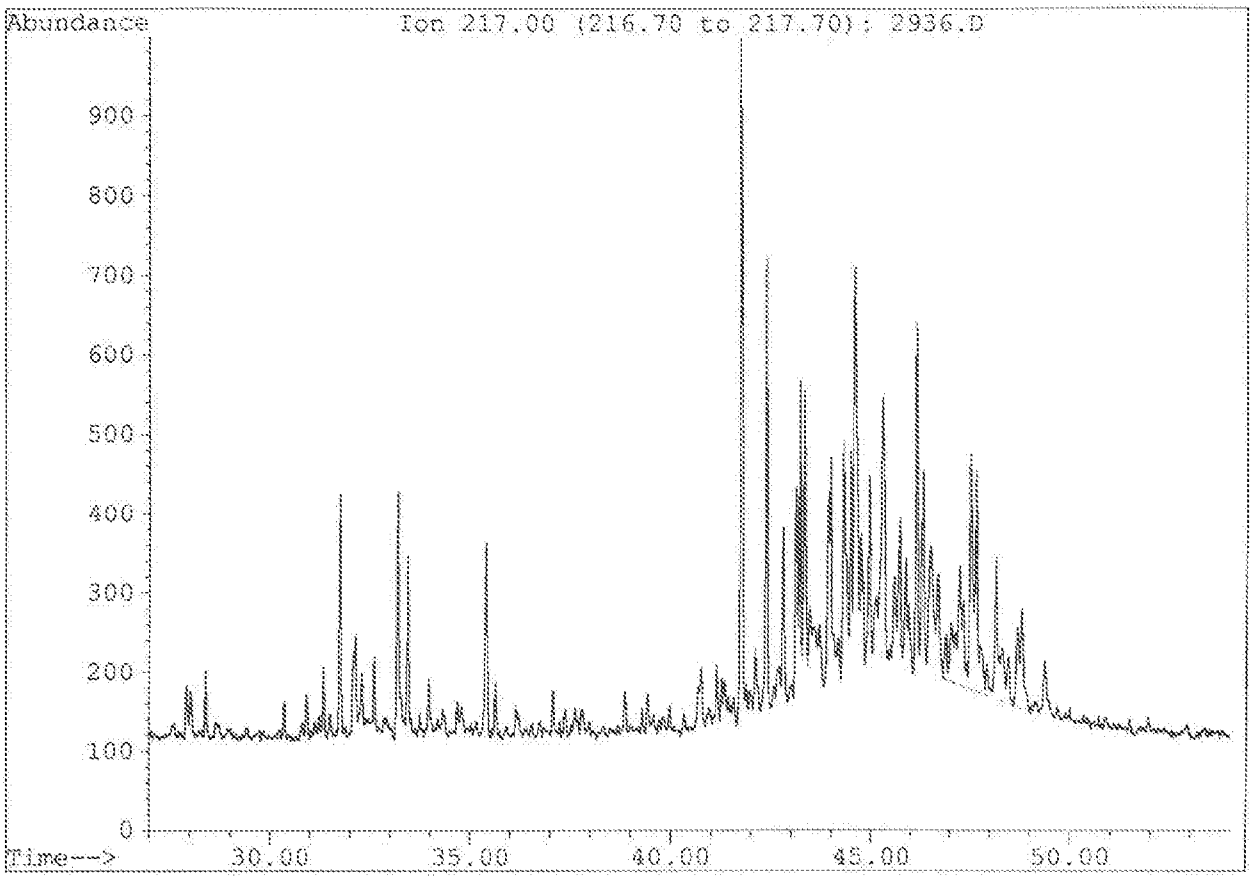
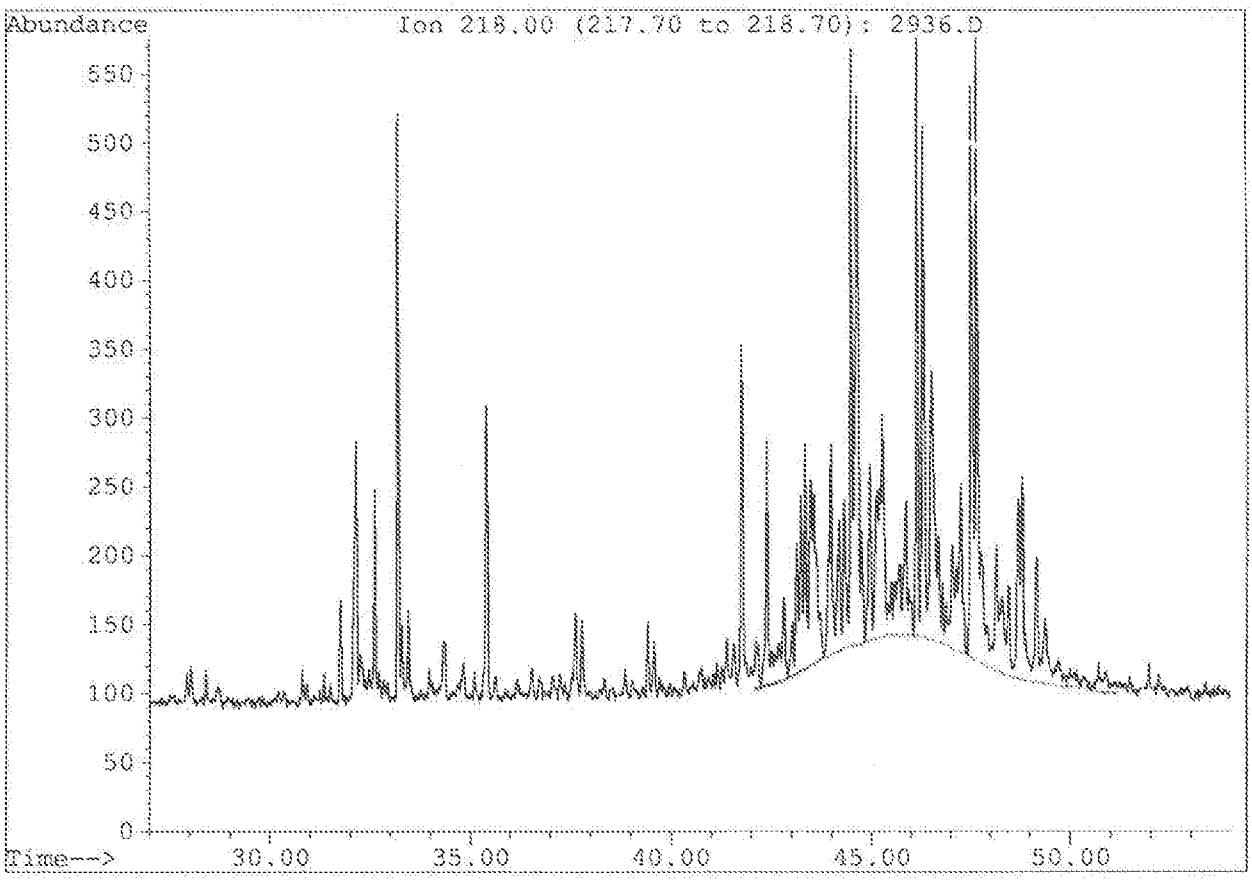
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B3408095\2936.D
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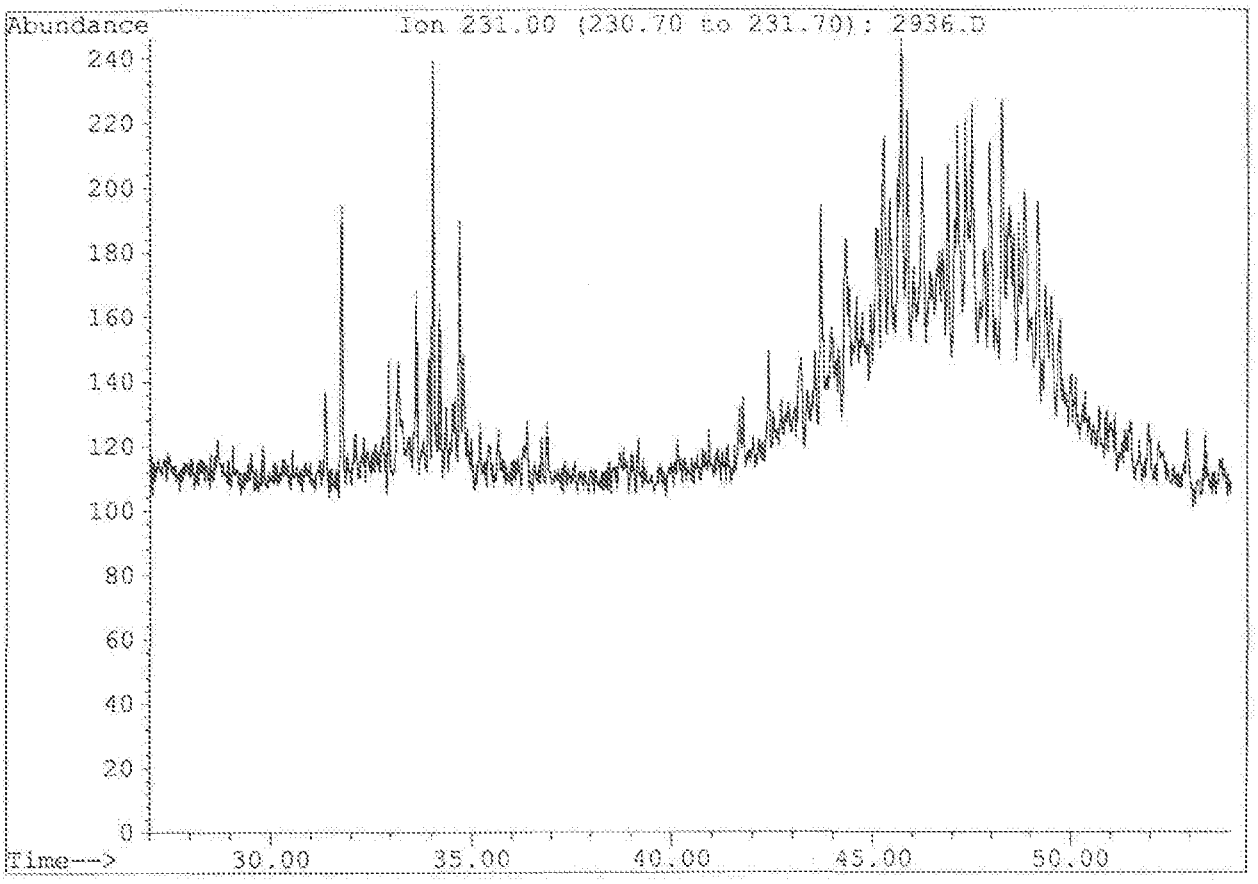
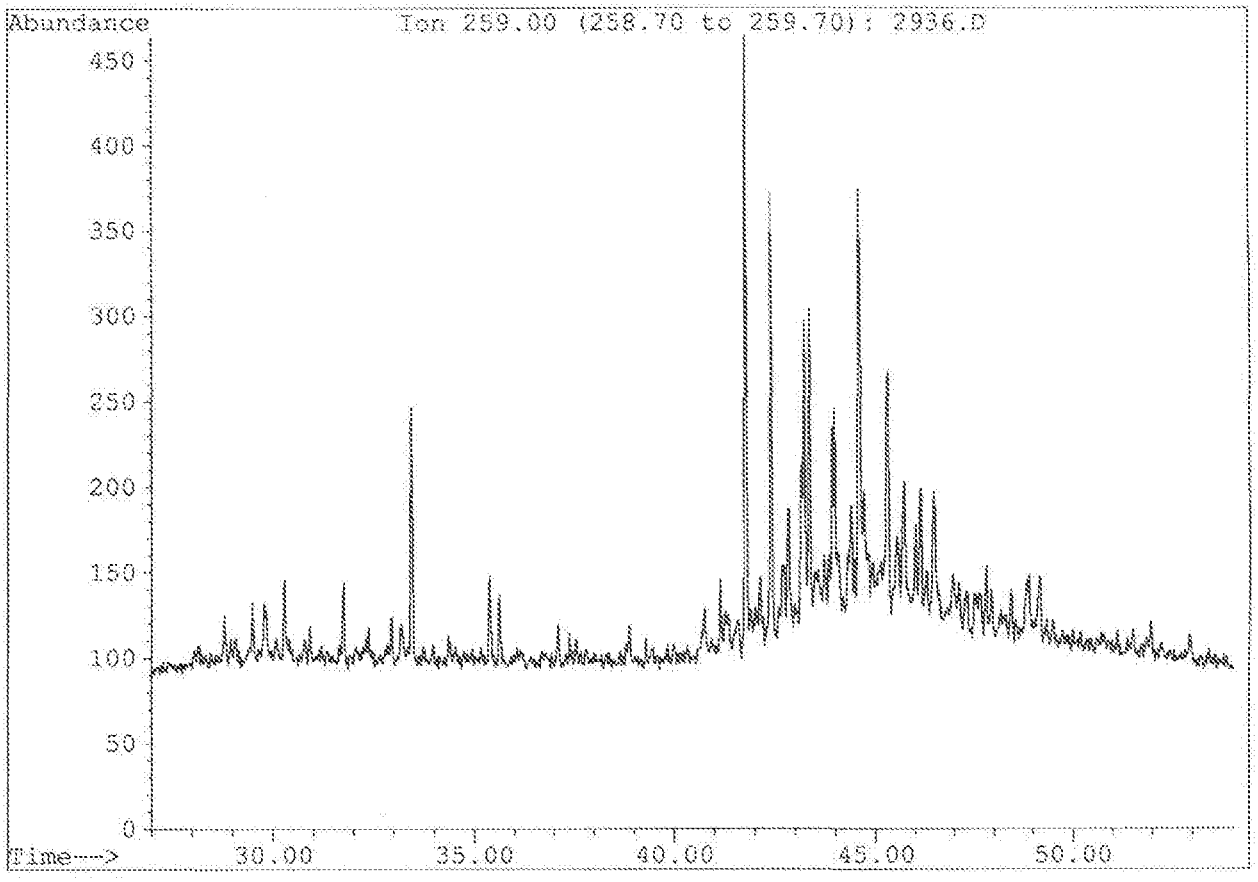
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





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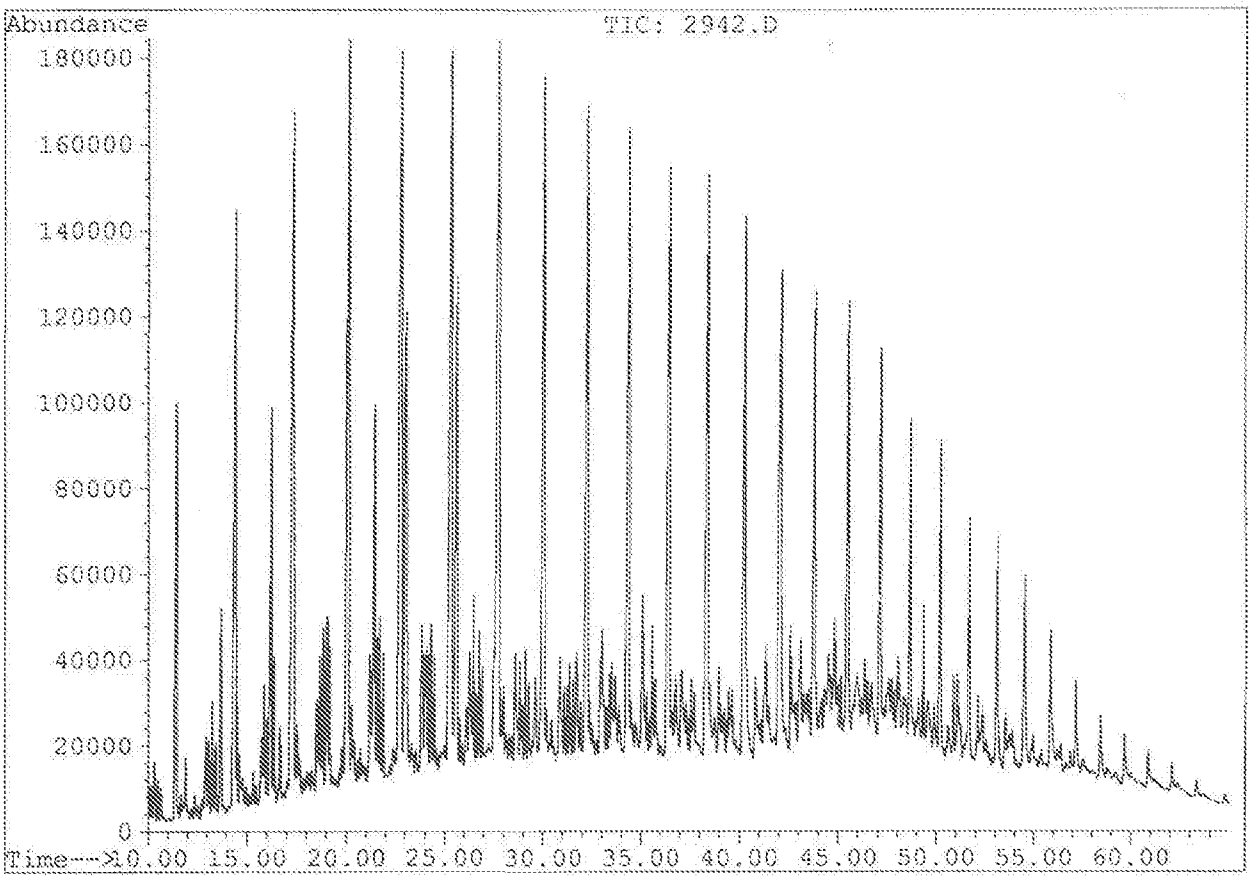
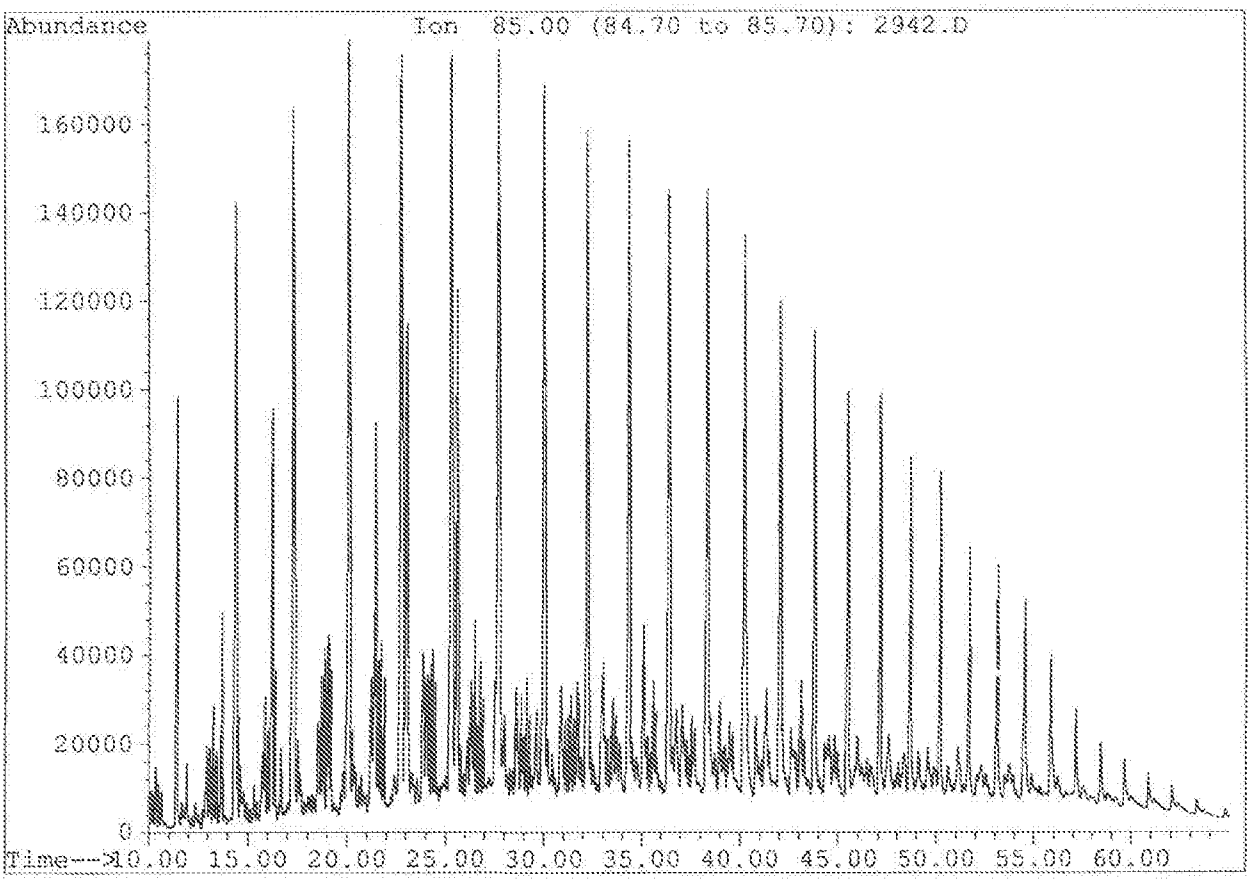
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B3408095\2942.D
Name: sample 1
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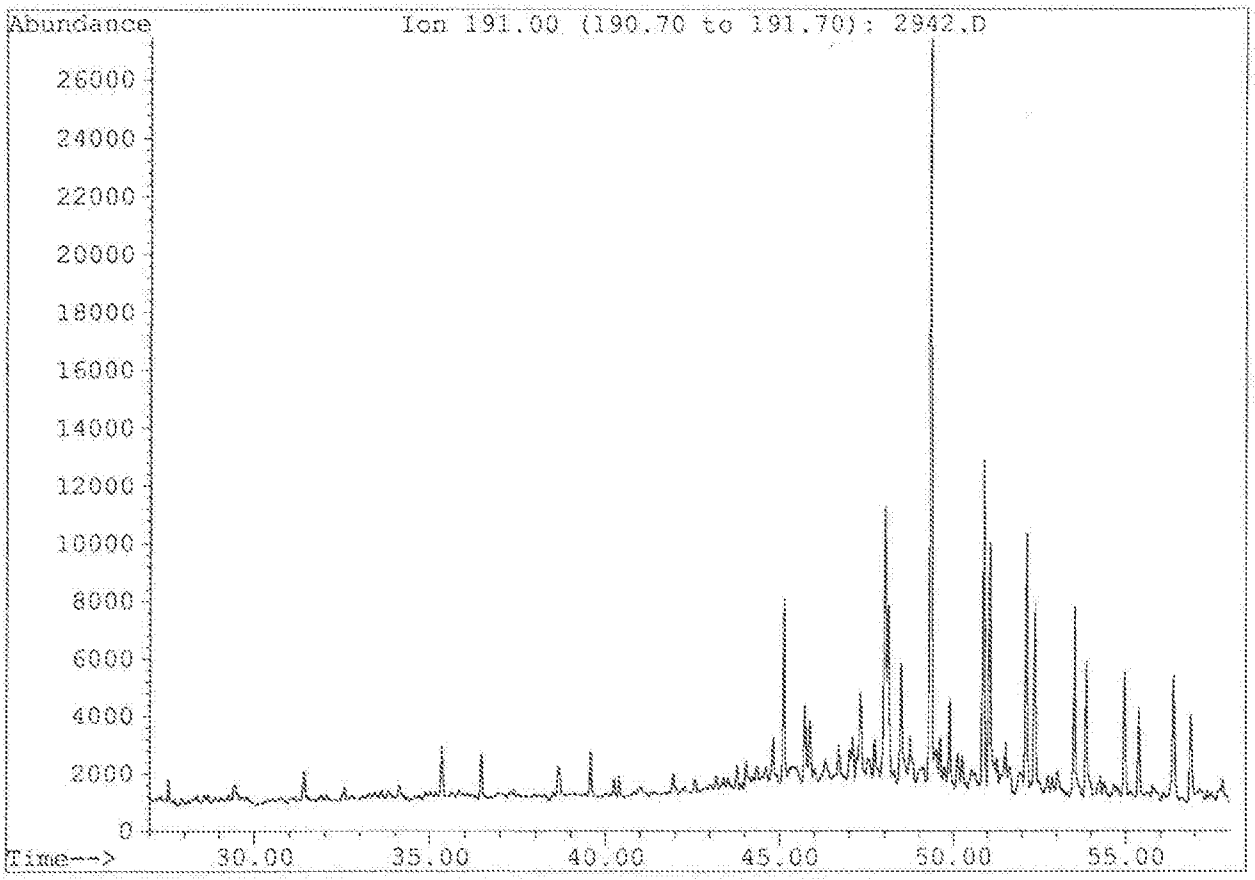
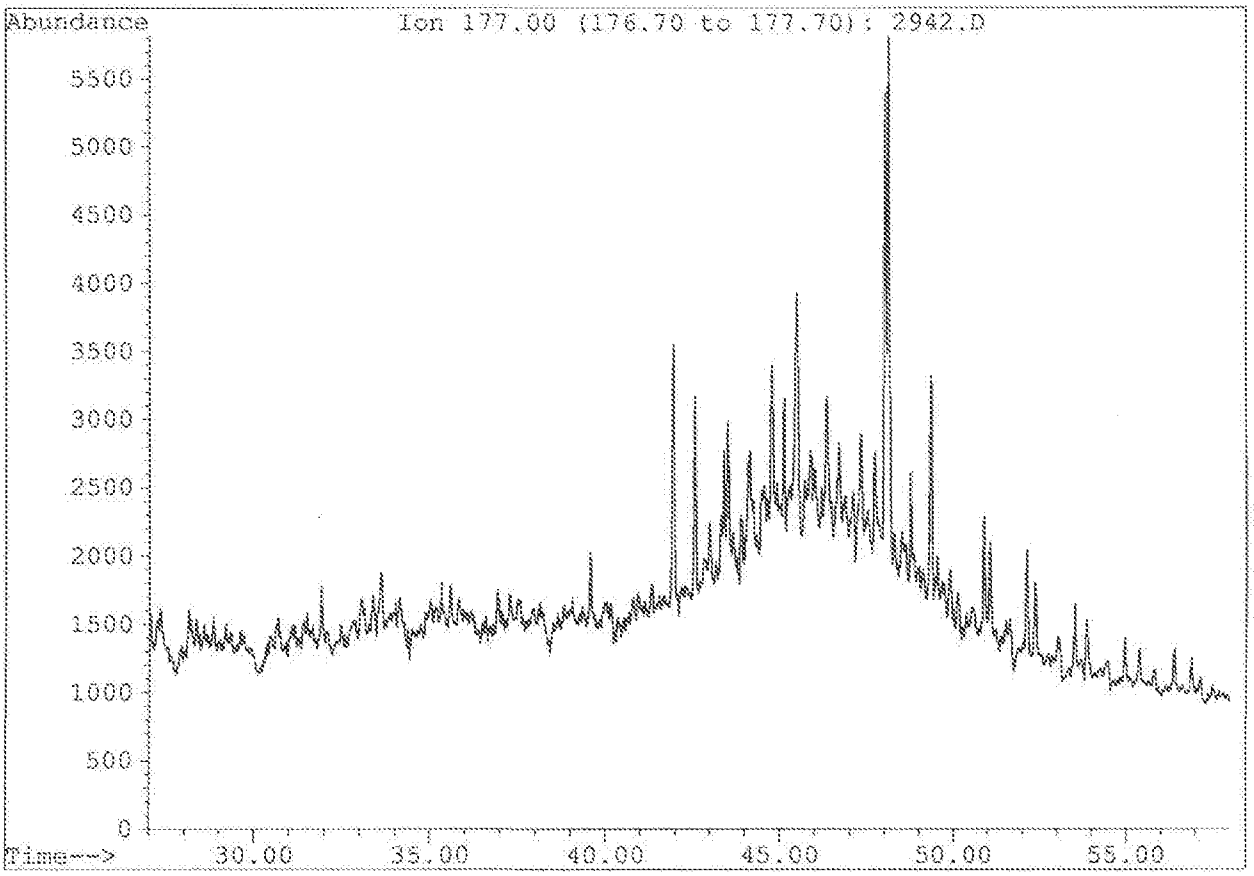
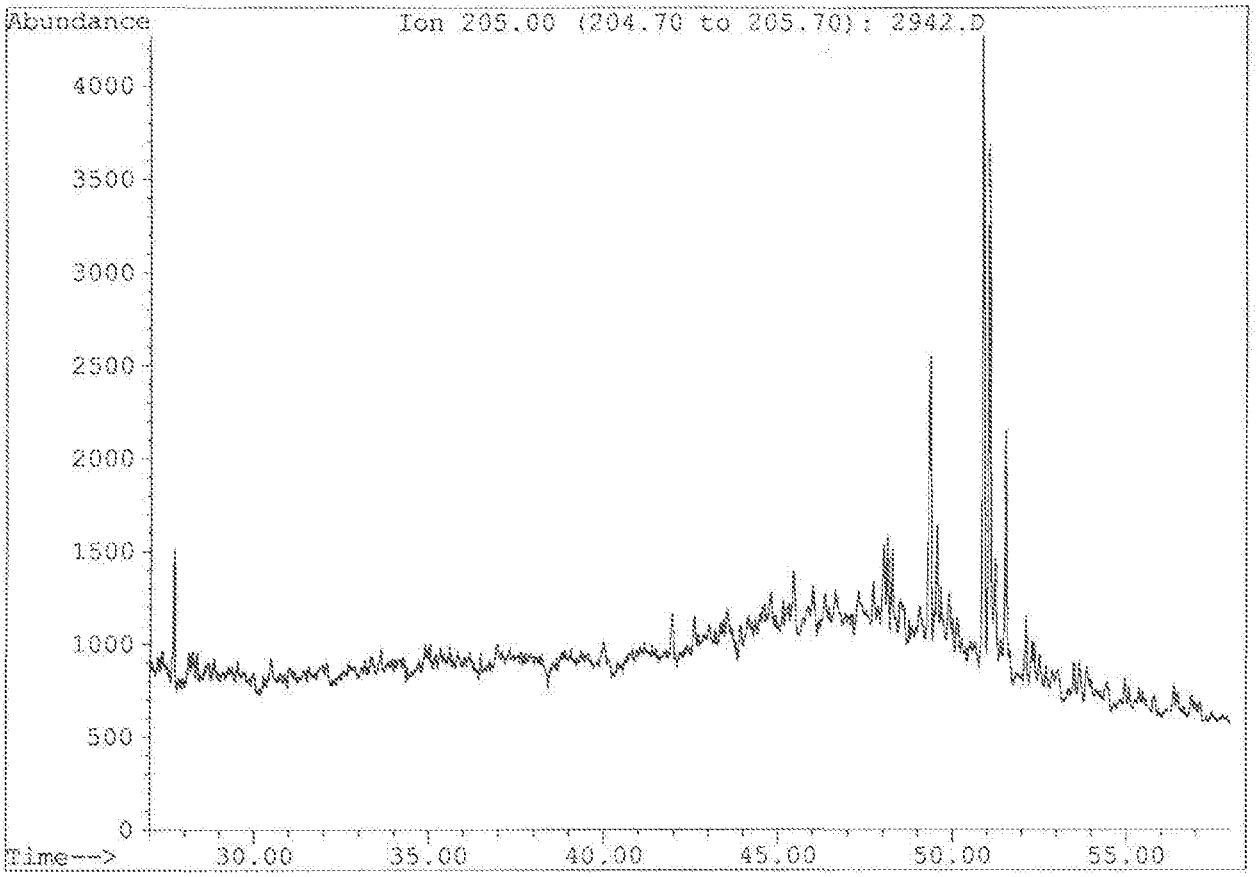
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B340809S\2942.D
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993



Data File: C:\HPCHEM\1\DATA\B3408095\2942.D
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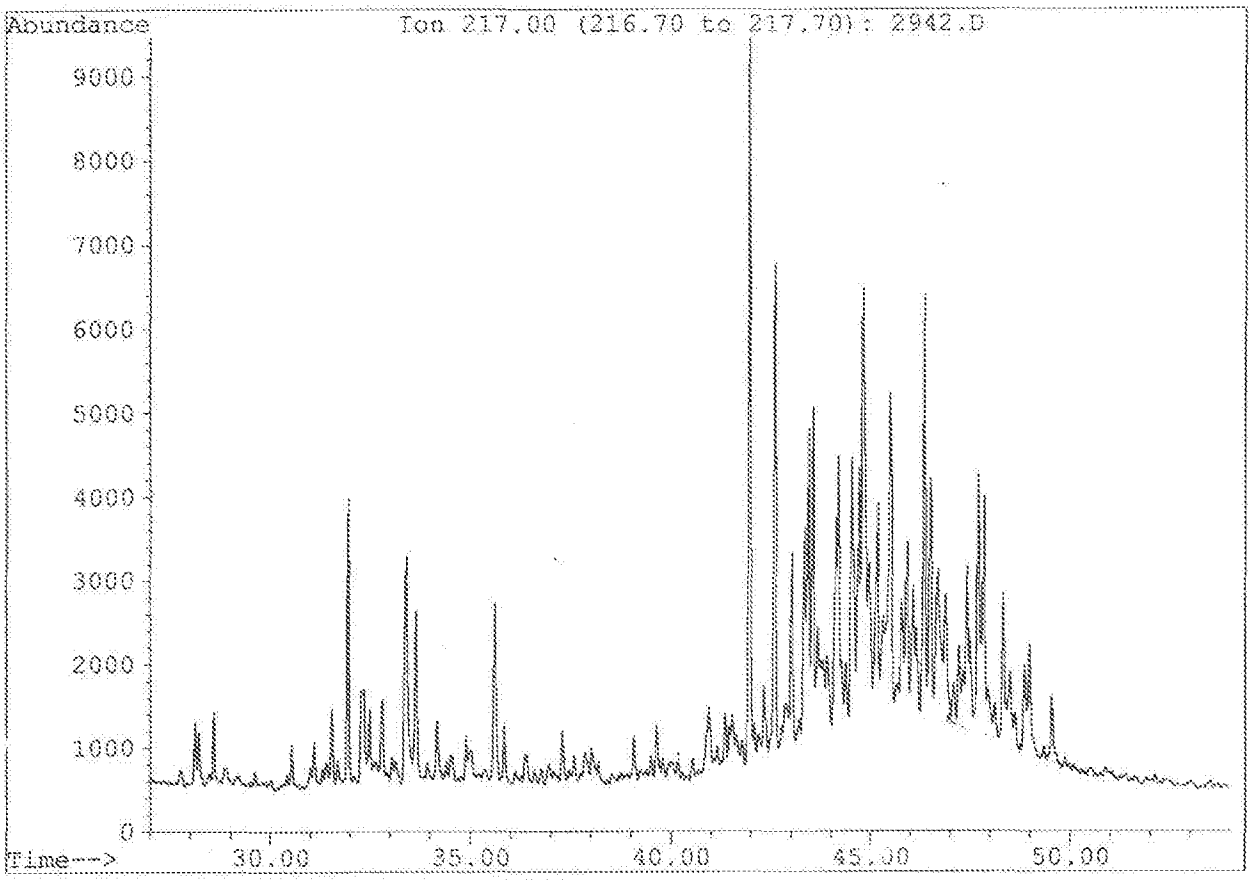
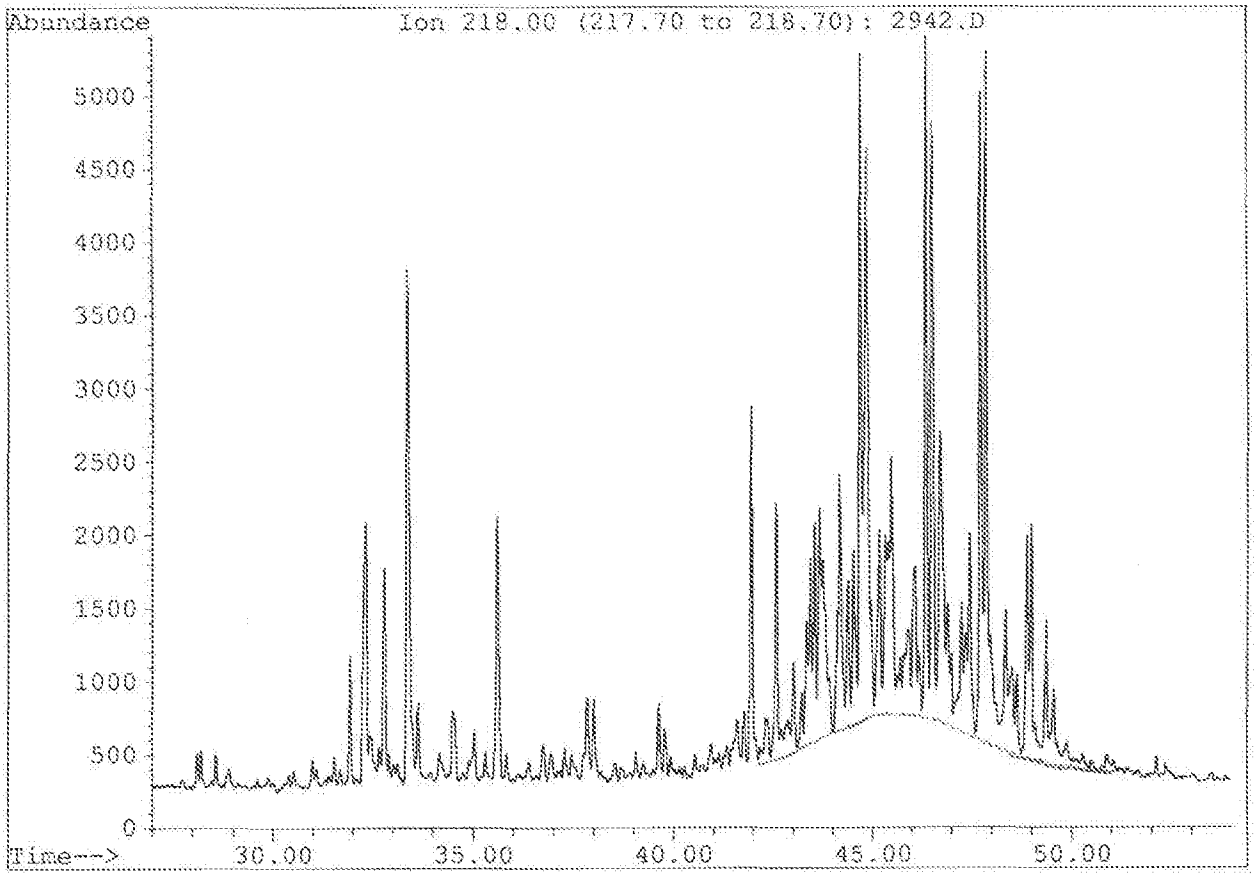
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B340809S\2942.D
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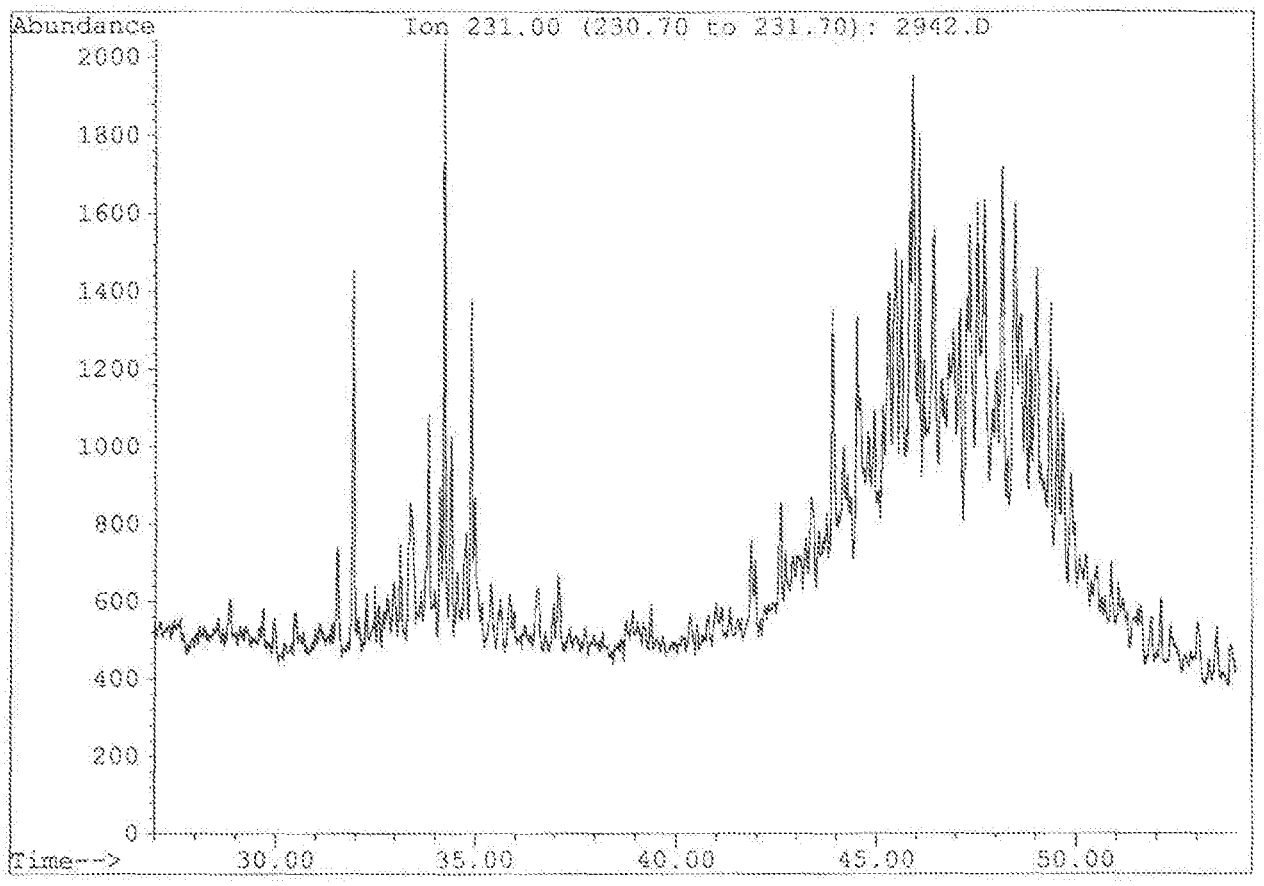
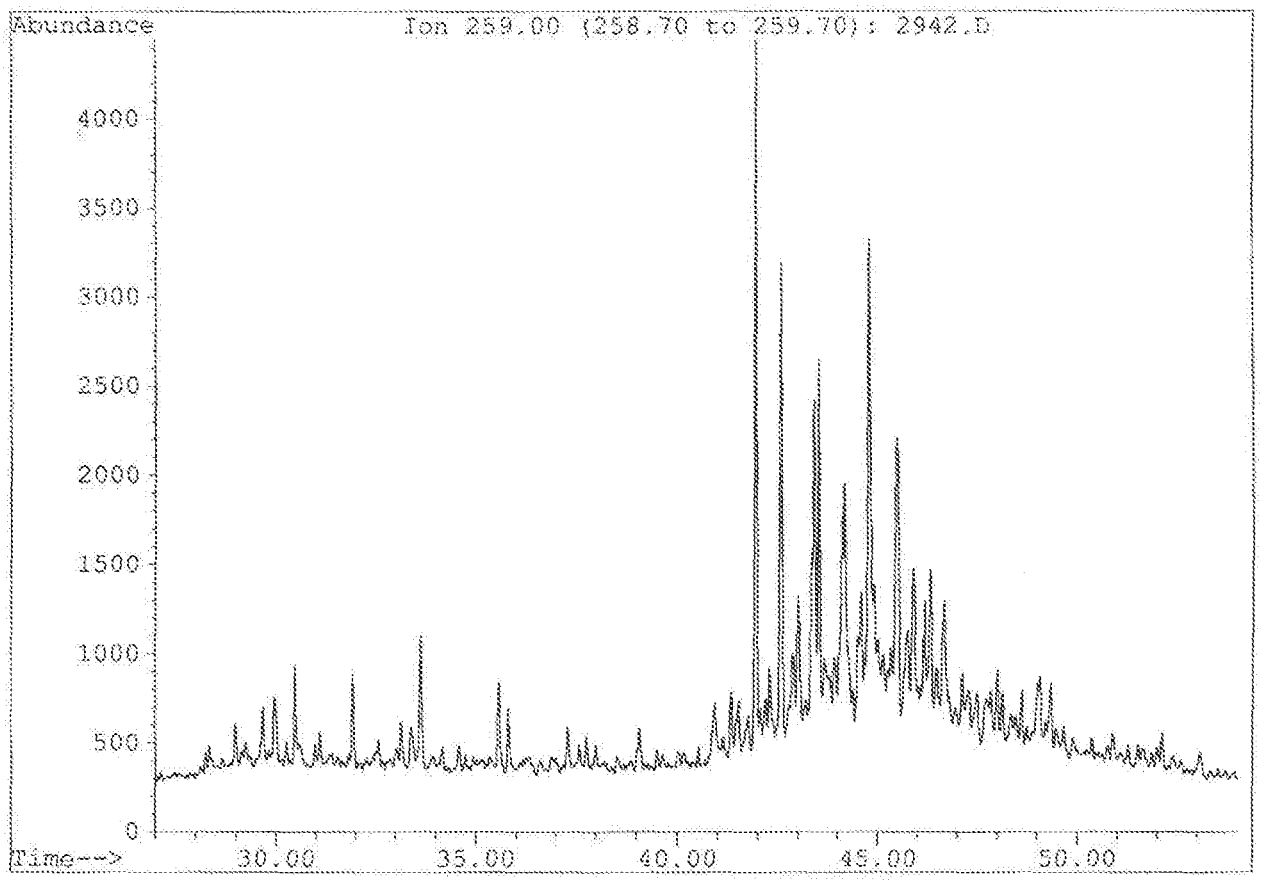
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B3408099\2945.D
Name: sample 1
Misc:

Method: MSDS.M
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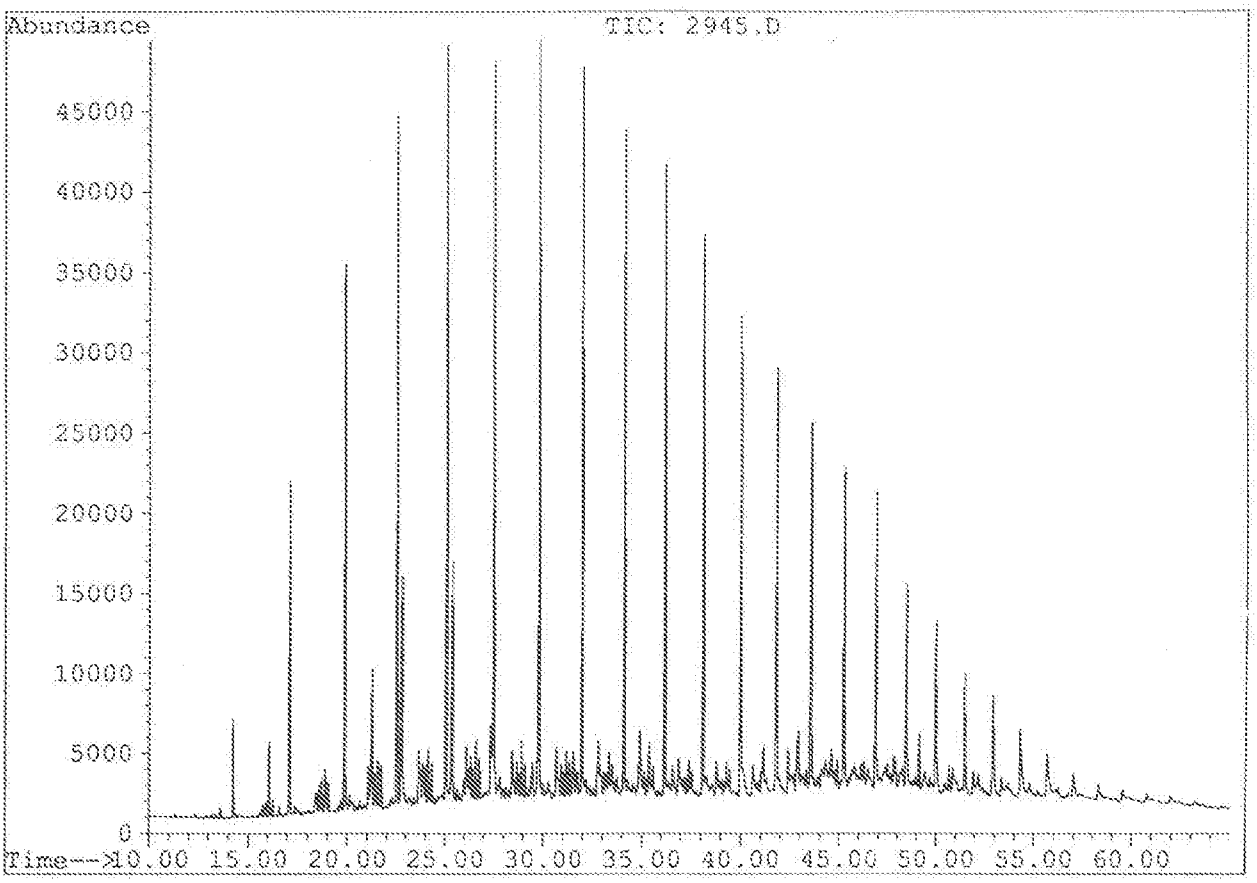
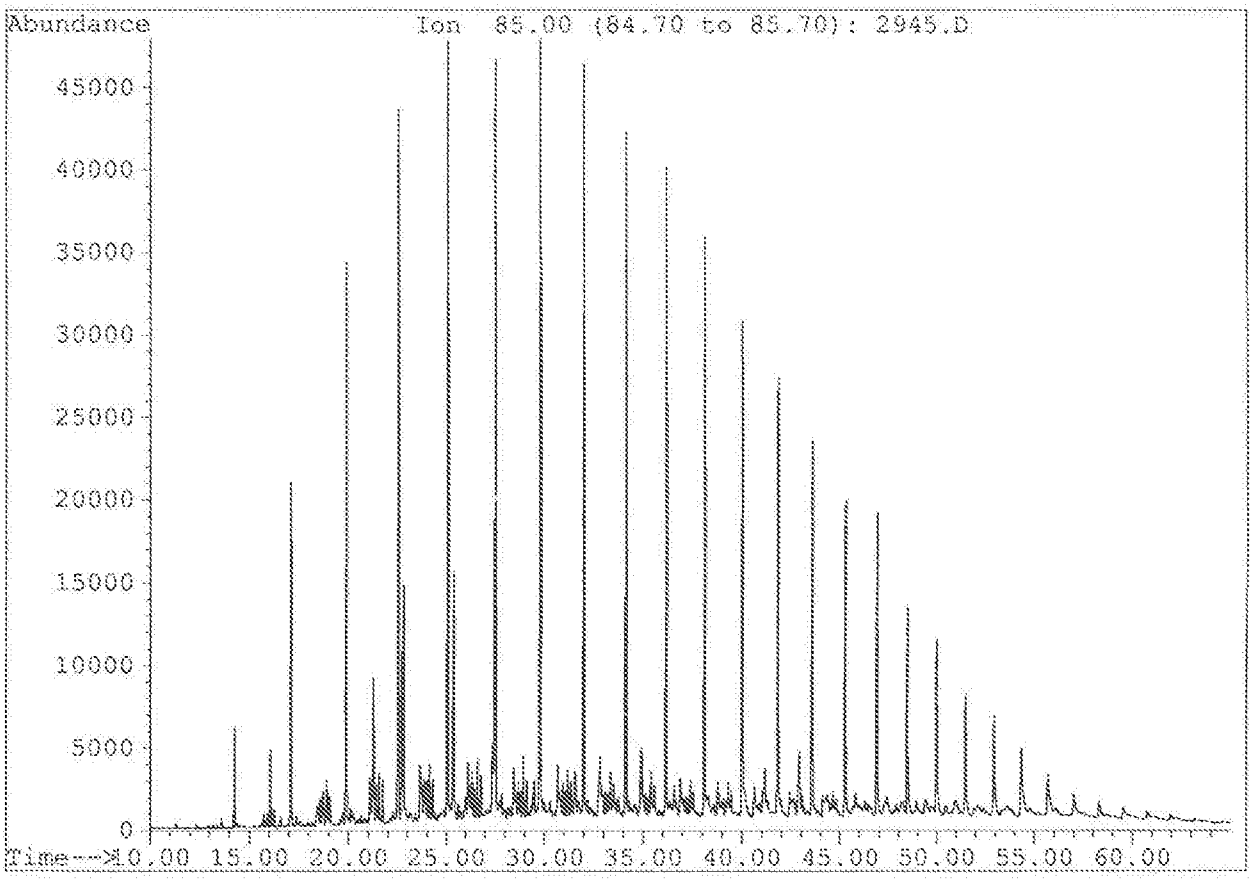
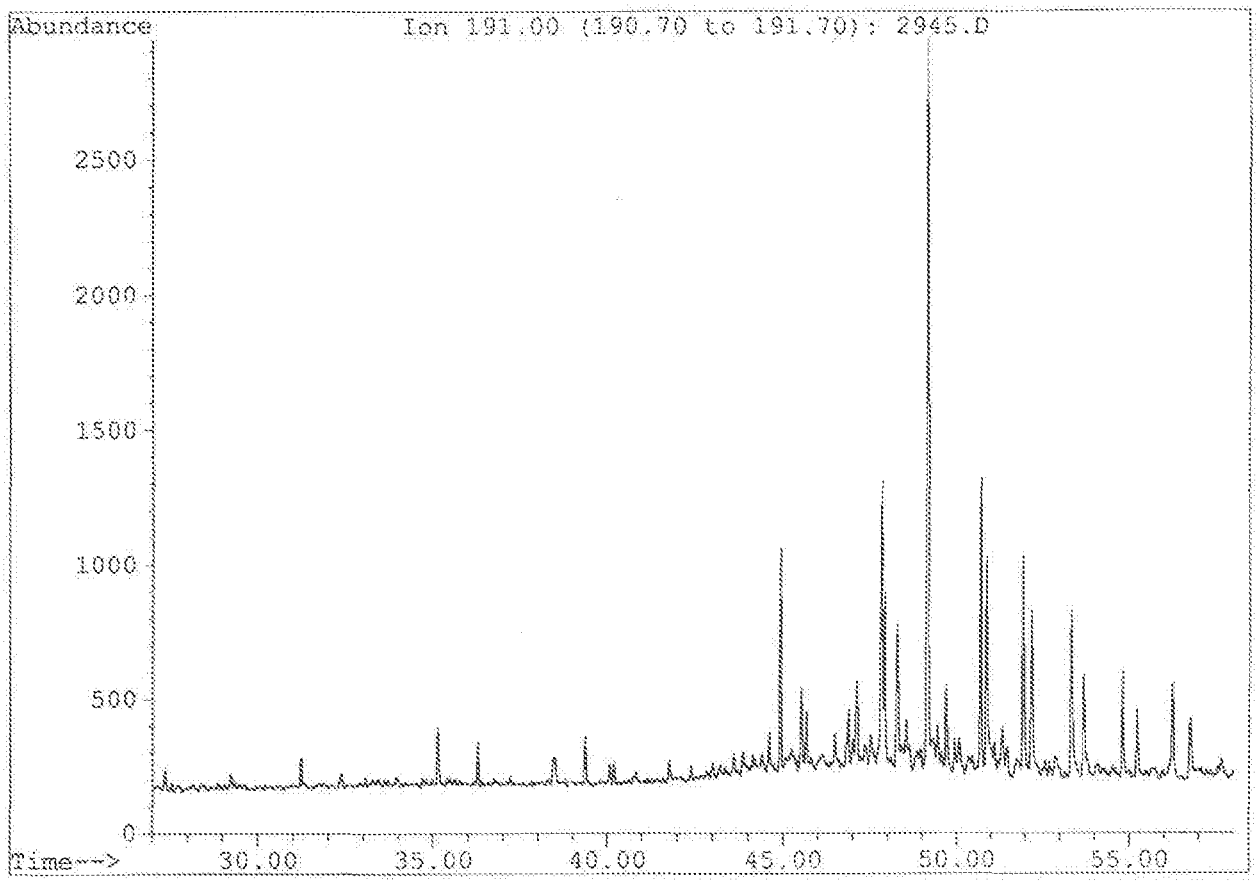
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993

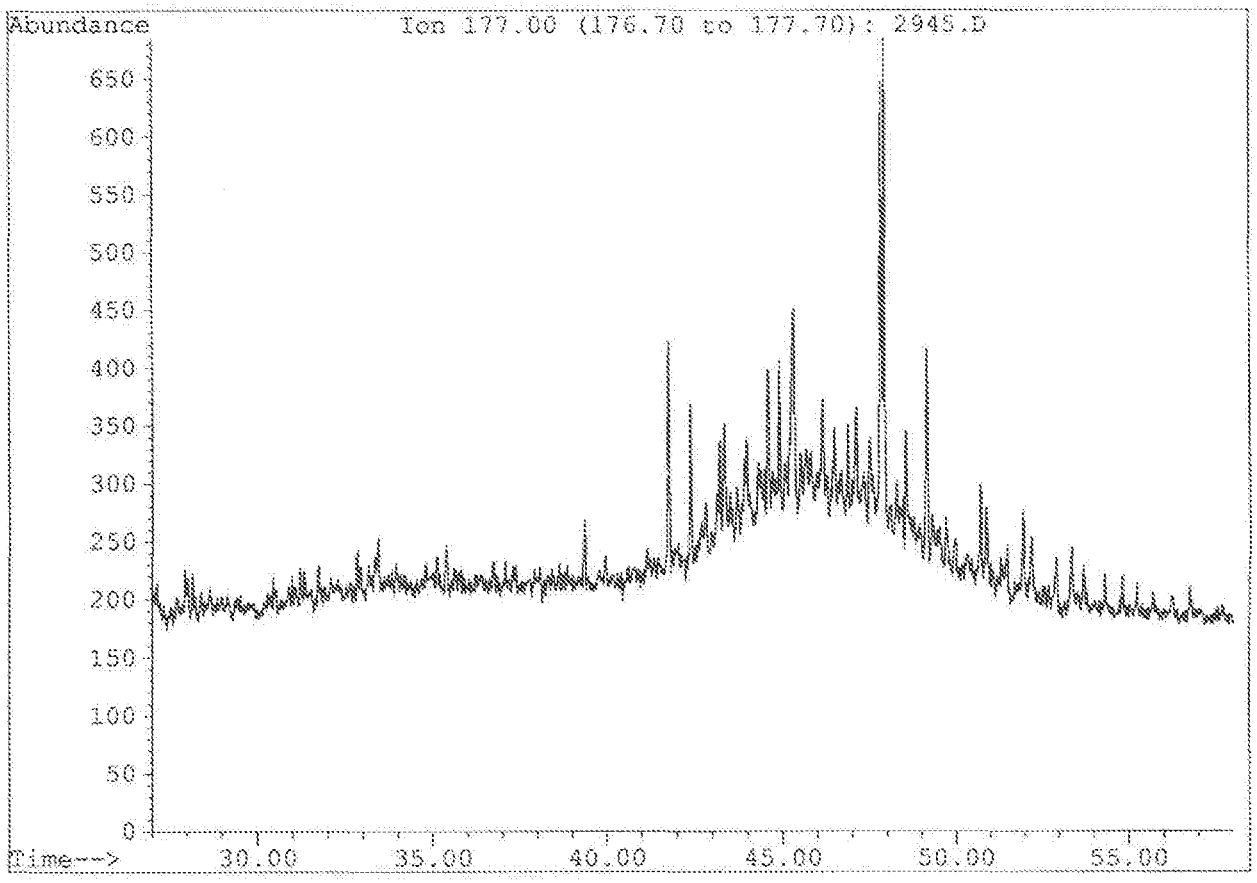




Data File: C:\HPCHEM\1\DATA\B340809S\2945.D
Name: sample 1
Misc:

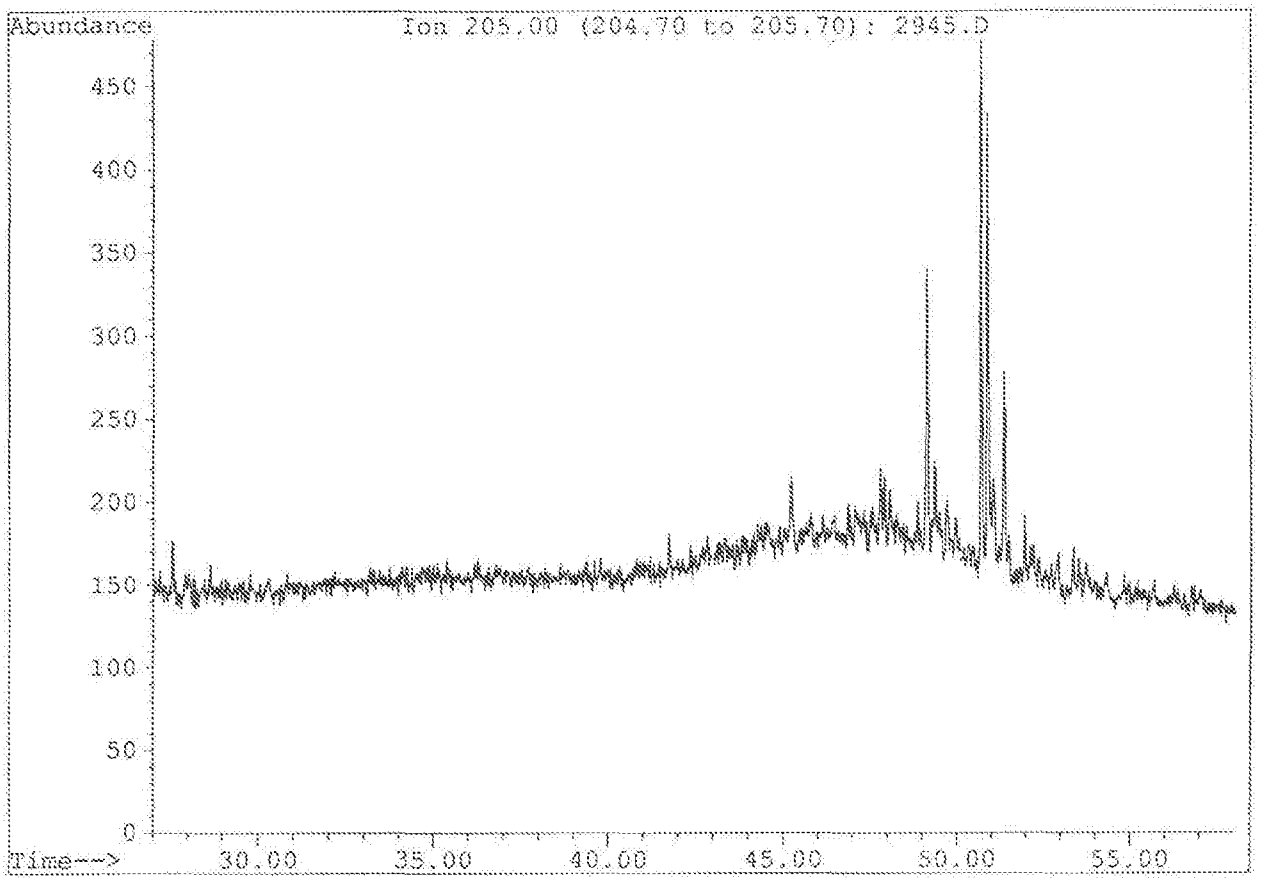
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B340809S\2945.D
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993



Data File: C:\HPCHEM\1\DATA\B340809S\2945.D
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Method: MSDS.M
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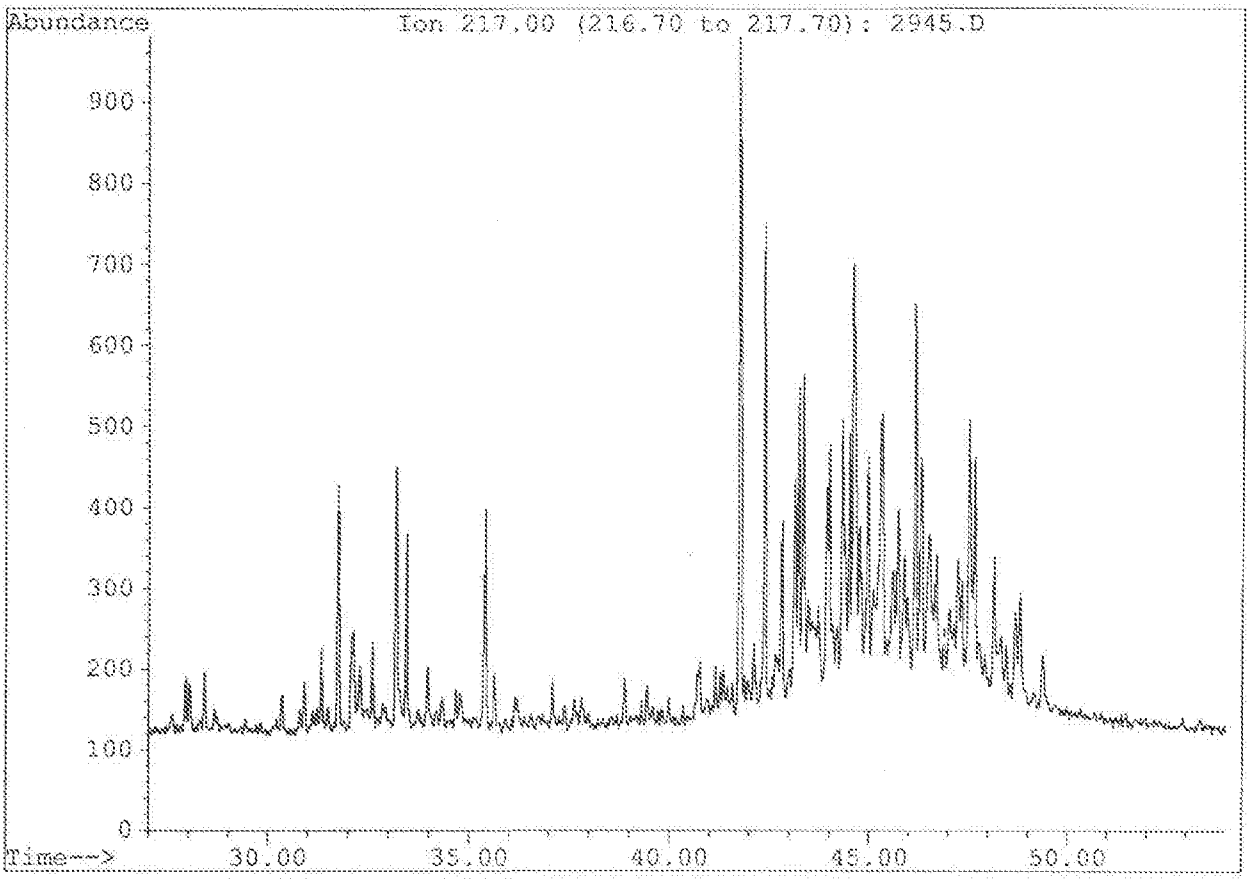
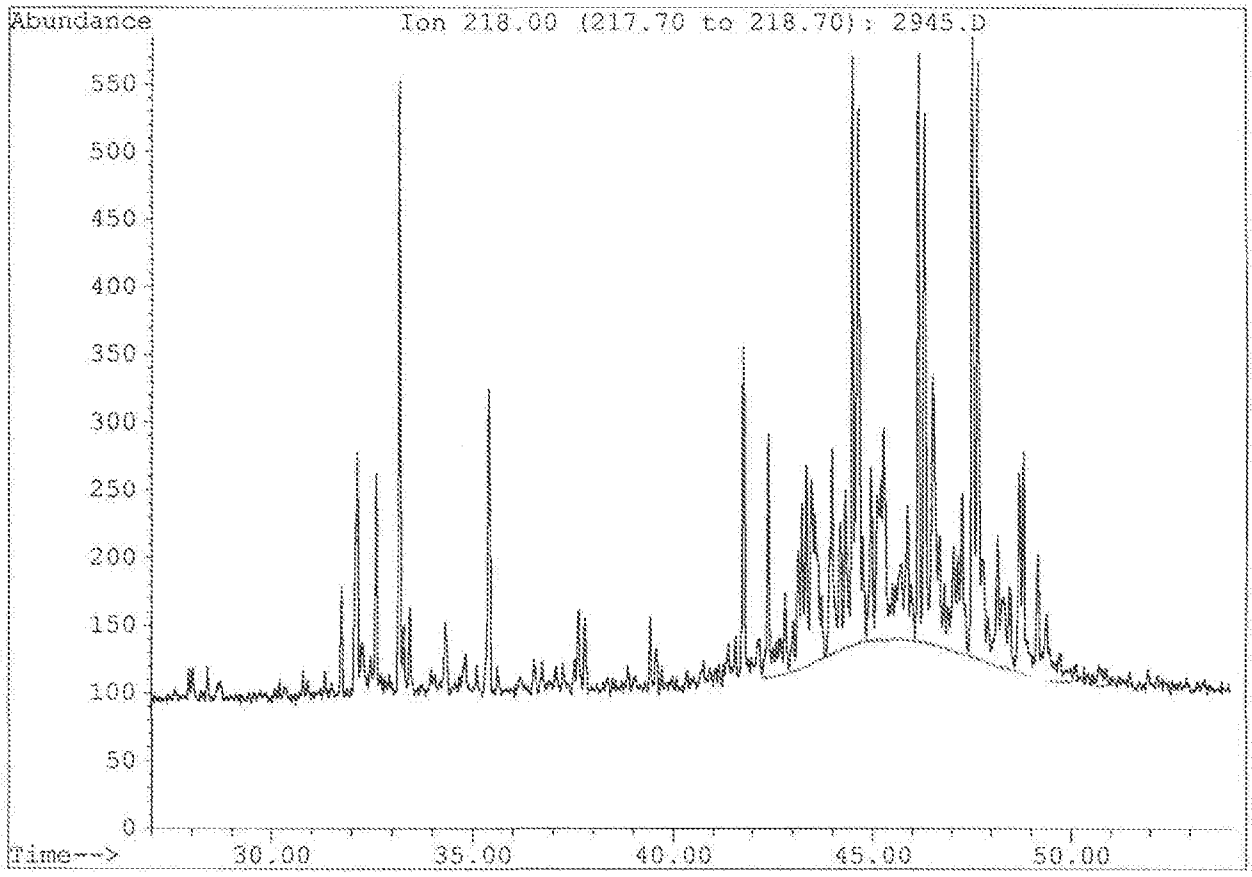
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B3408095\2945.D
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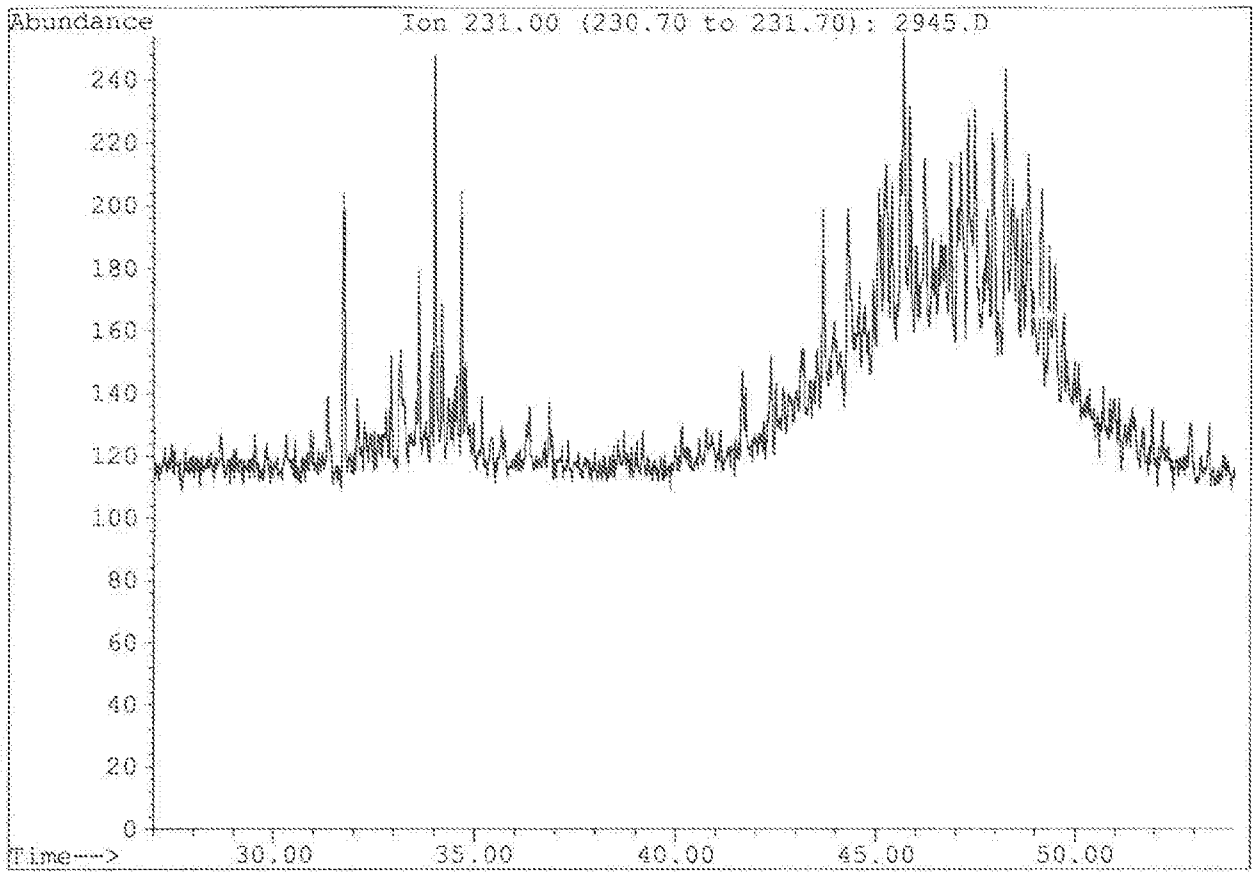
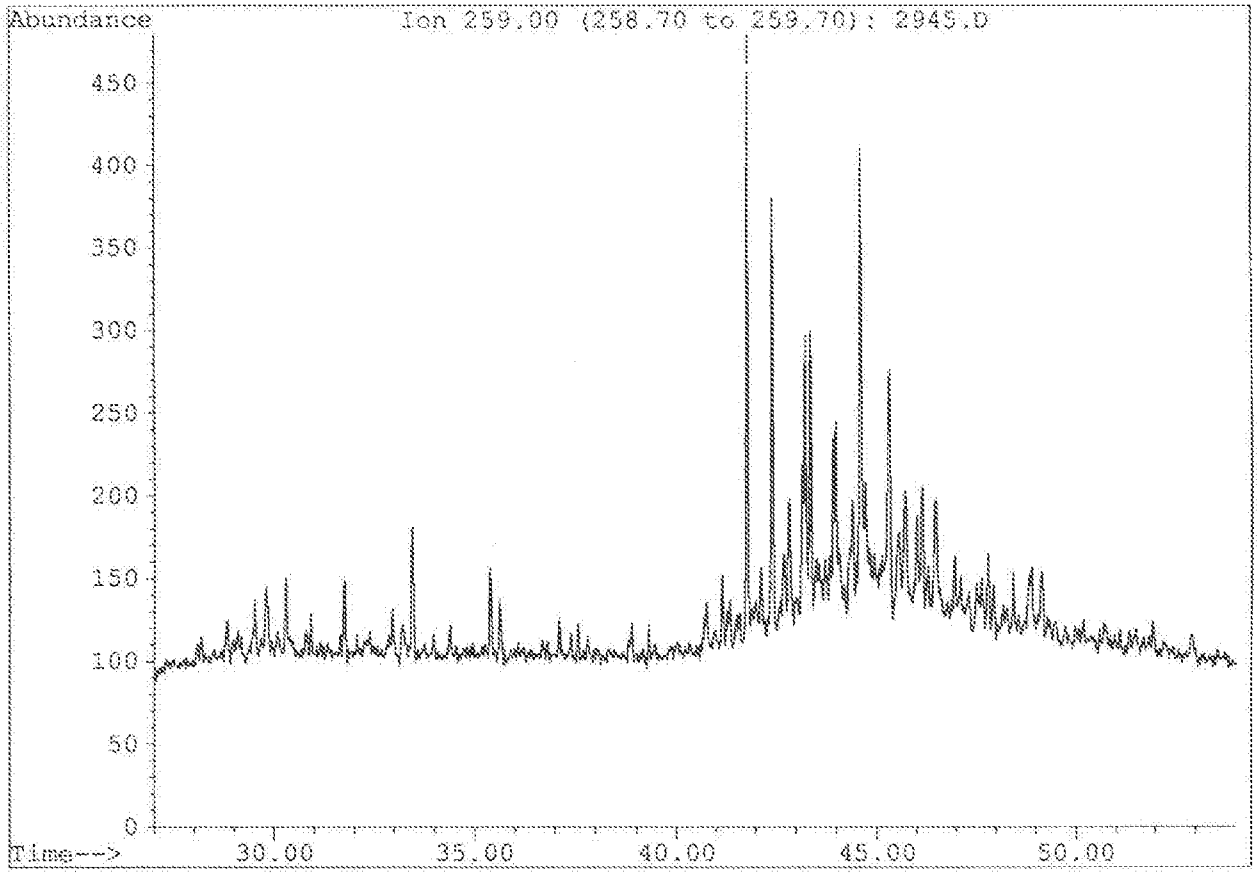
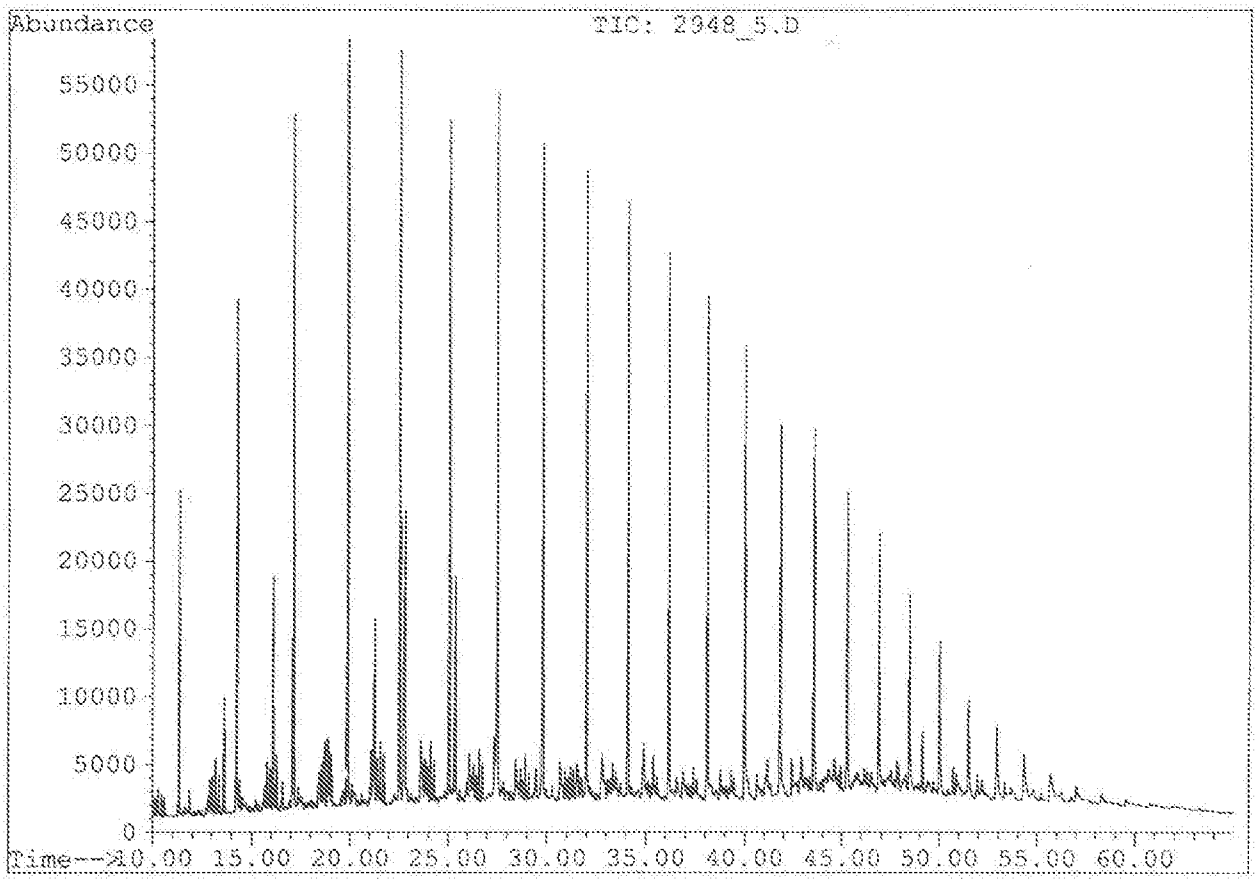
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993

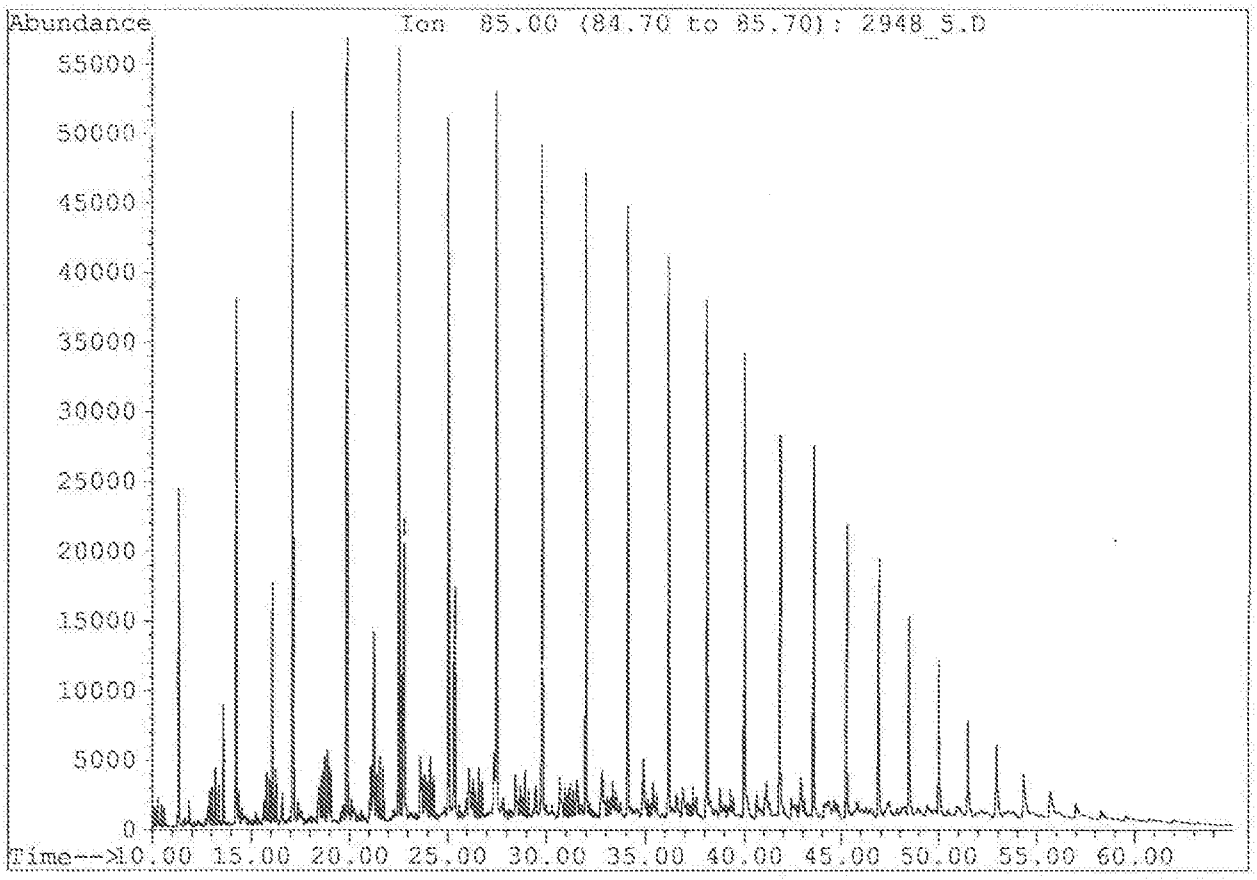




Data File: C:\HPCHEM\1\DATA\B340809S\2948_5.D
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B3408095\2948_5.D
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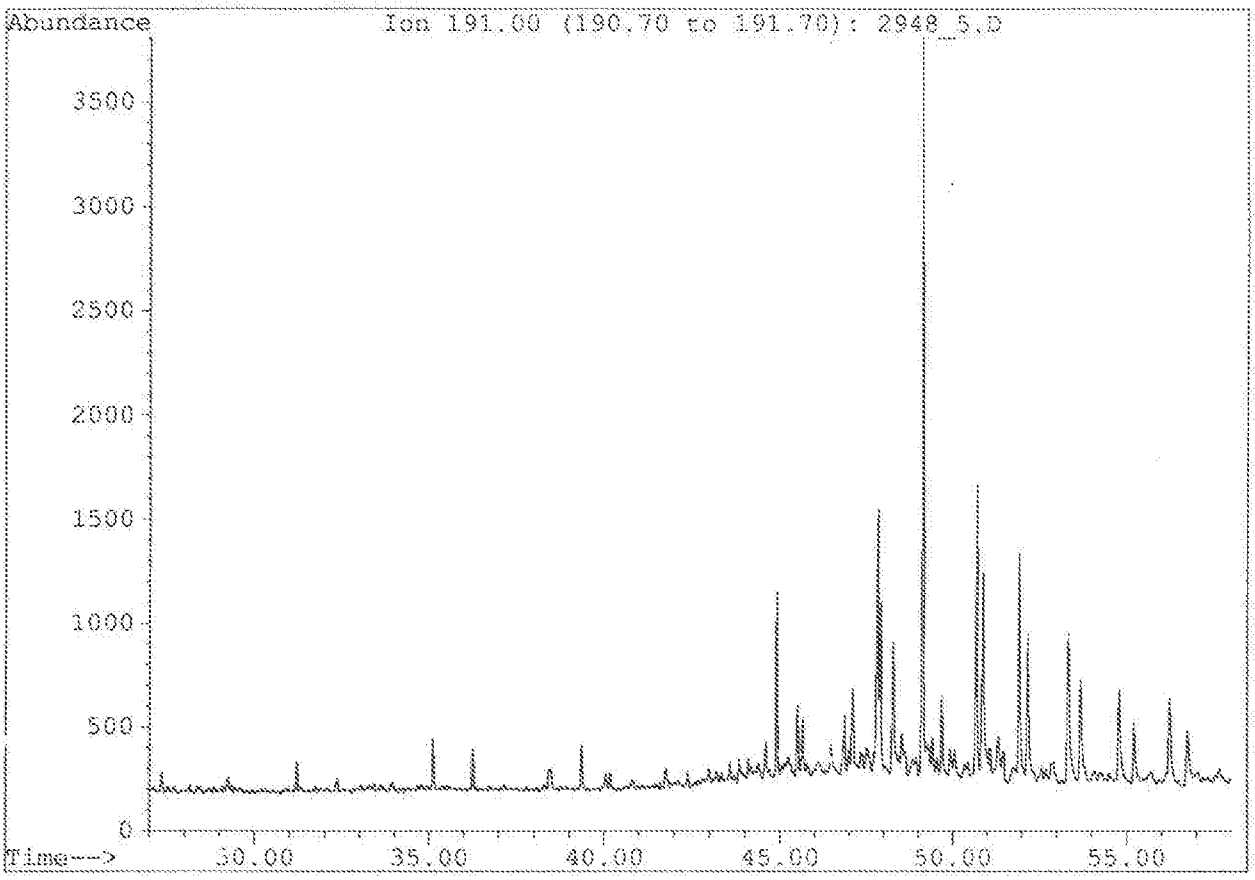
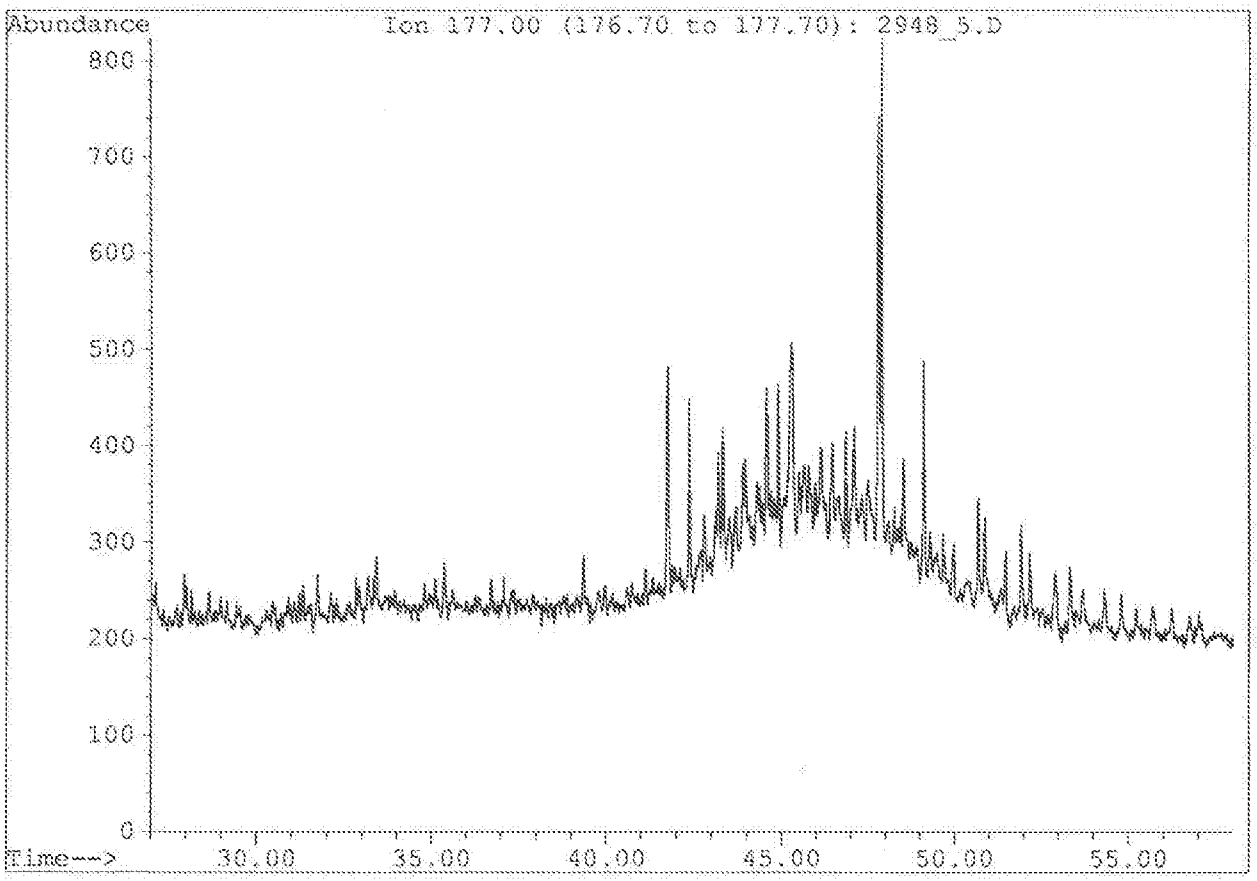
Misc:

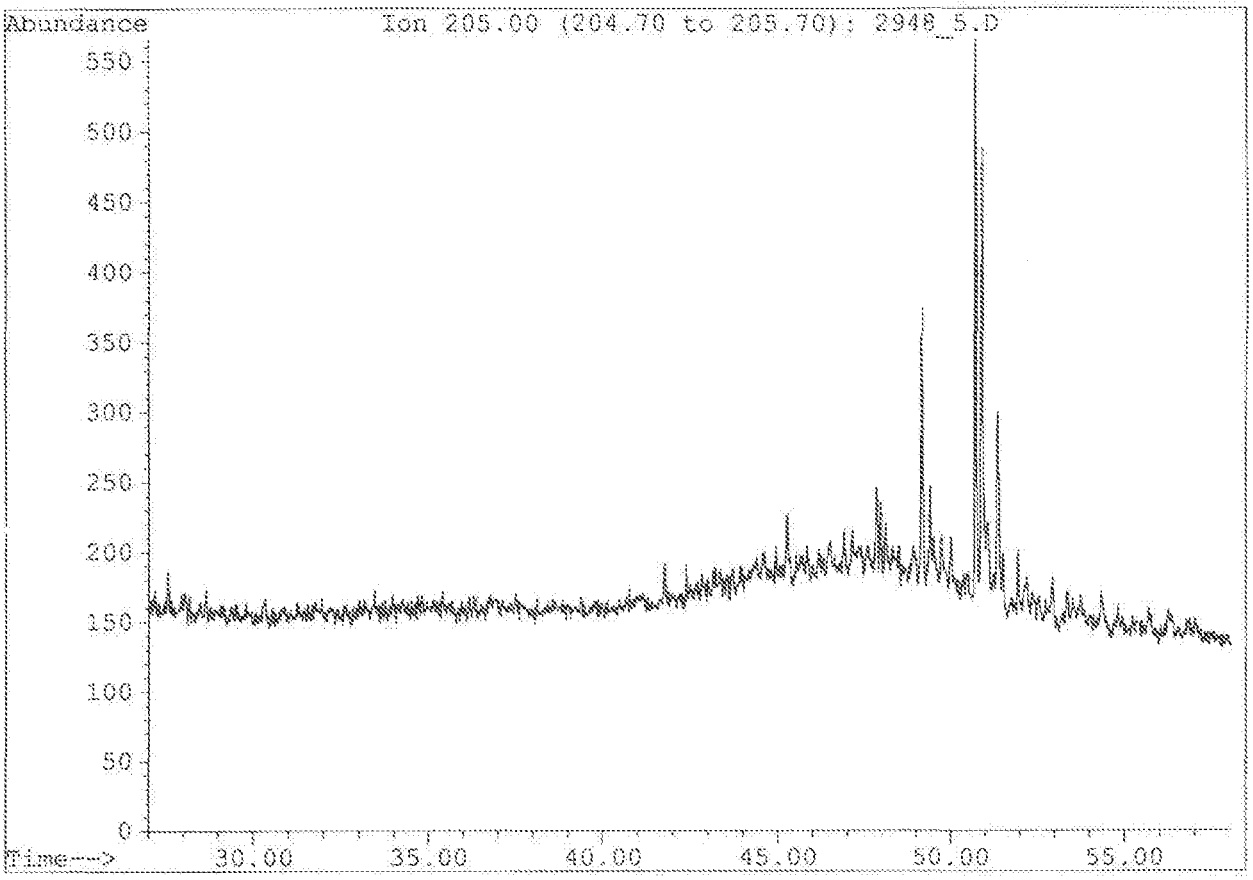
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





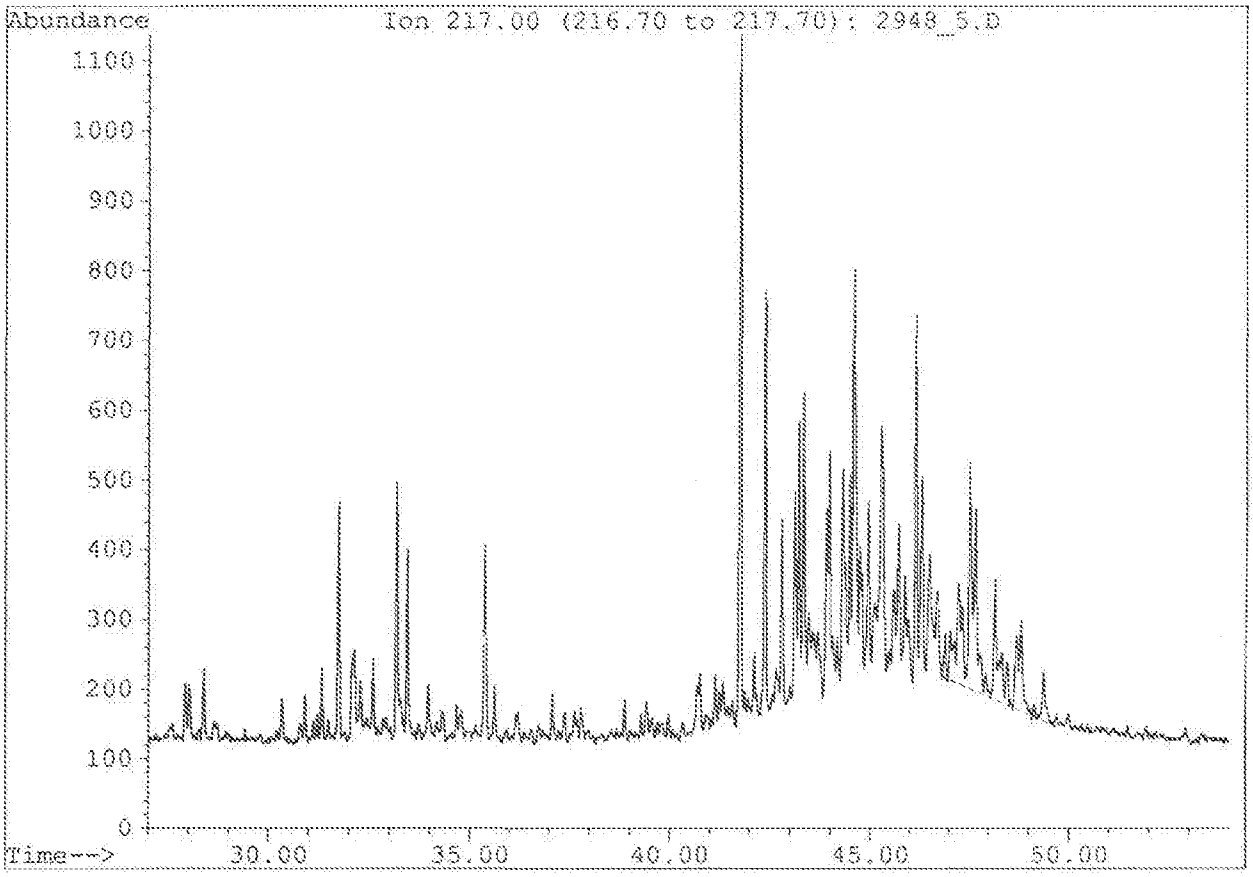
Data File: C:\HPCHEM\1\DATA\B340809S\2948_5.D
Name: sample 1
Misc:

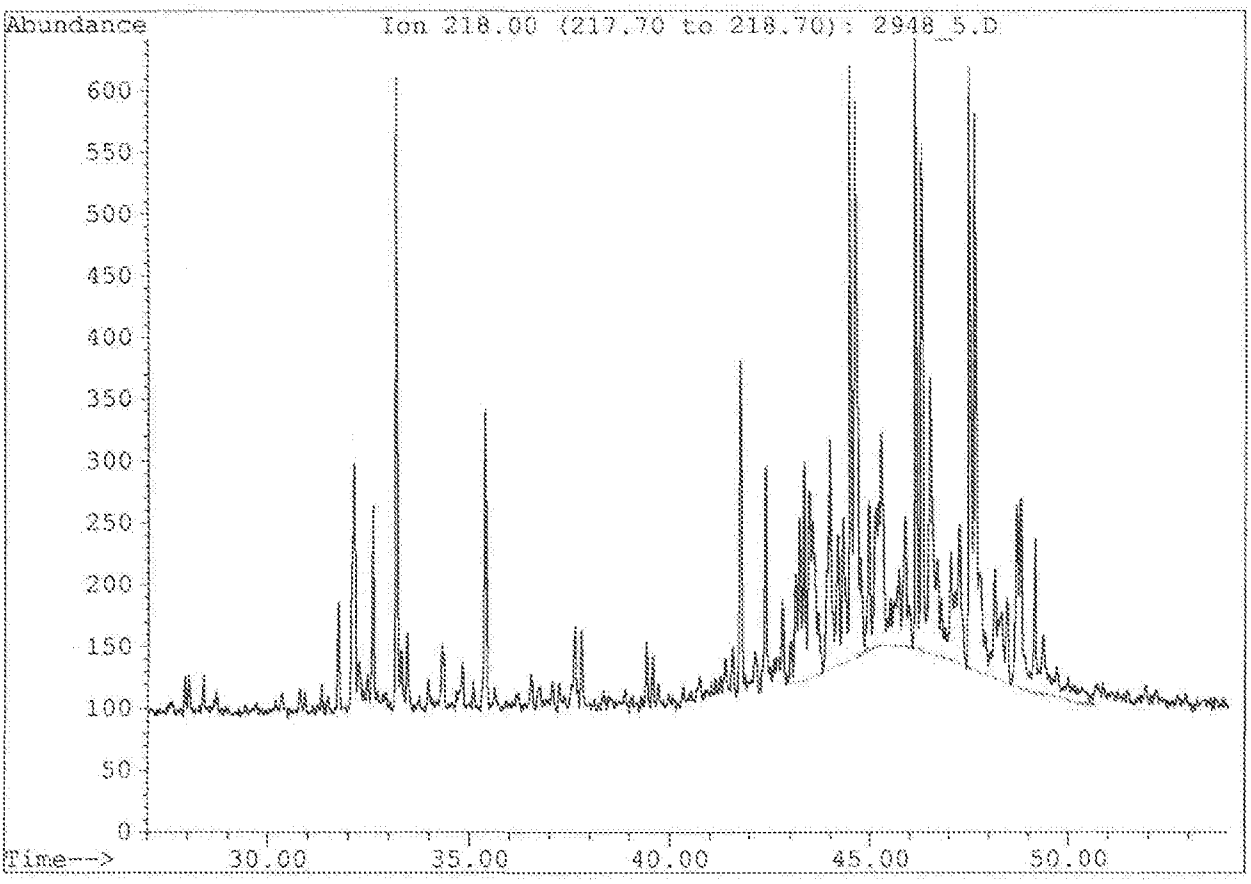
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993



Data File: C:\HPCHEM\1\DATA\B3408095\2948_5.D
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





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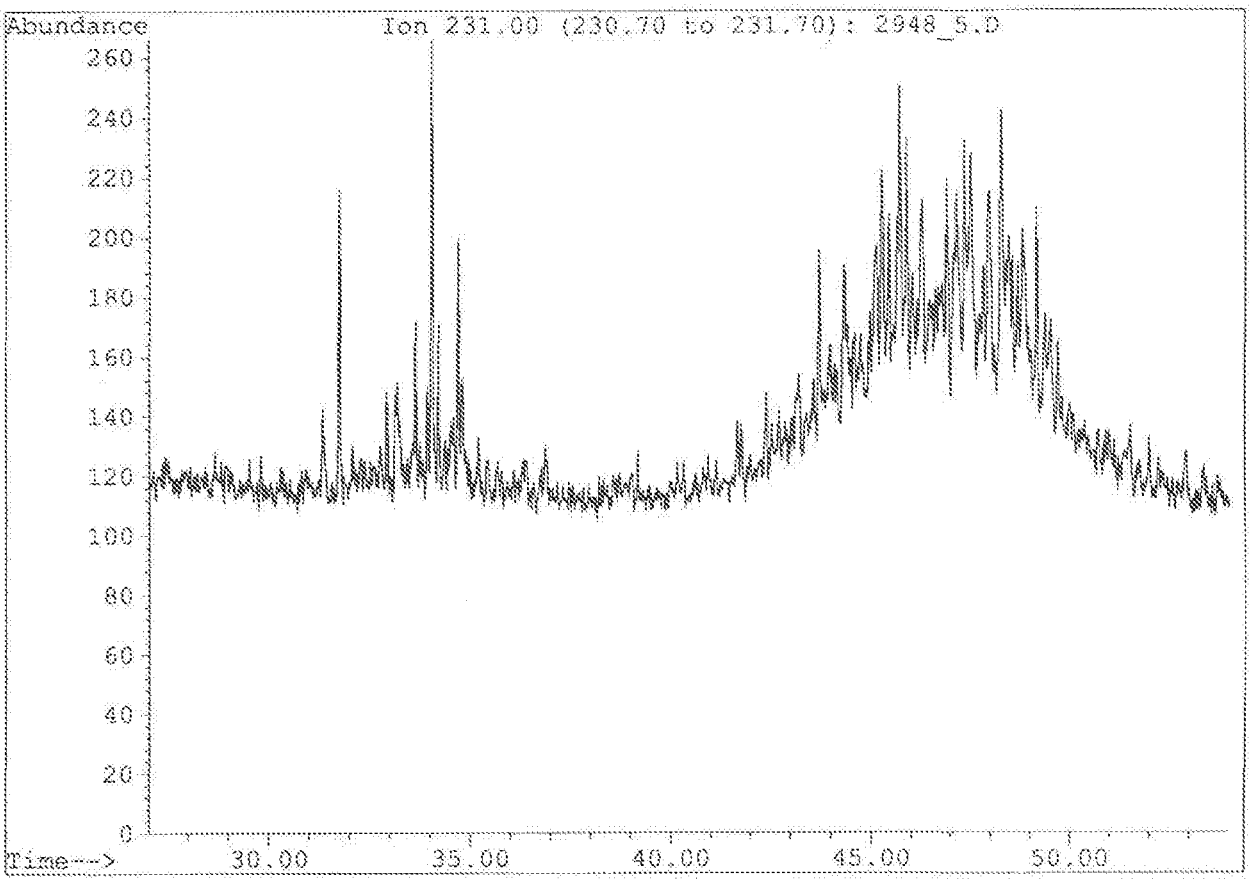
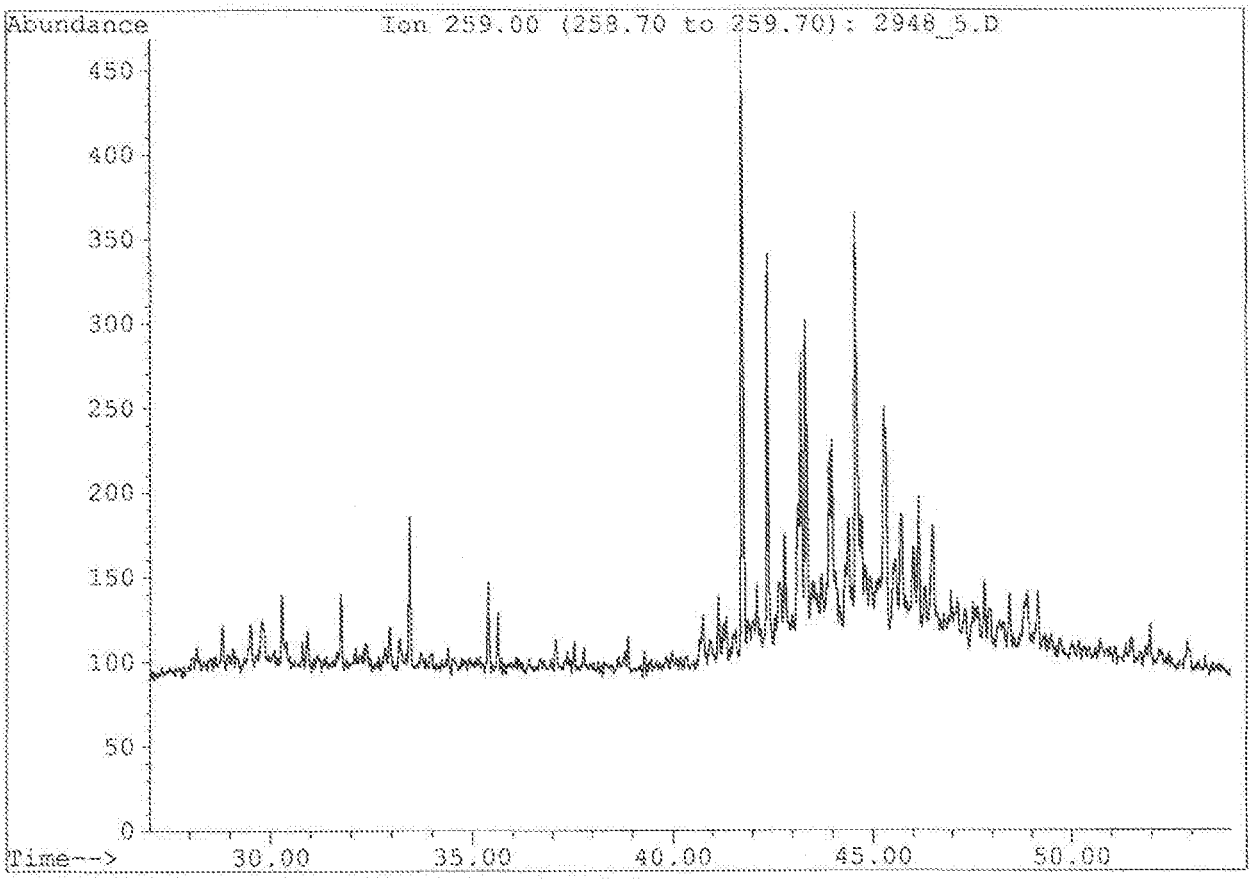
Name: sample 1
Misc:

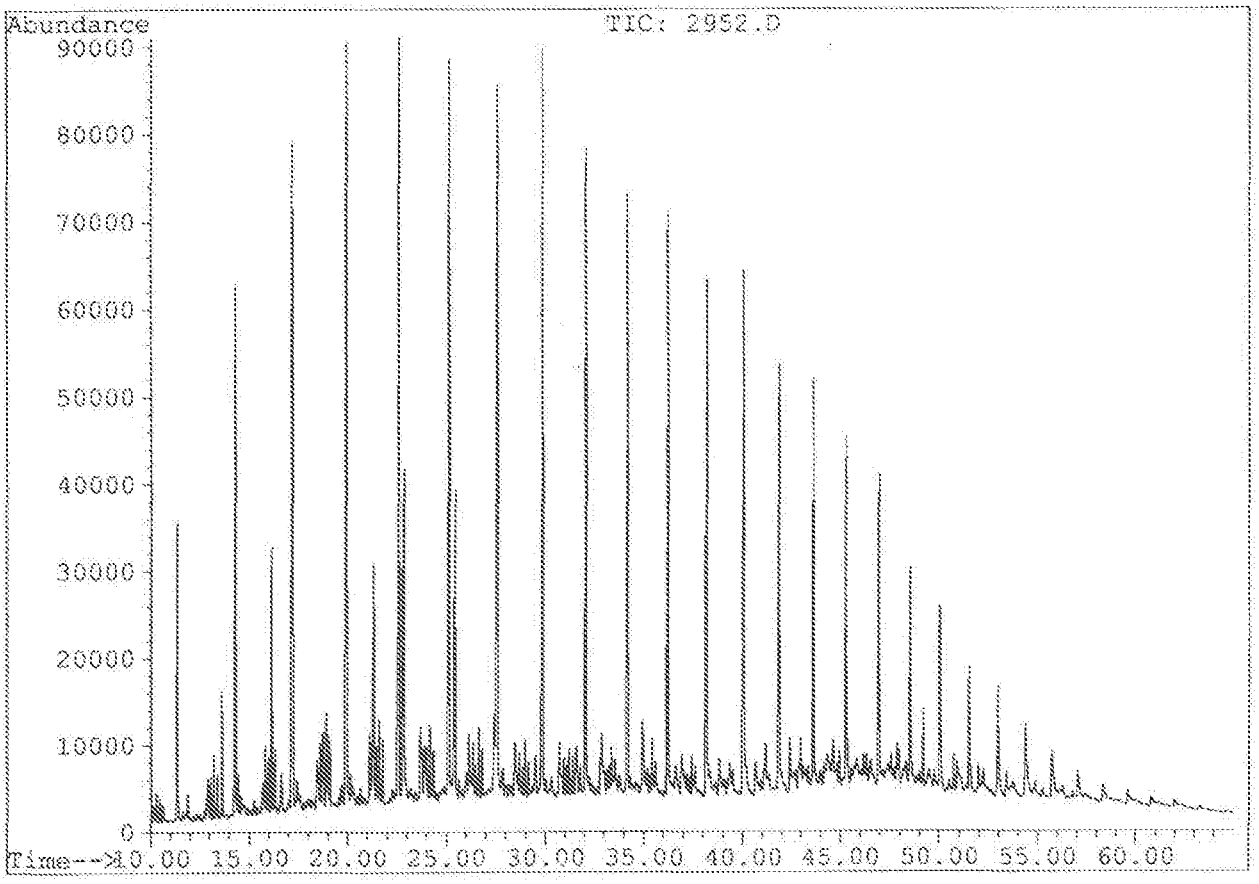
Method: MSD5.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993

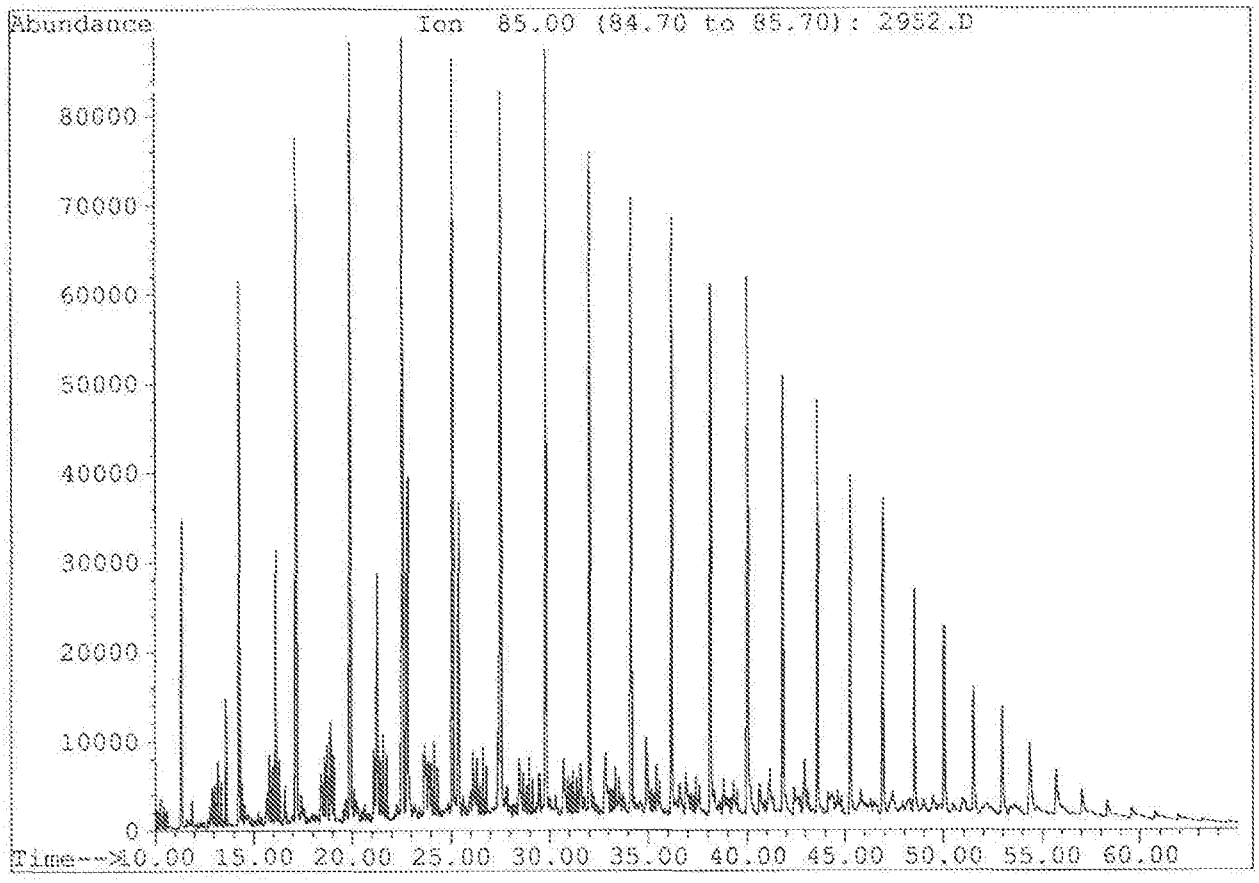




Data File: C:\HPCHEM\1\DATA\B340809S\2952.D
Name: sample 1
Misc:

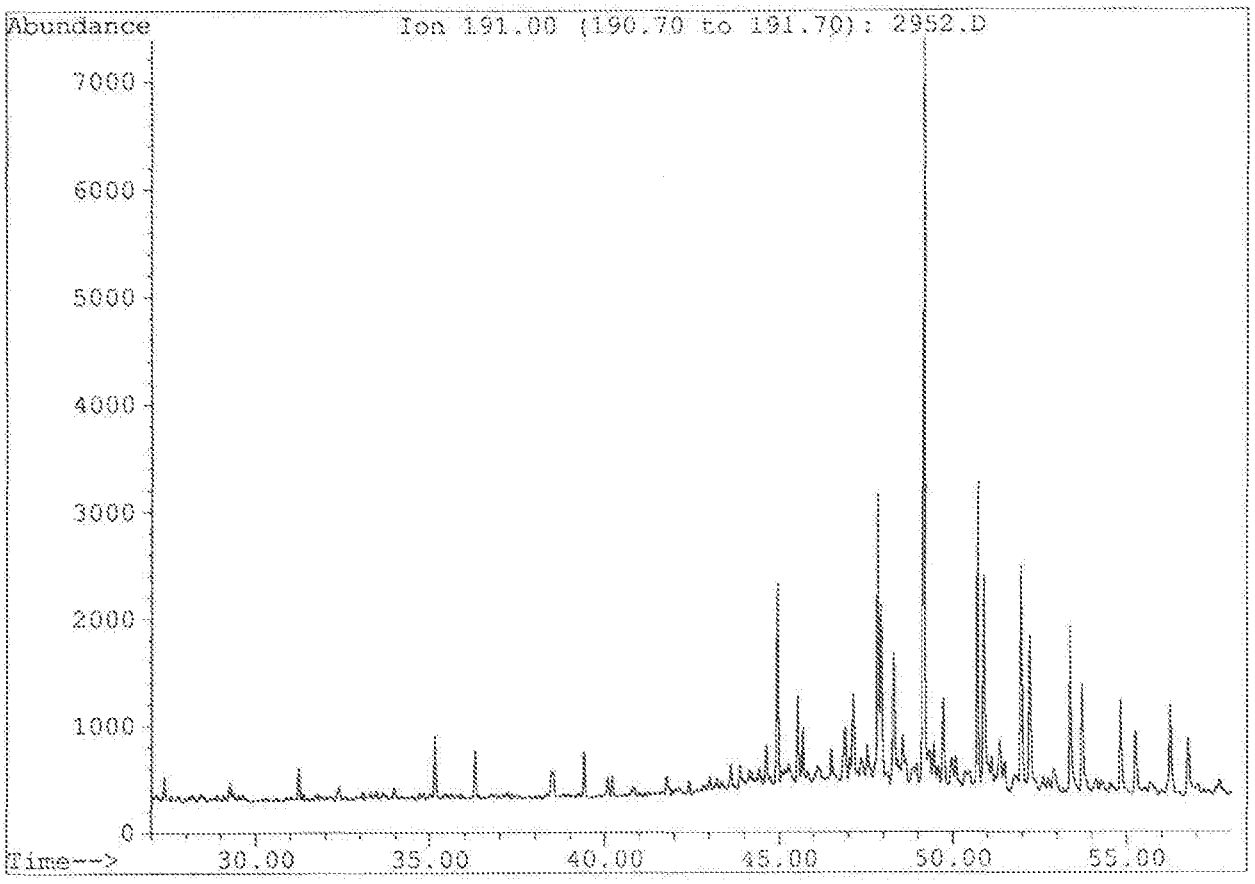
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993

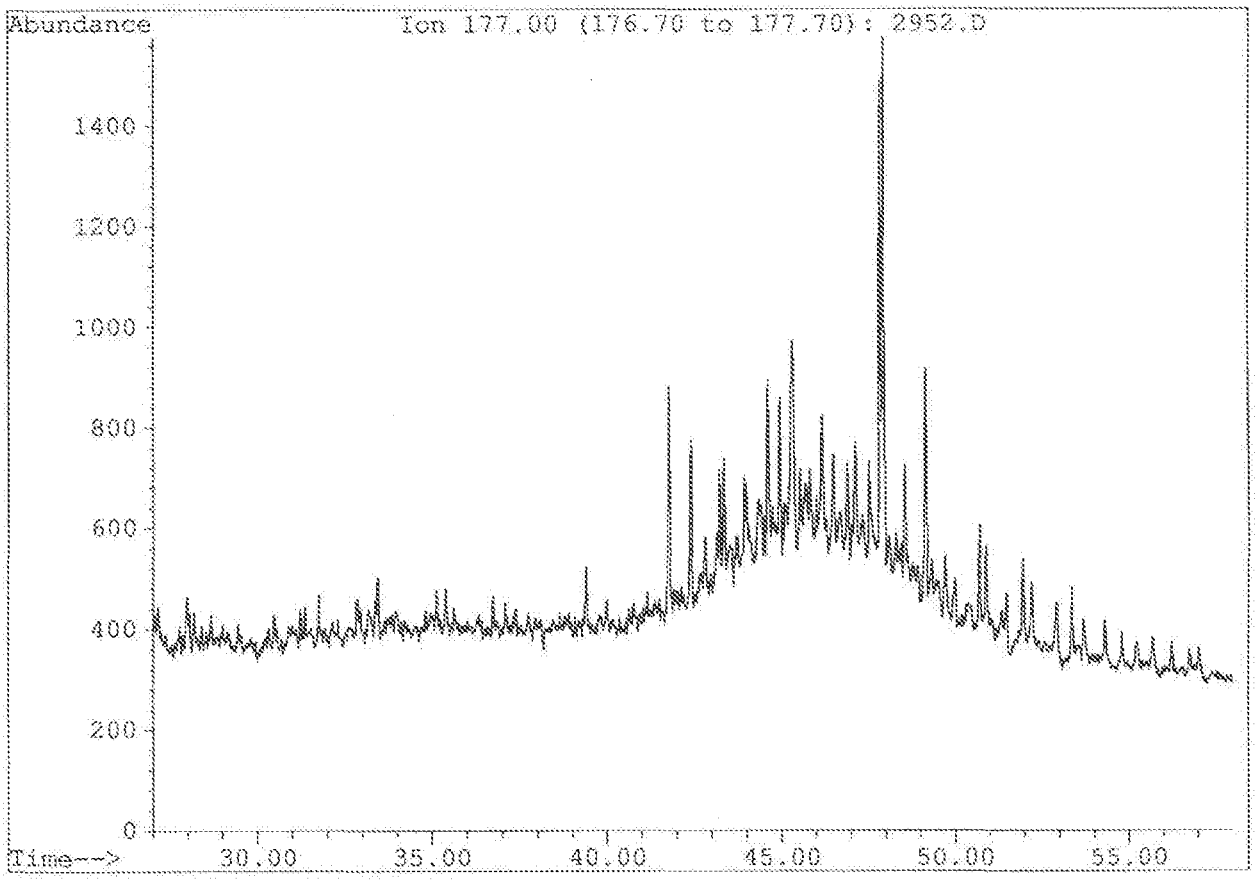




Data File: C:\HPCHEM\1\DATA\B340809S\2952.D
Name: sample 1
Misc:

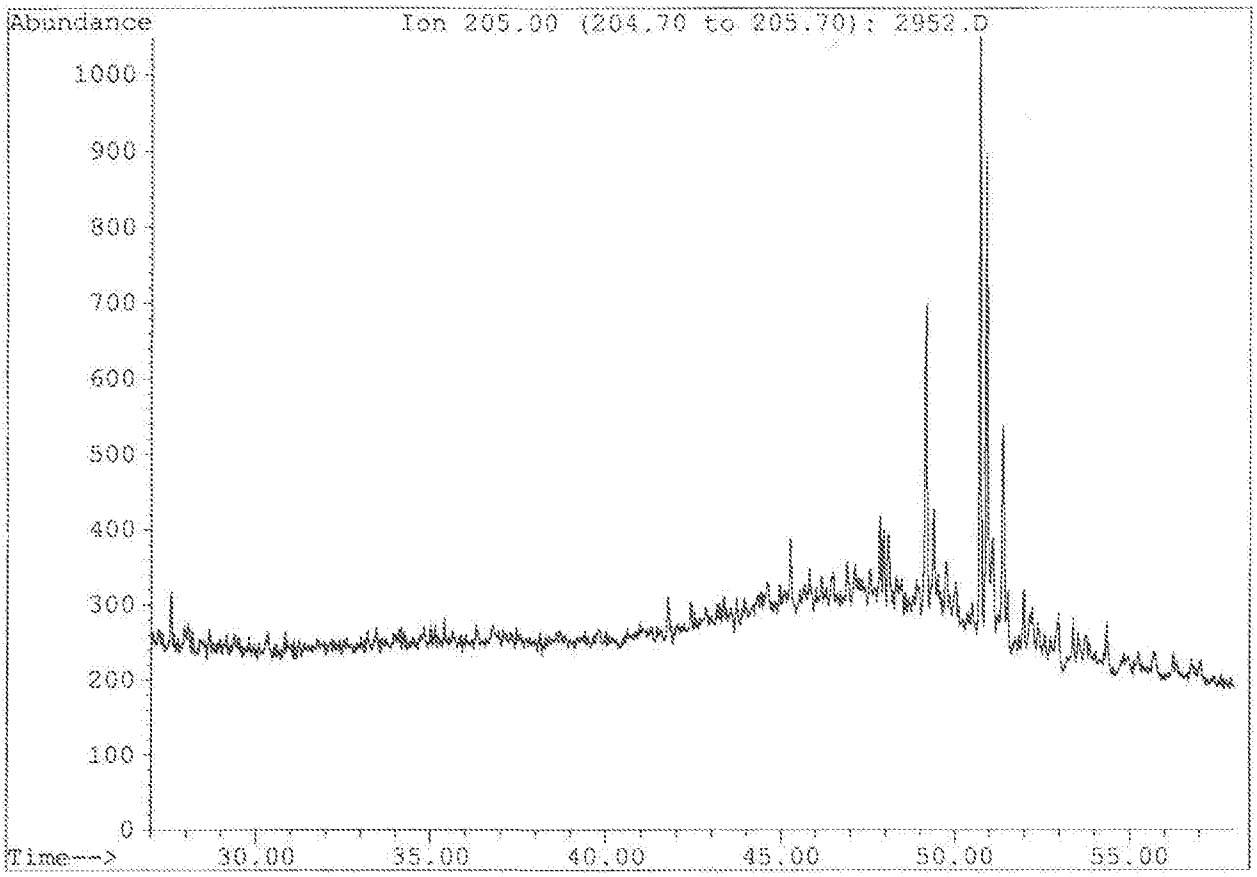
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





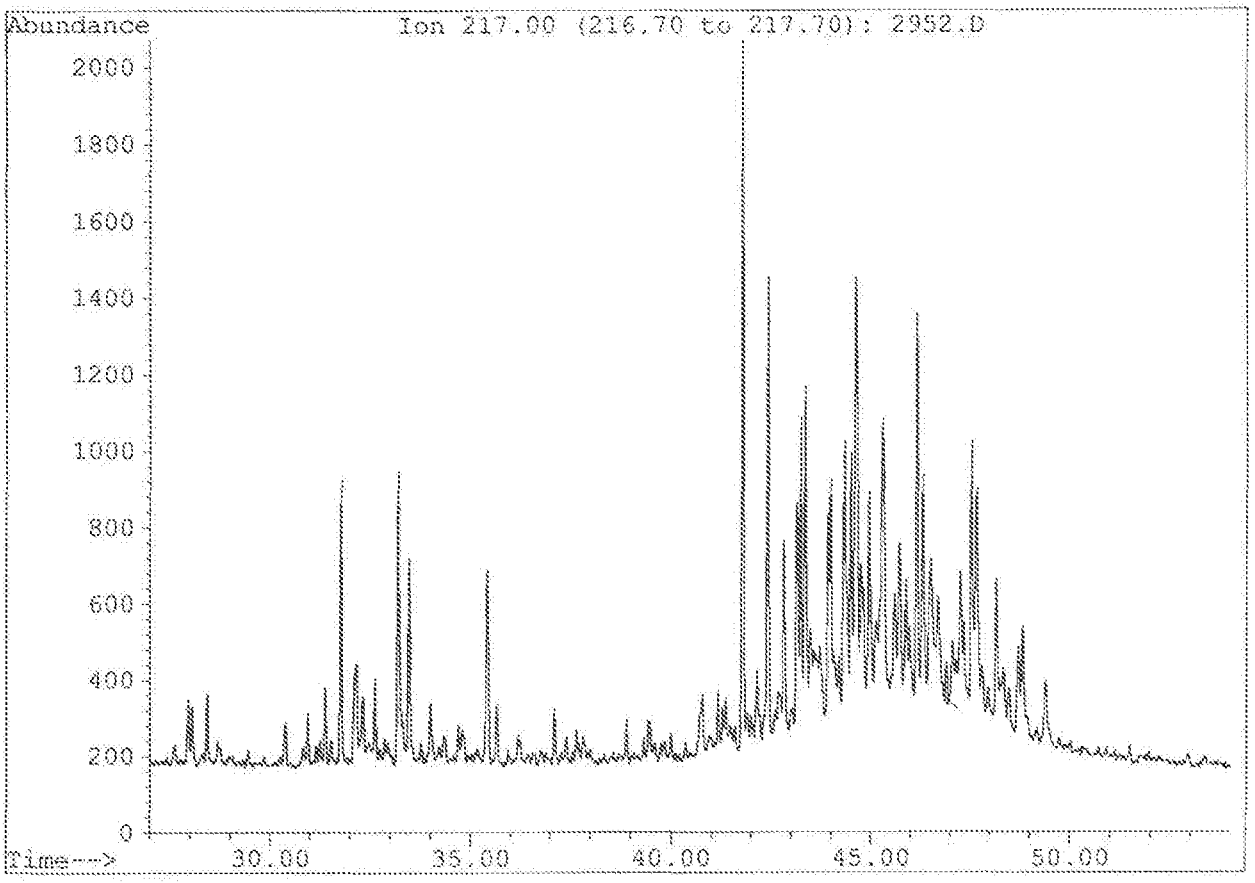
Data File: C:\HPCHEM\1\DATA\B340809S\2952.D
Name: sample 1
Misc:

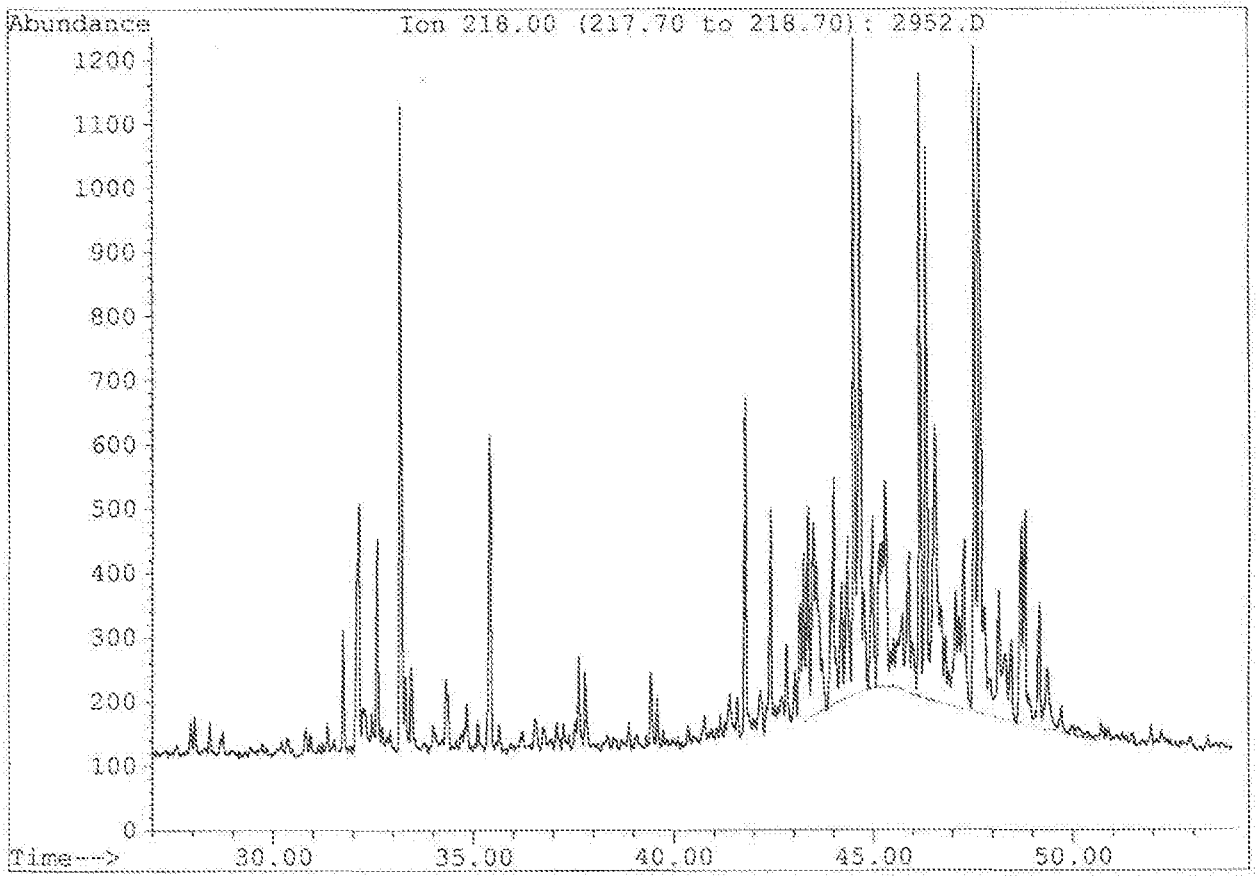
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993



Data File: C:\HPCHEM\1\DATA\B340809S\2952.D
Name: sample 1
Misc:

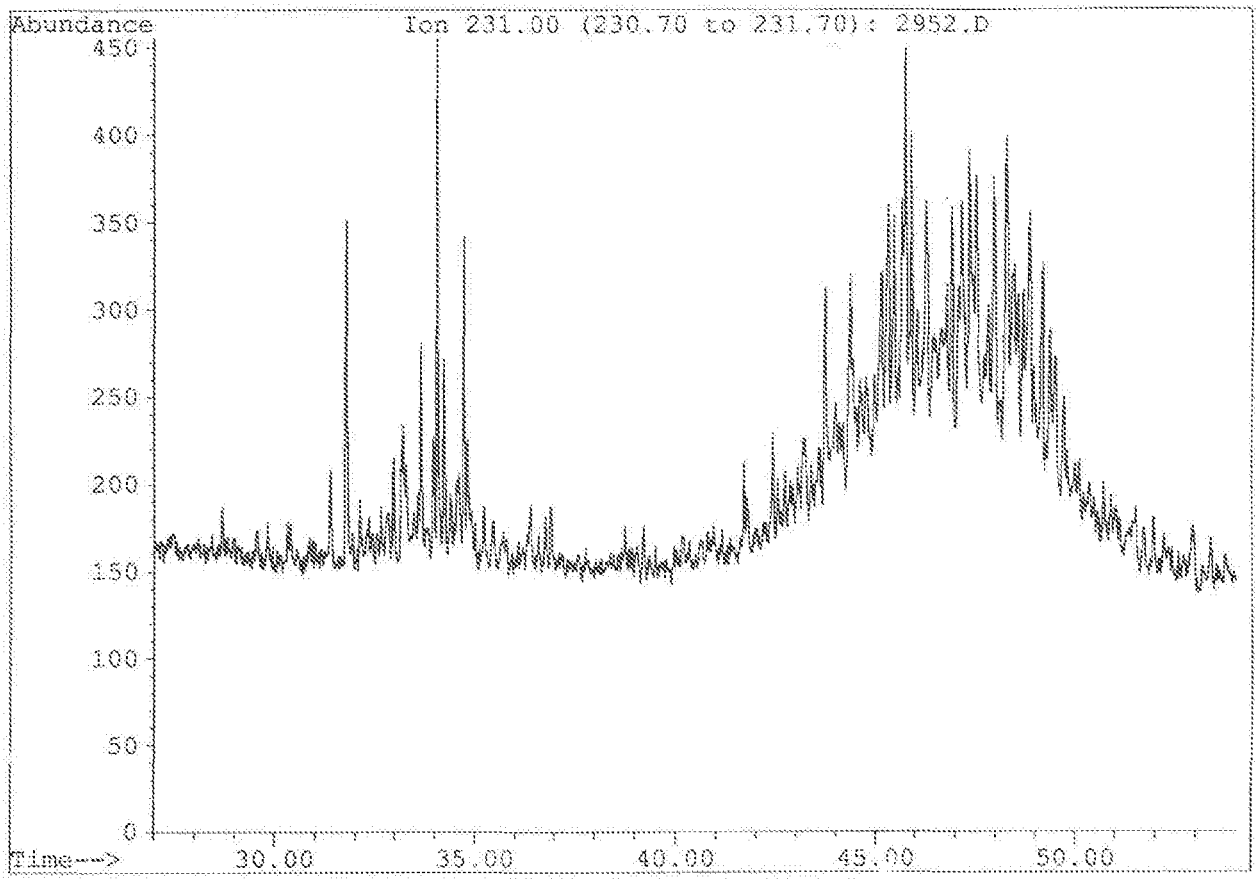
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993

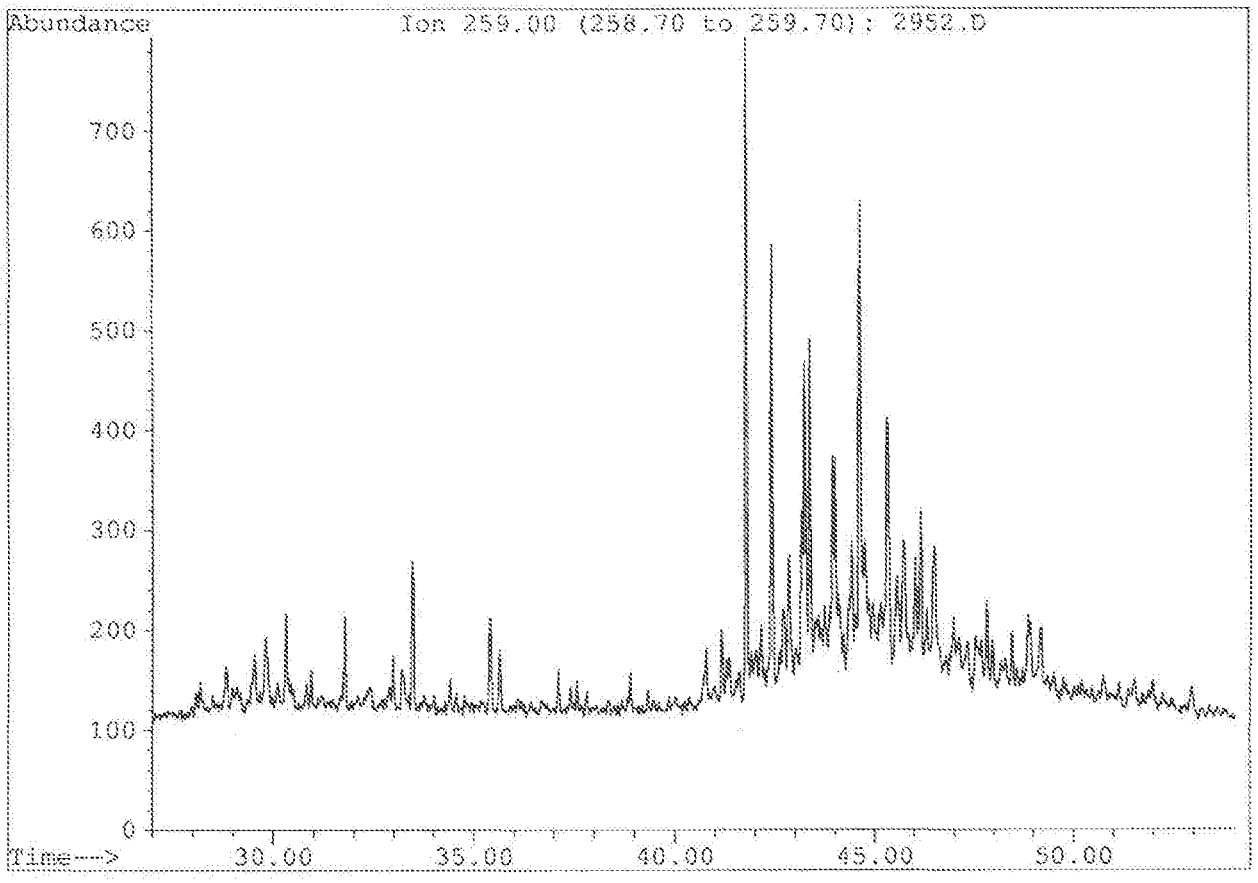




Data File: C:\HPCHEM\1\DATA\B340809S\2952.D
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B340809S\2965.D
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Method: MSDS.M
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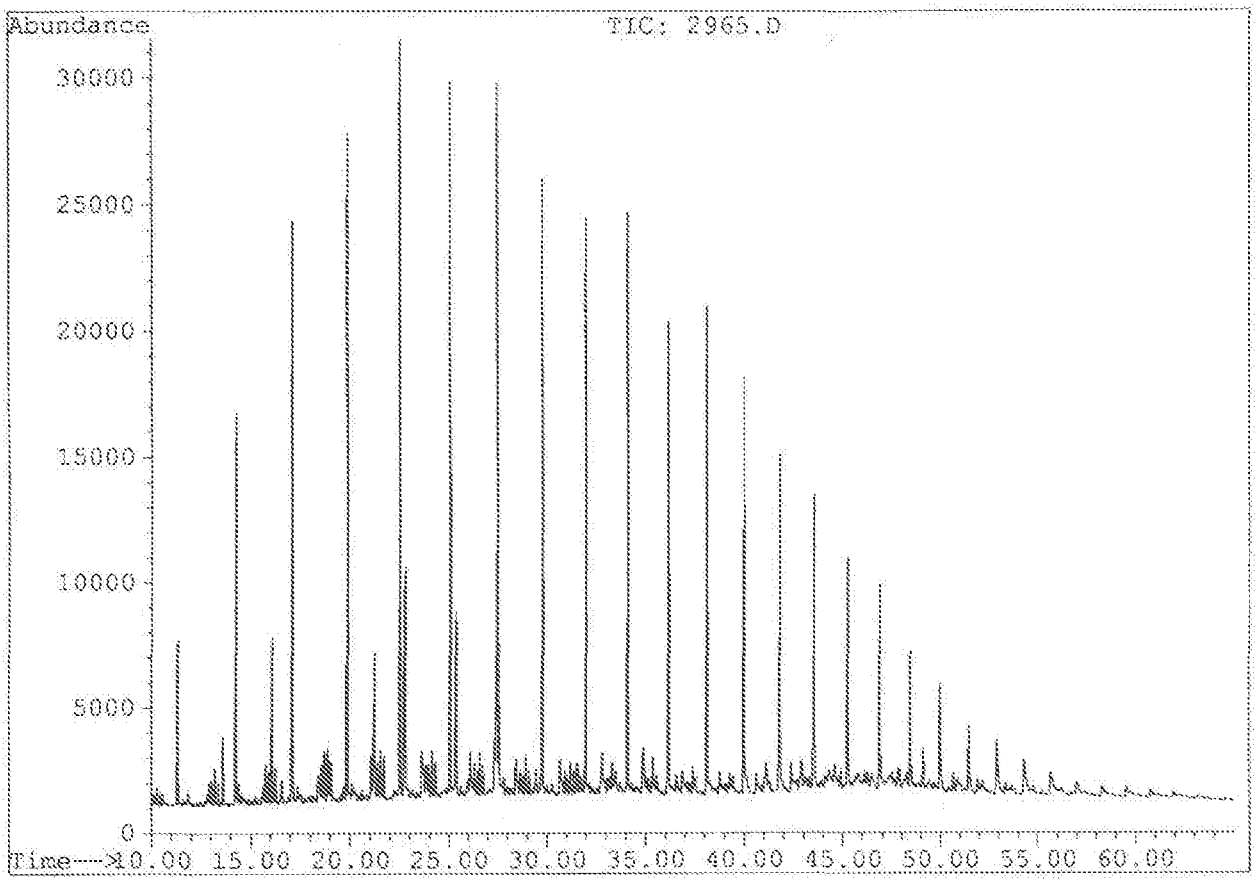
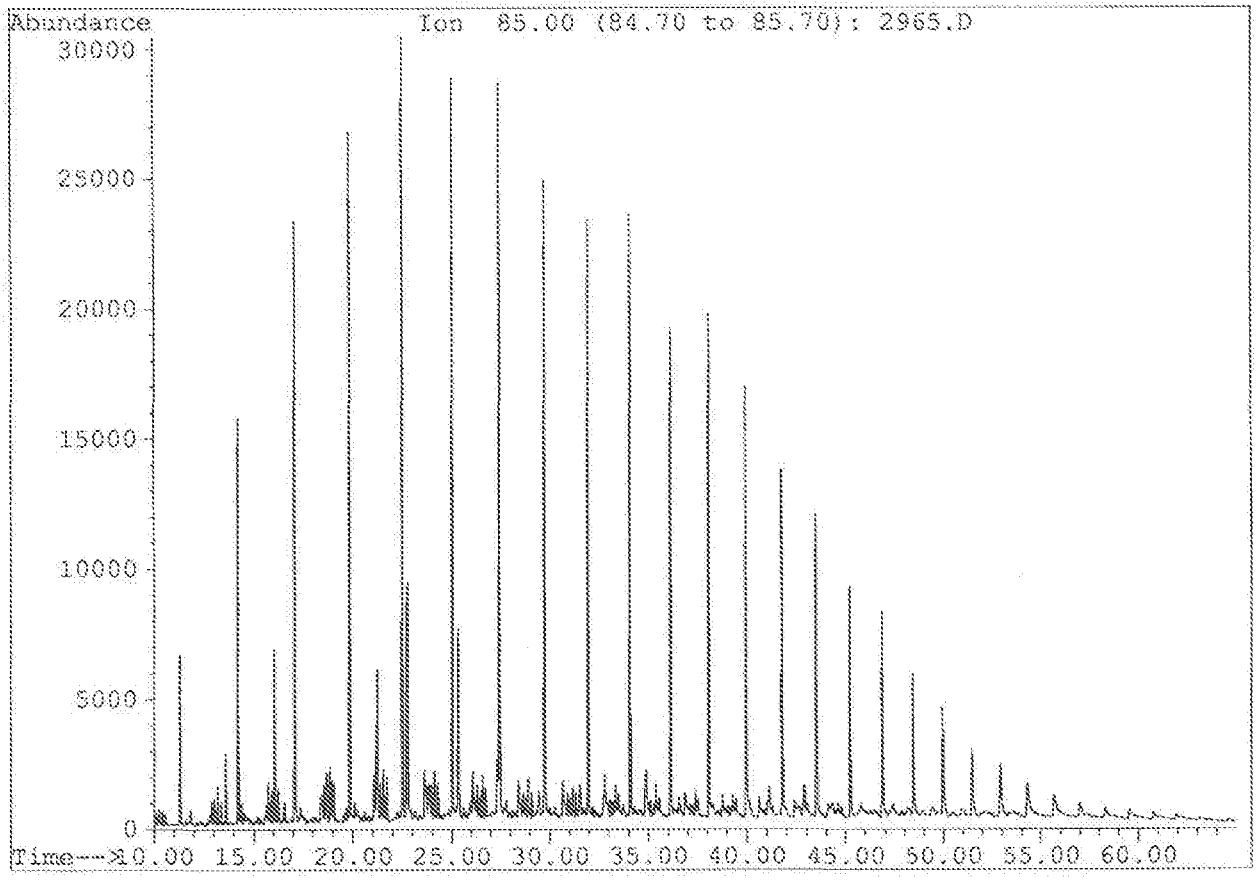
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





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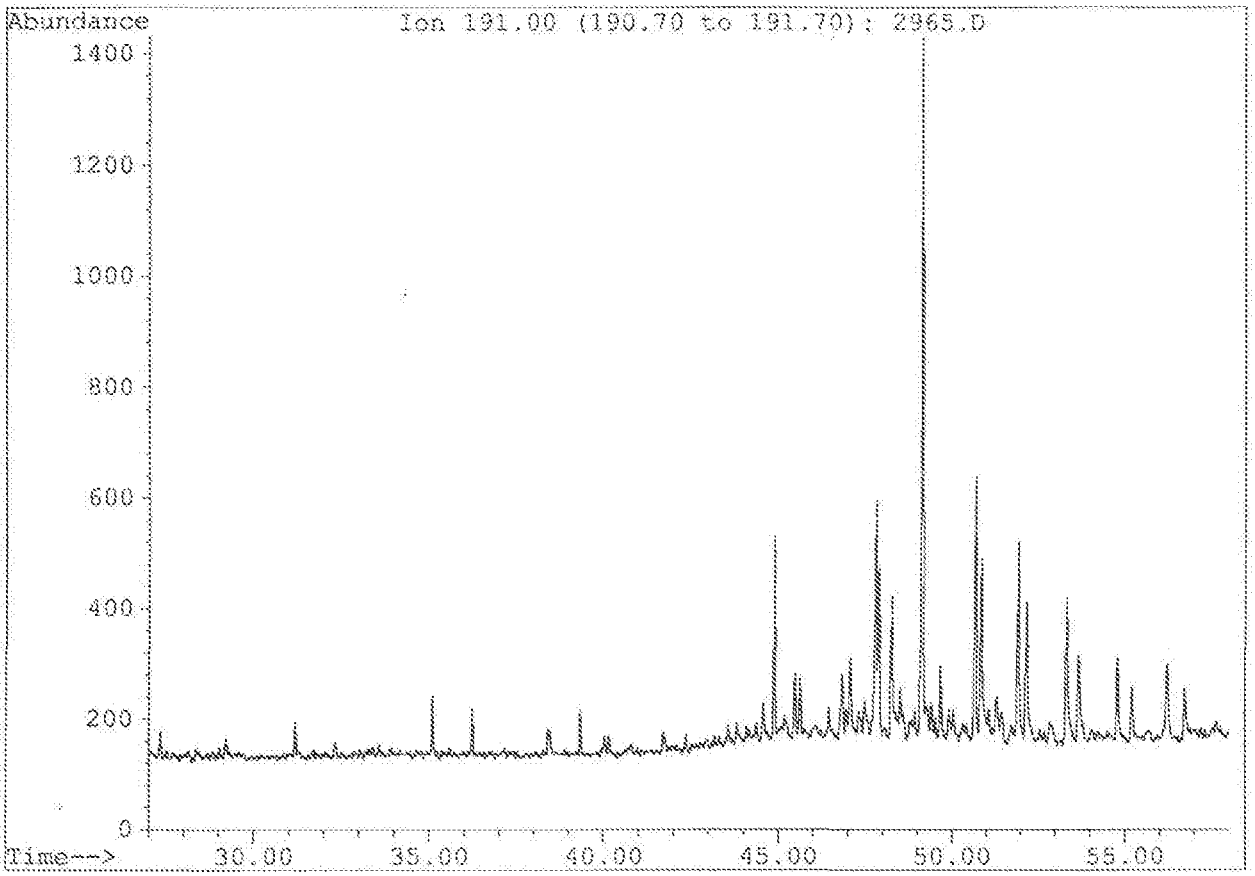
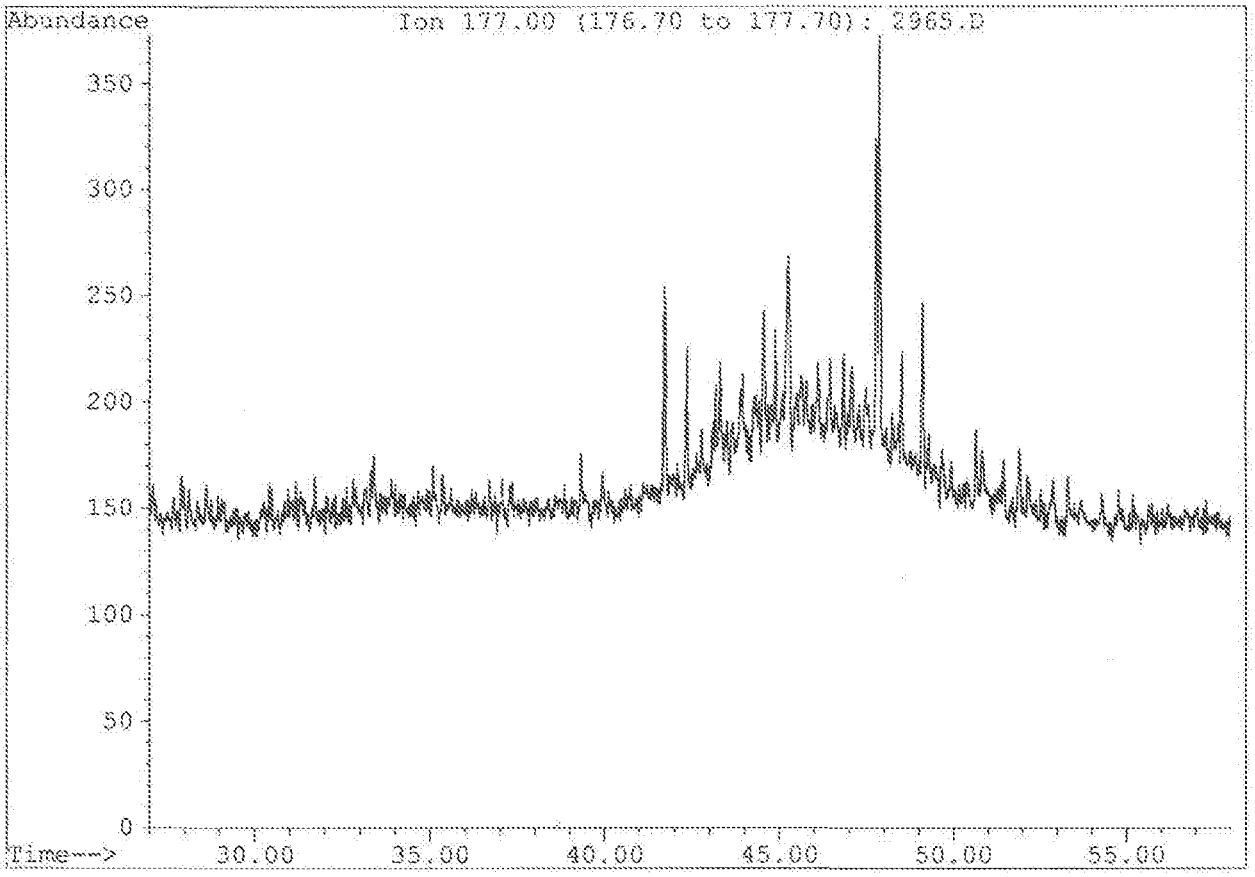
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





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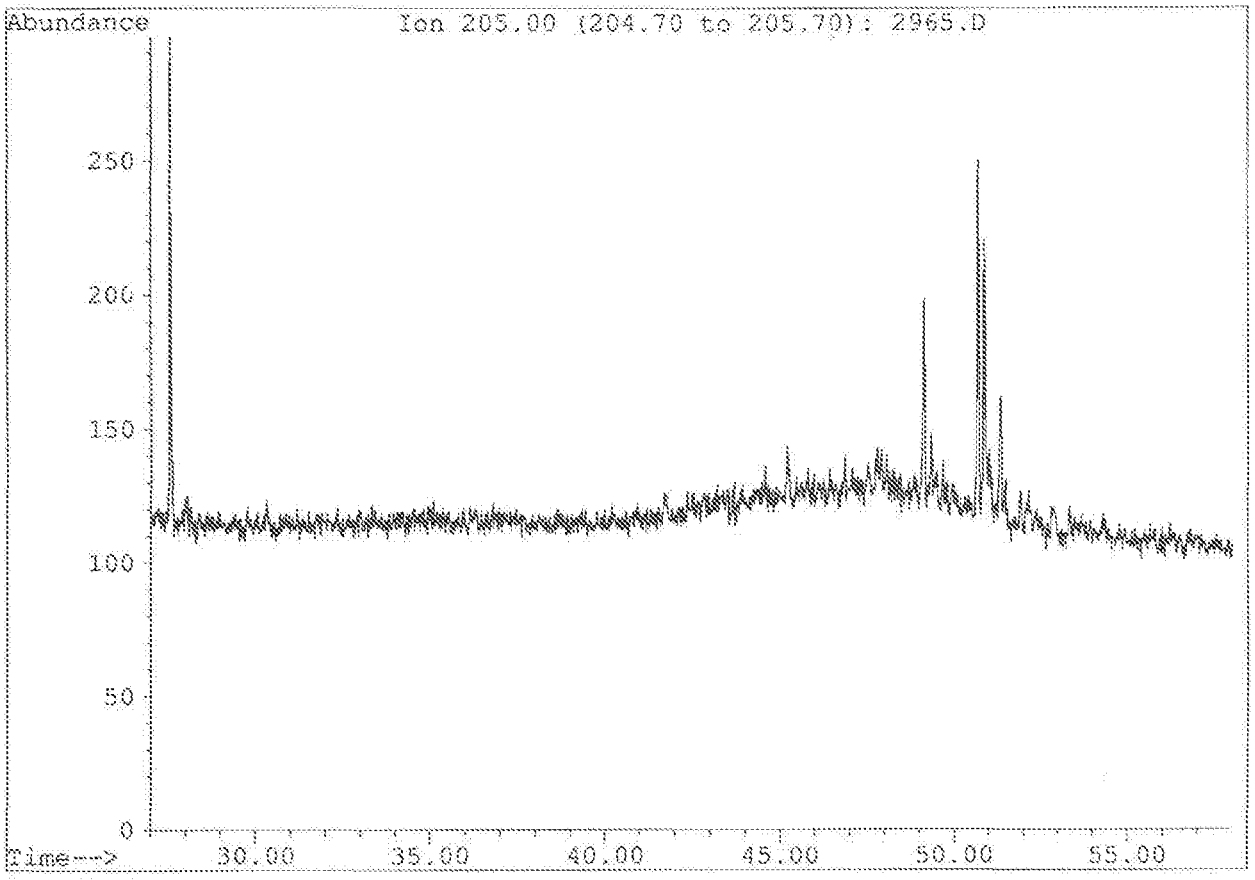
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993



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Quantitation database: SATURATE BIOMARKERS
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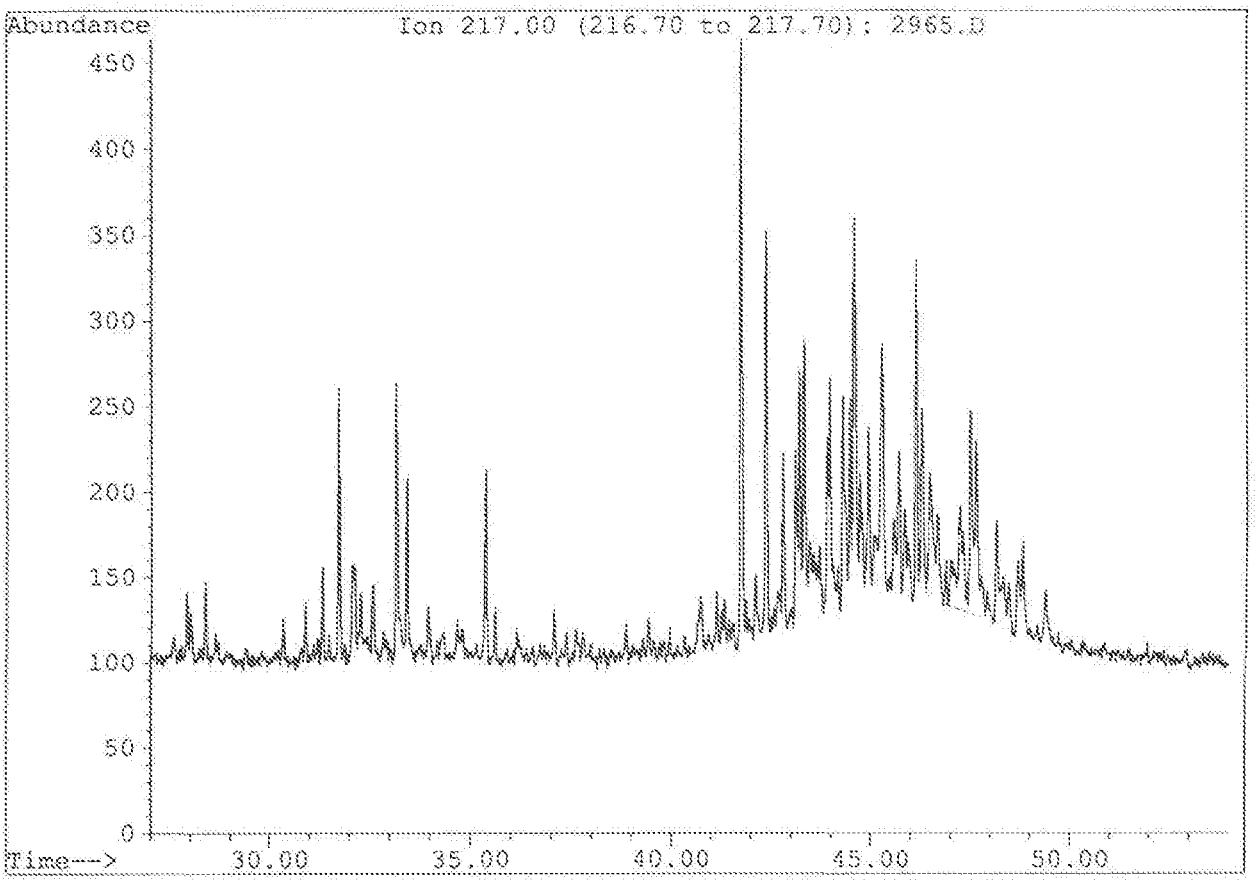

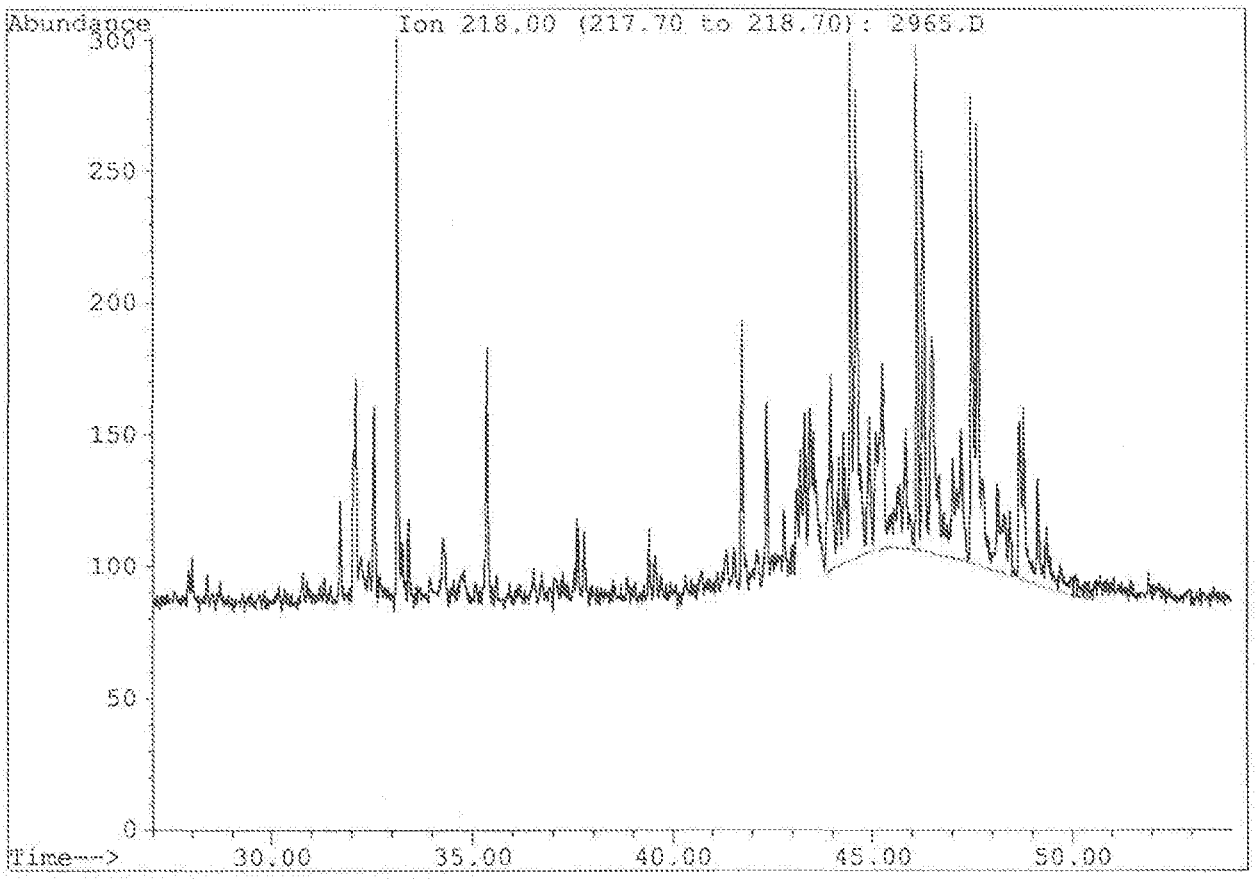

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Quantitation database: SATURATE BIOMARKERS
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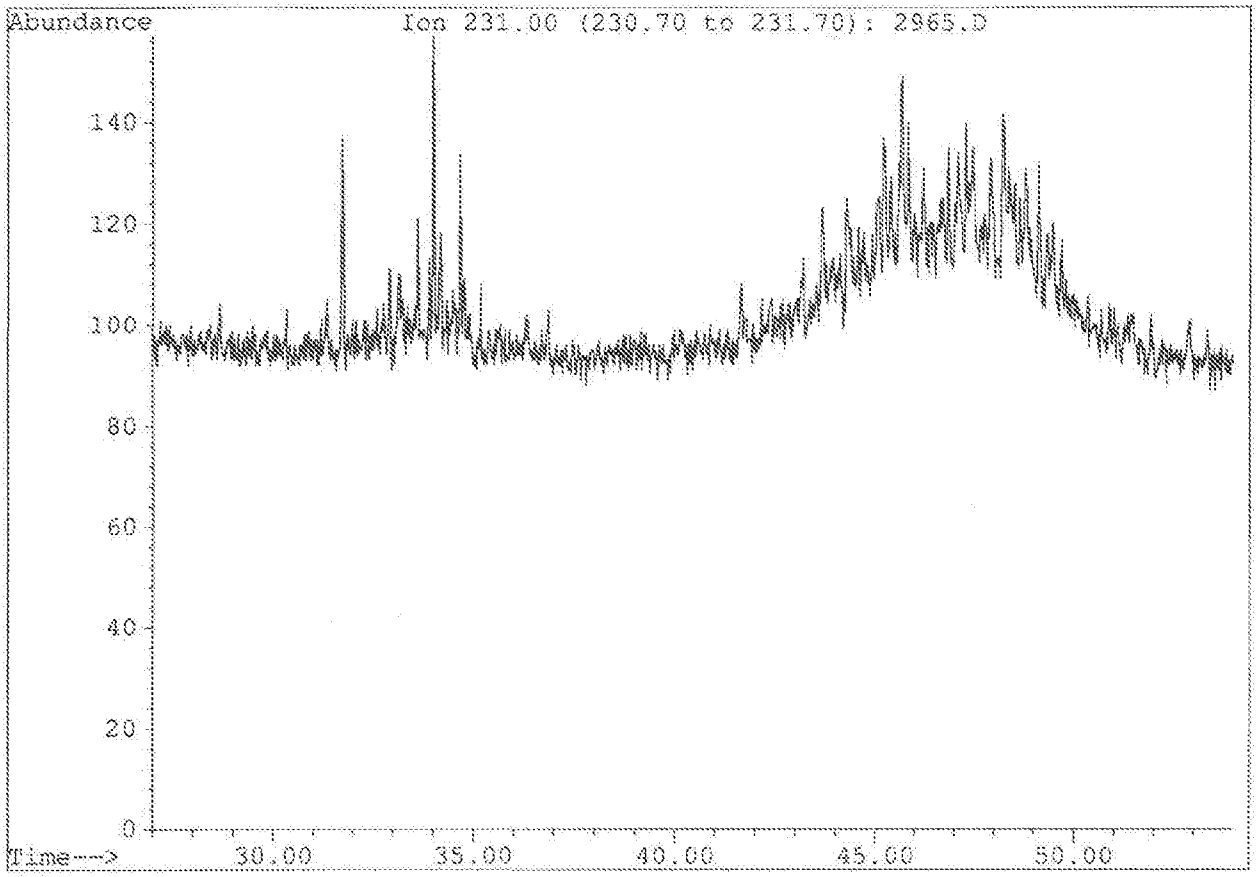

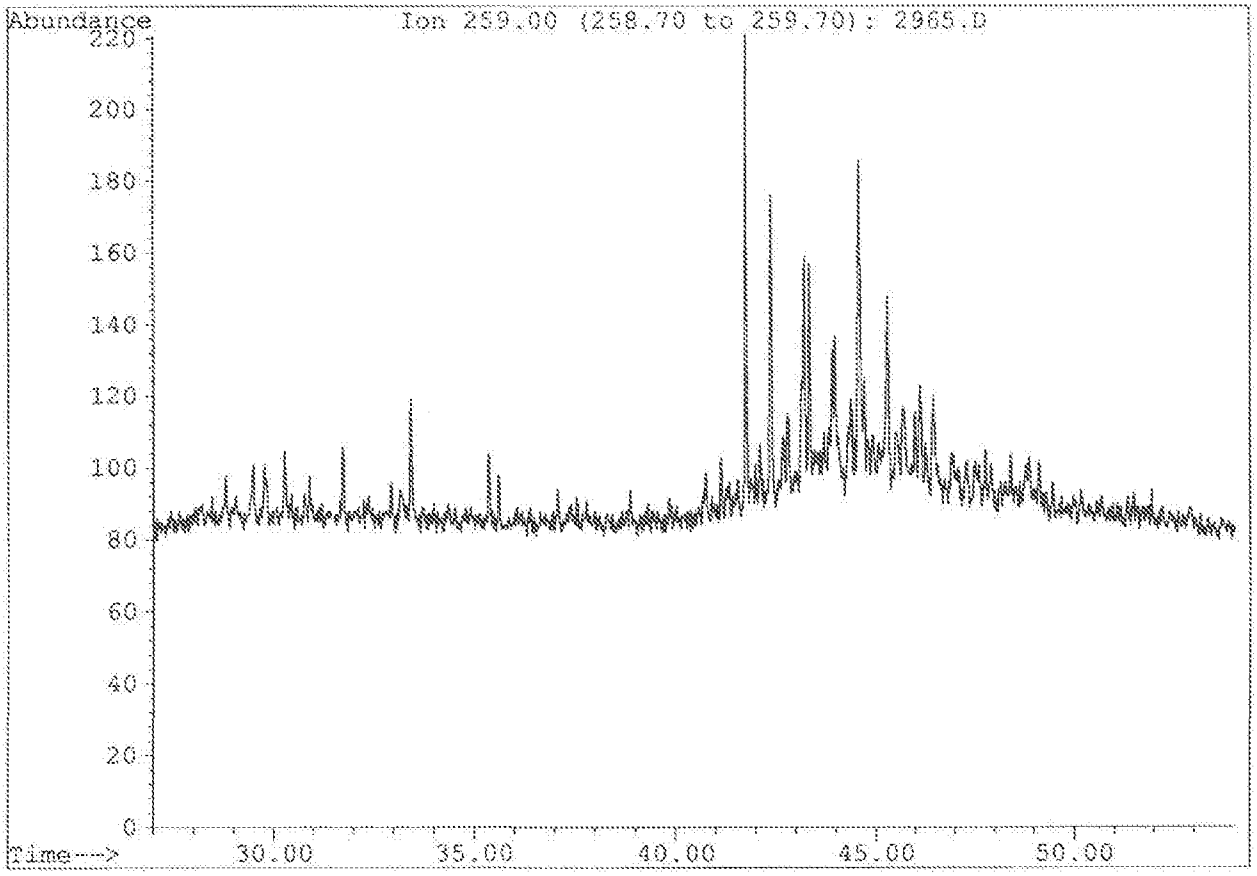

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Misc:

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Operator ID: jorunn kristine
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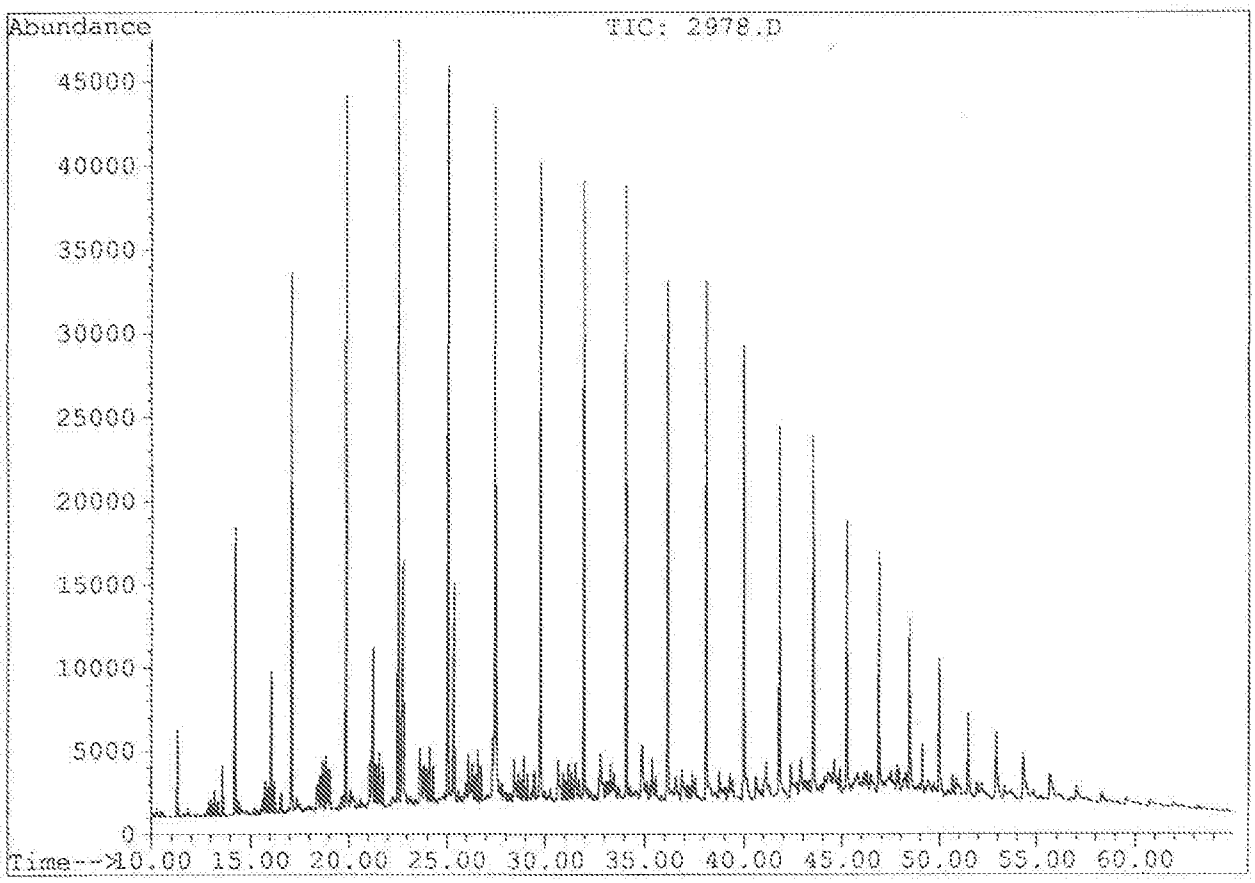
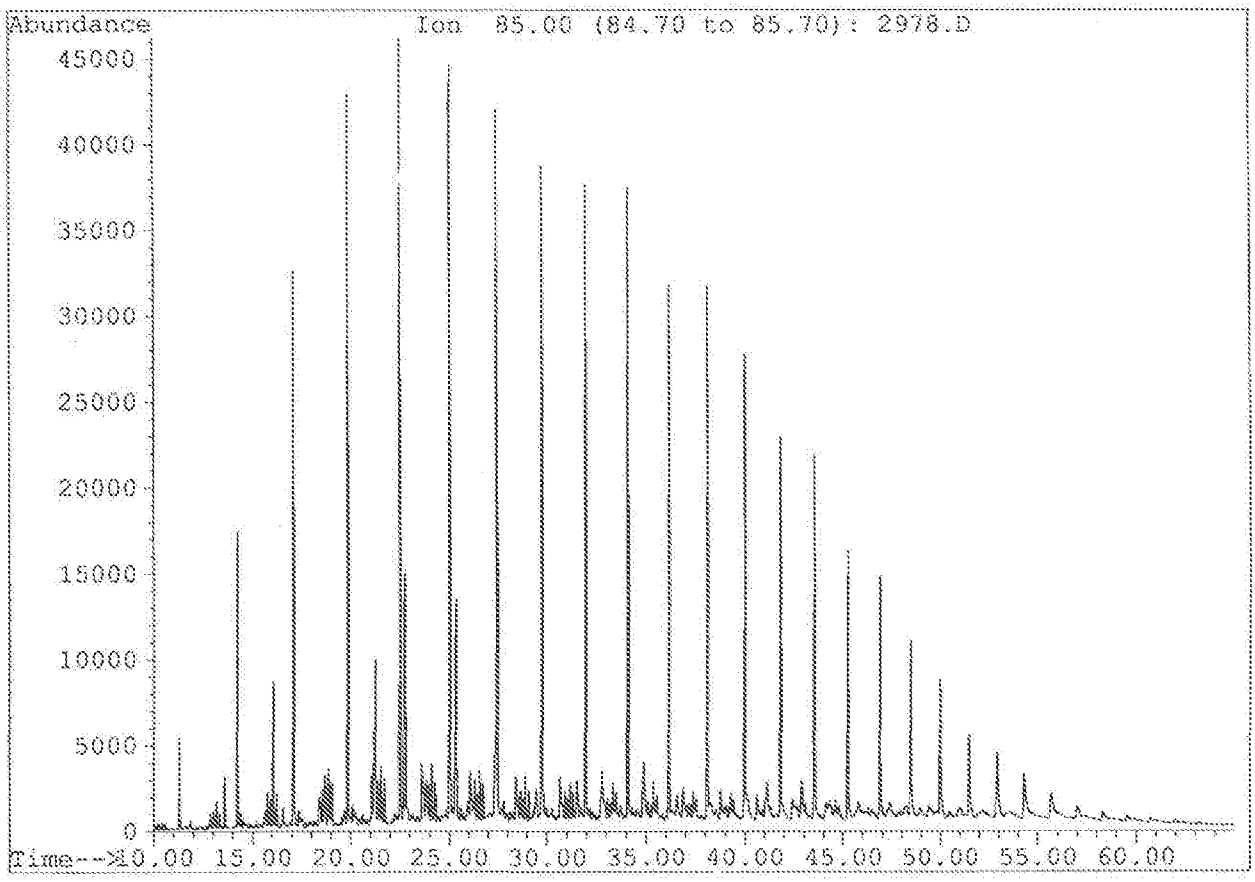
Last peak calibration: Thu Mar 18 14:42:11 1993





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Quantitation database: SATURATE BIOMARKERS
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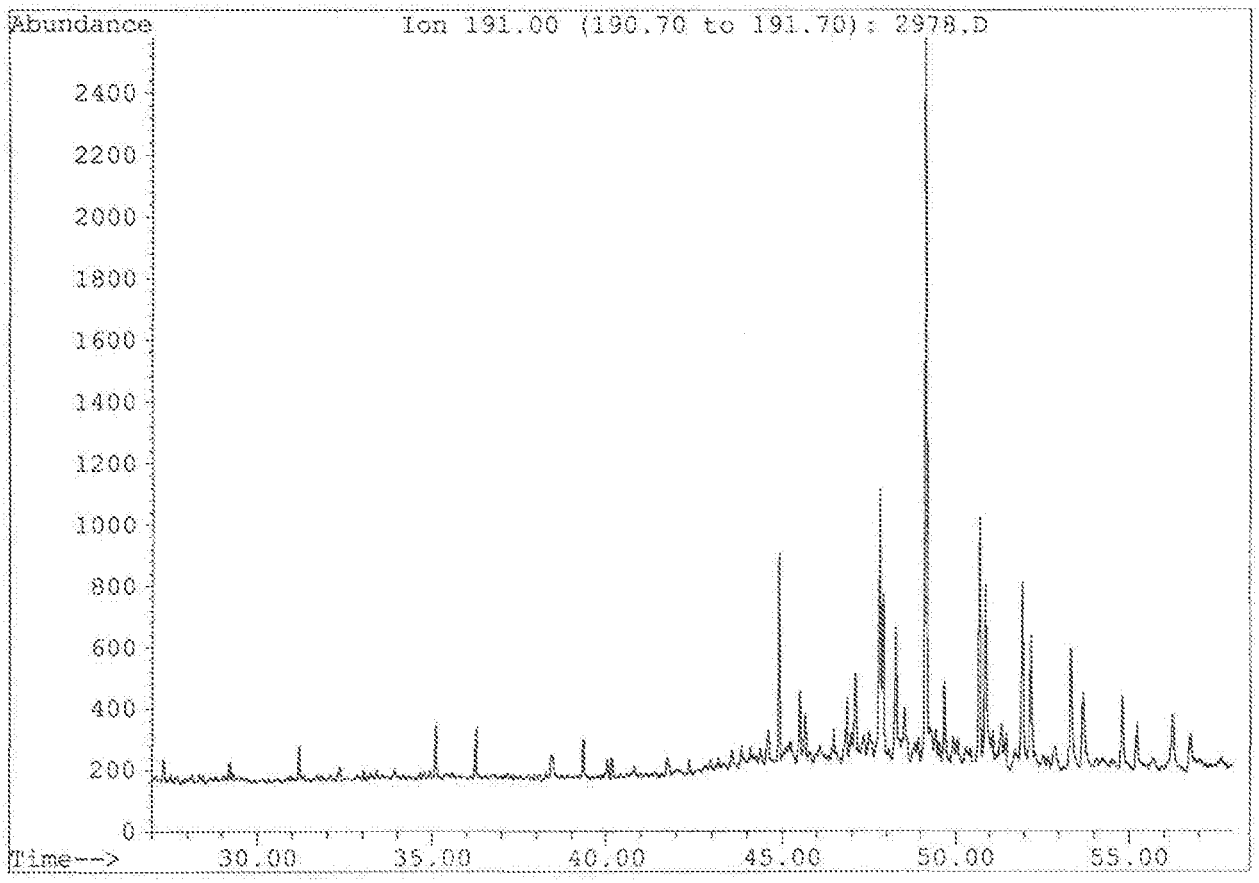

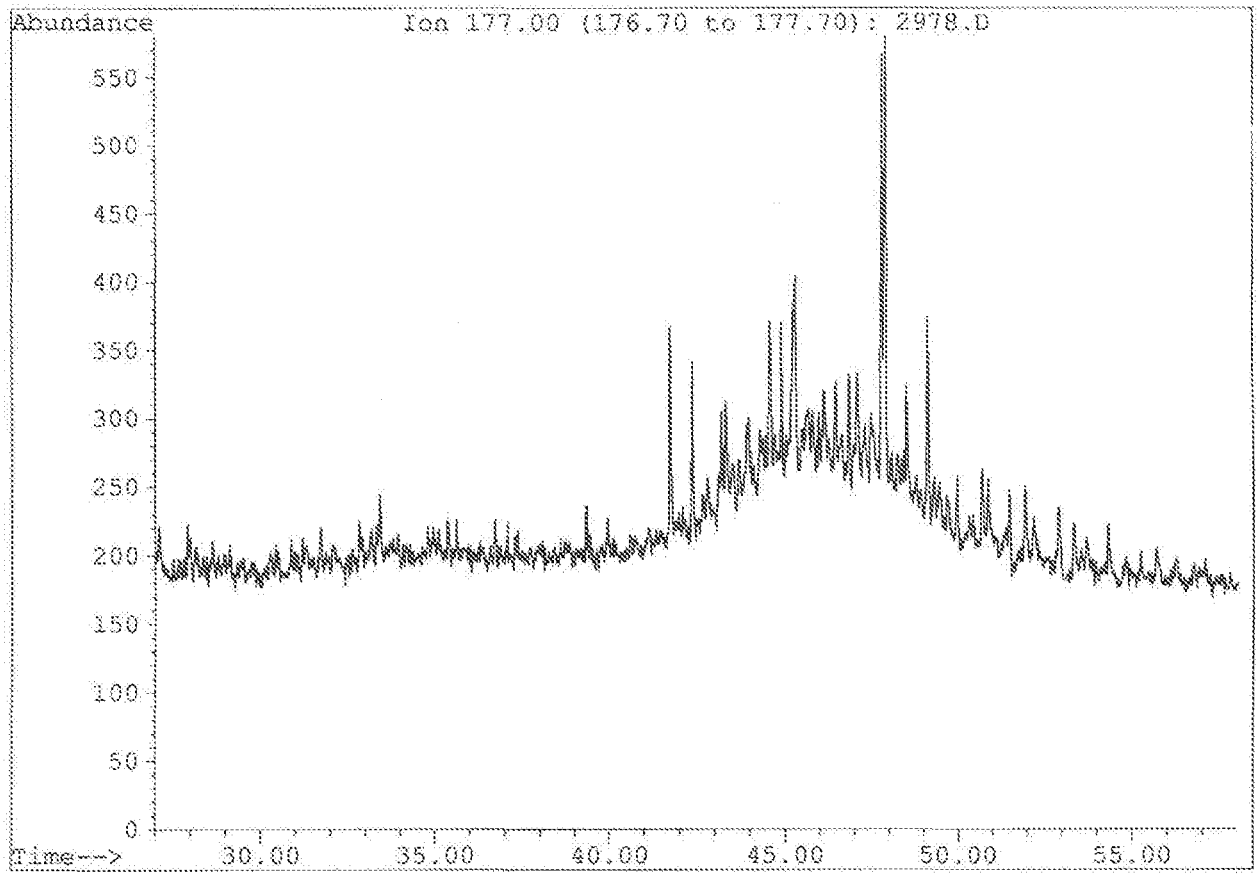

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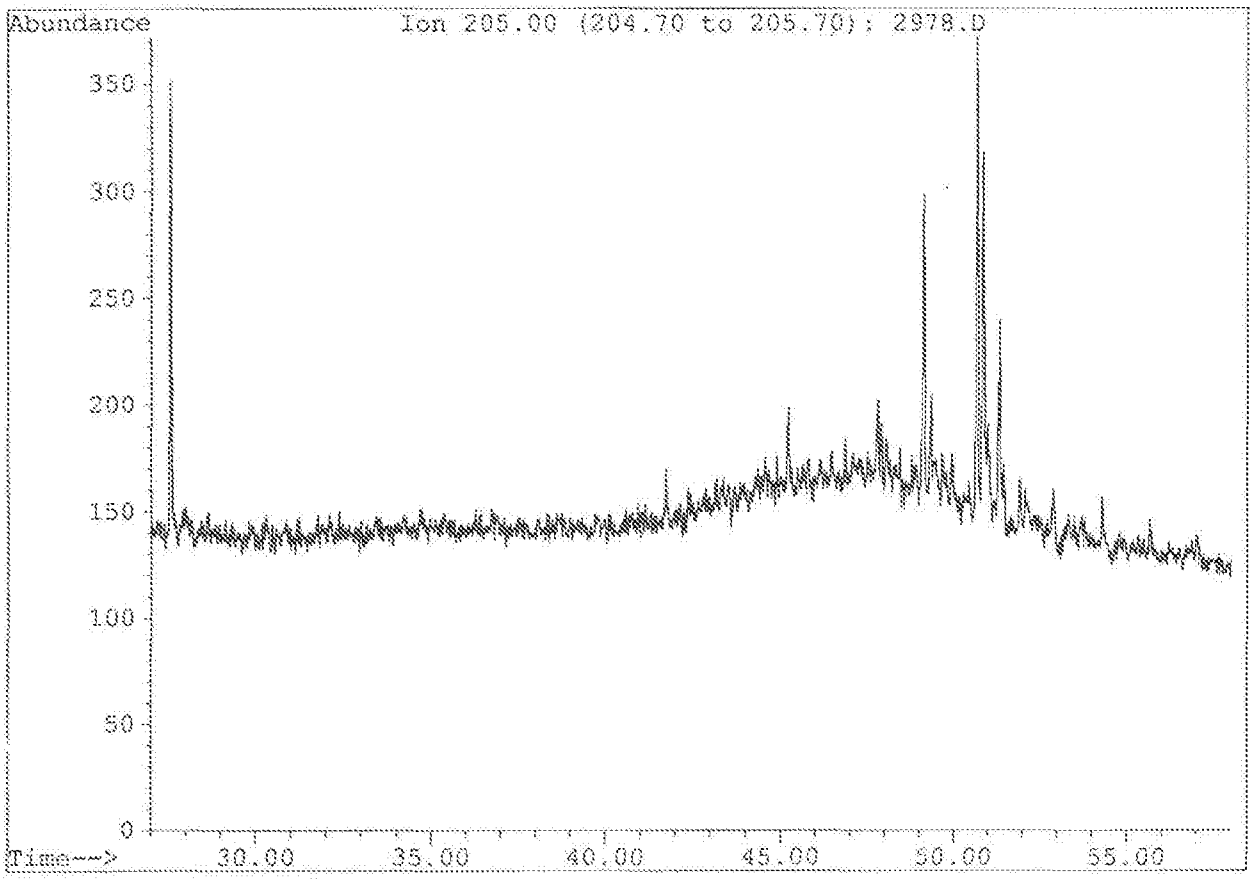
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993



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Method: MSDS.M
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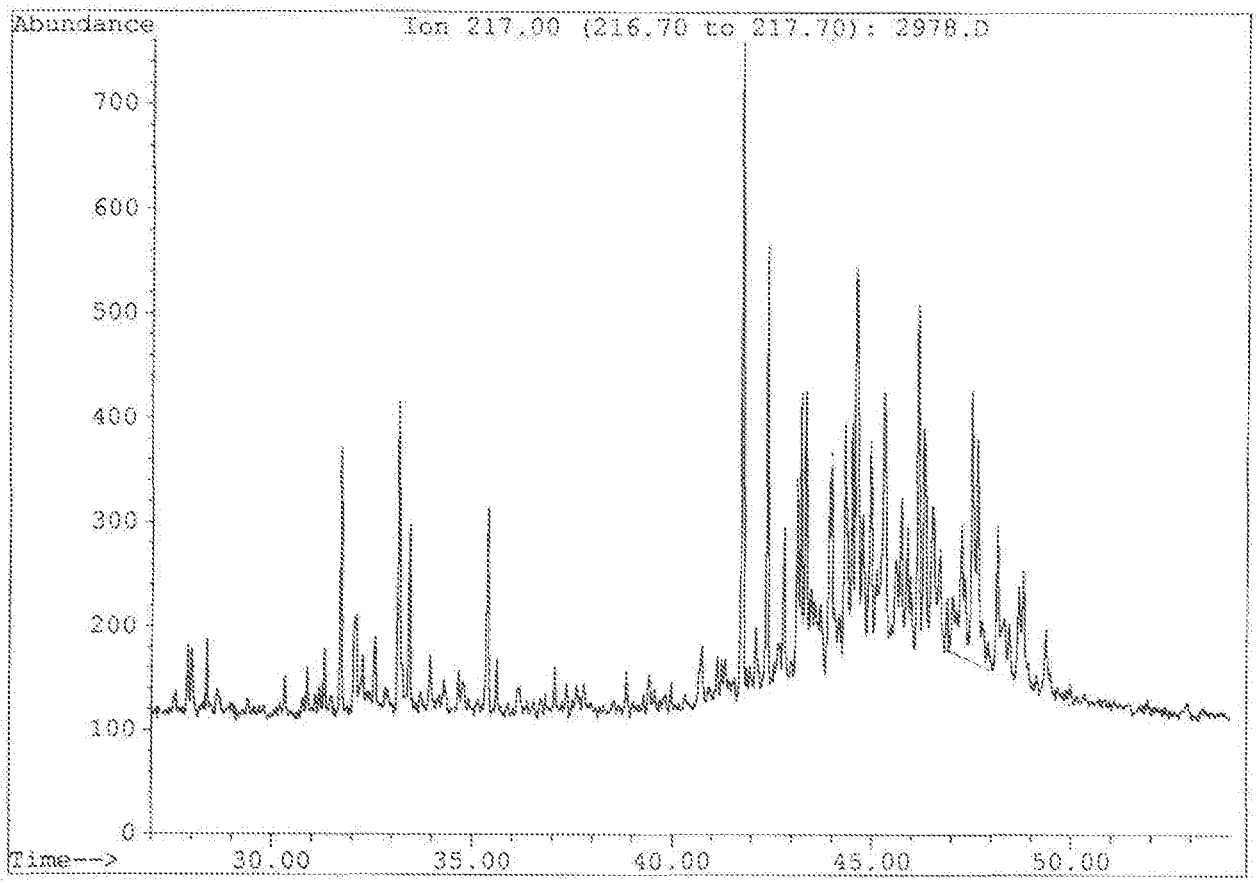

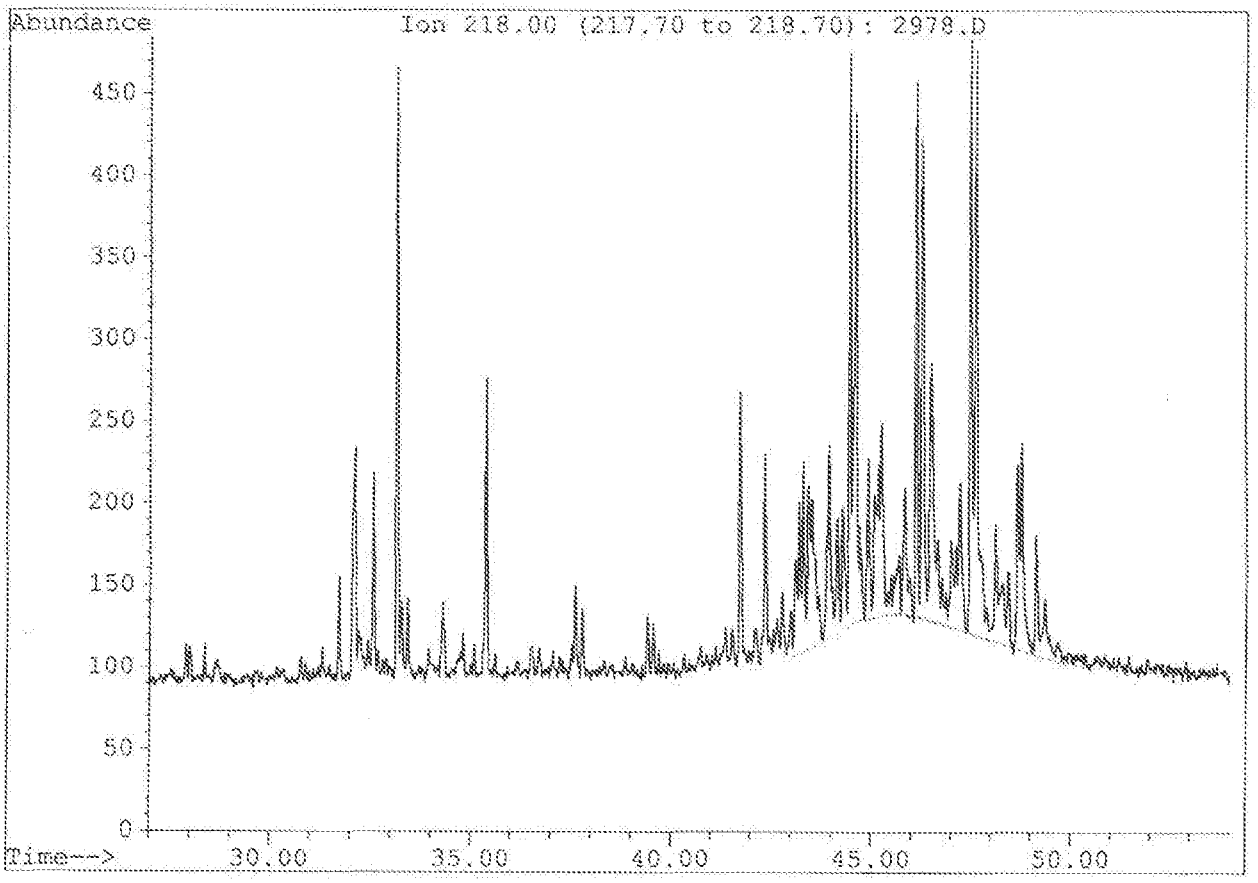

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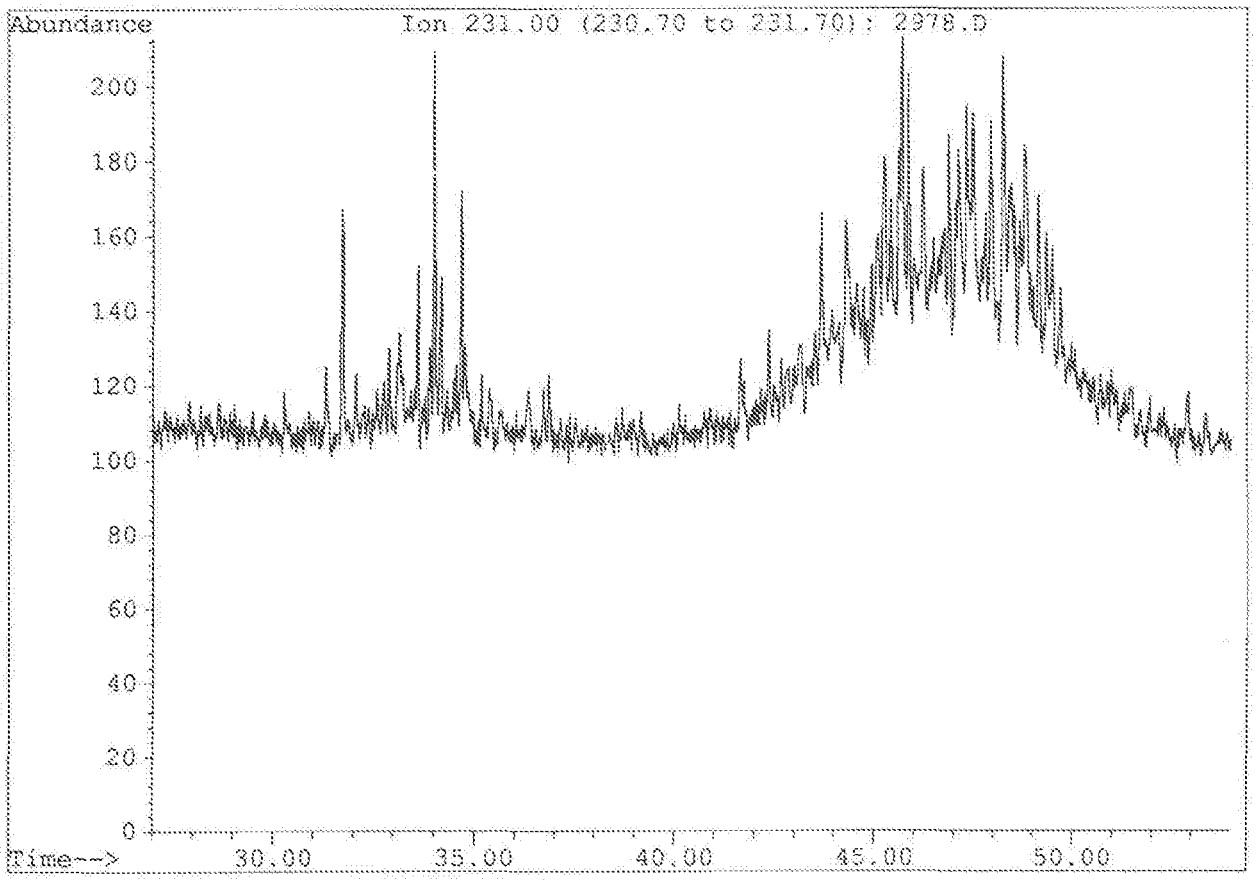
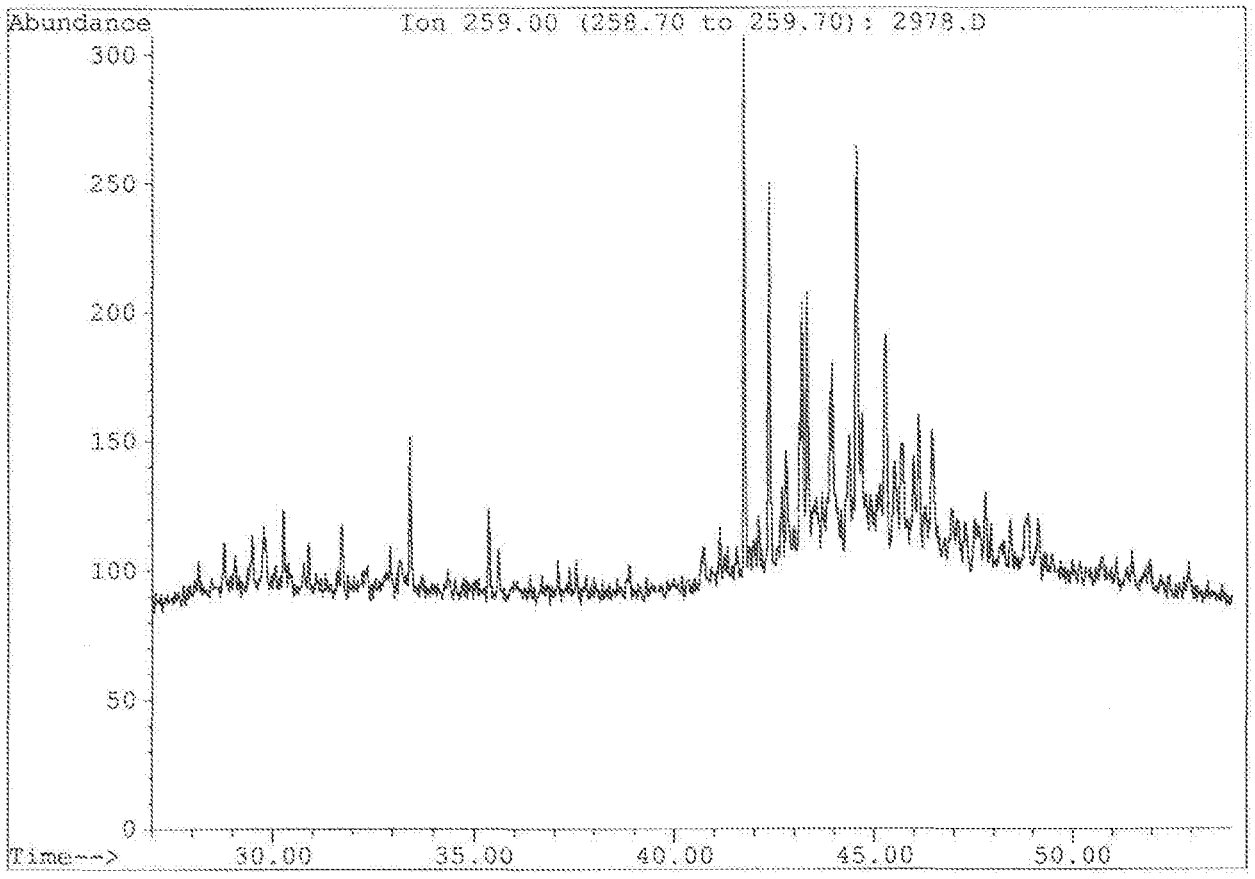
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





Data File: C:\HPCHEM\1\DATA\B340809S\3170_75.D
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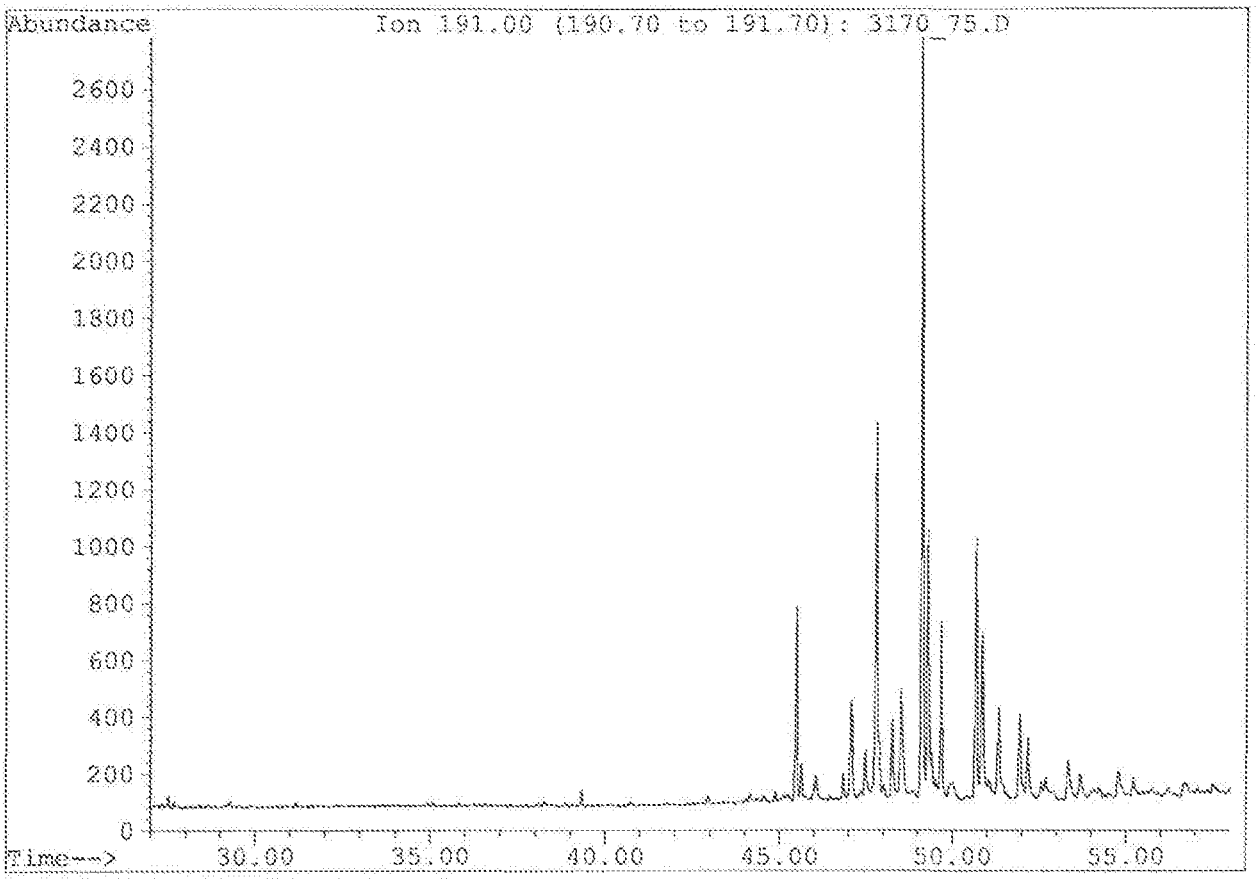
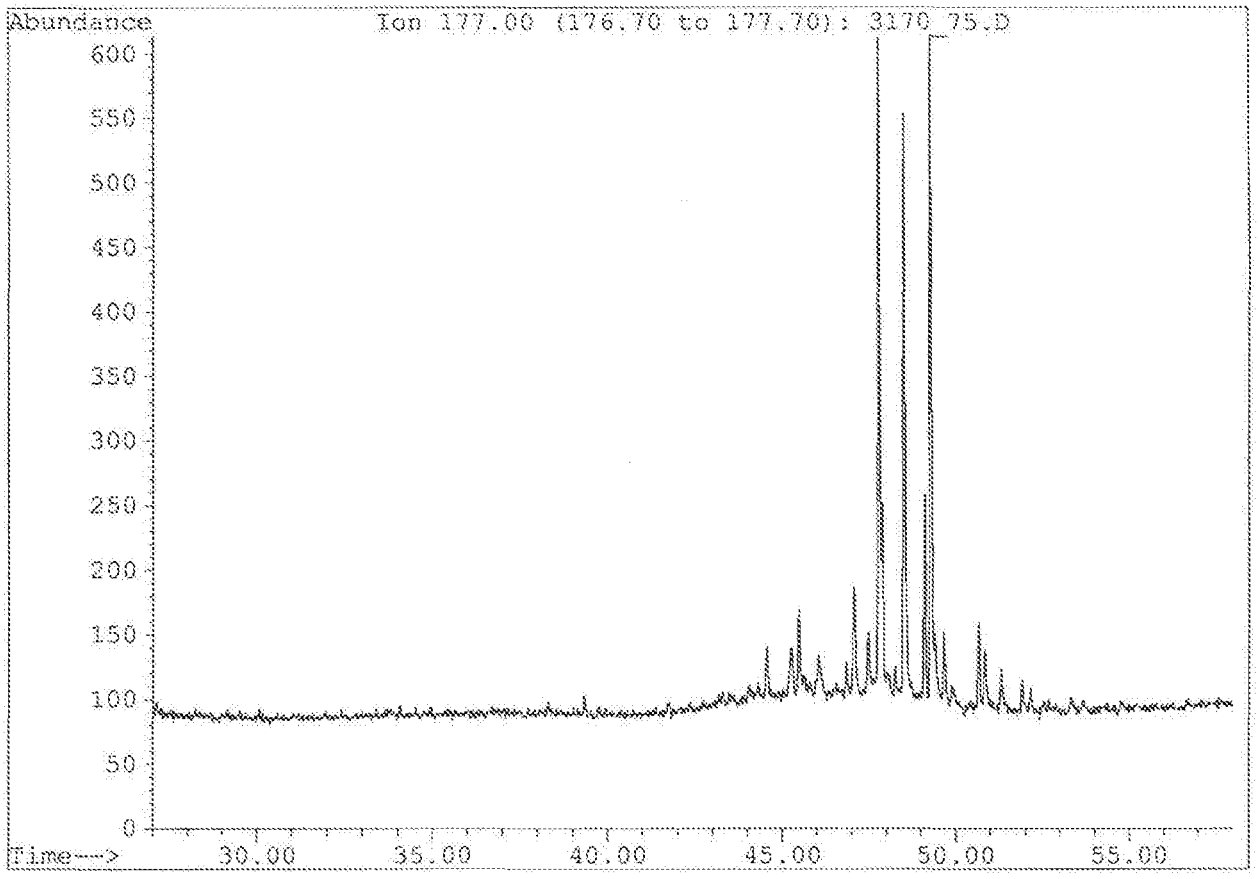
Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





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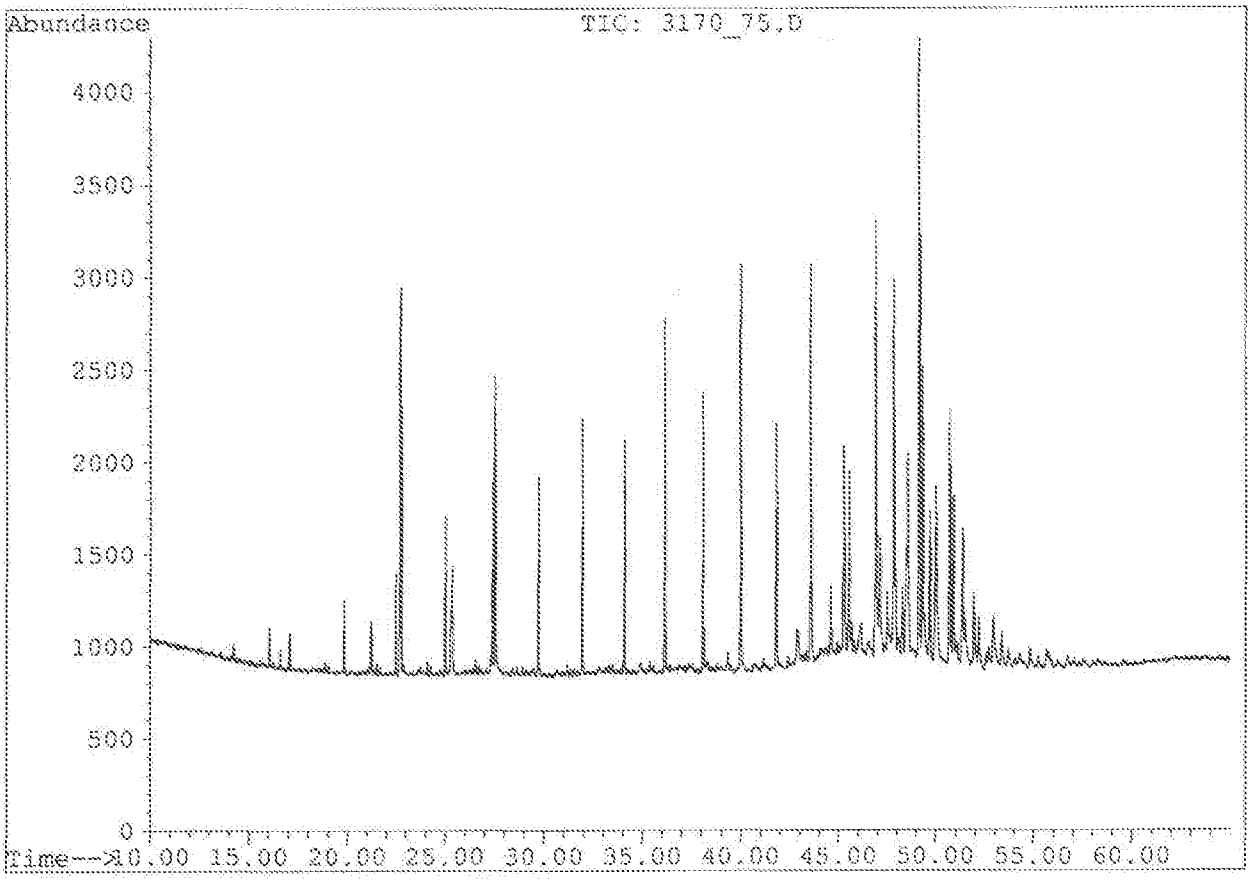
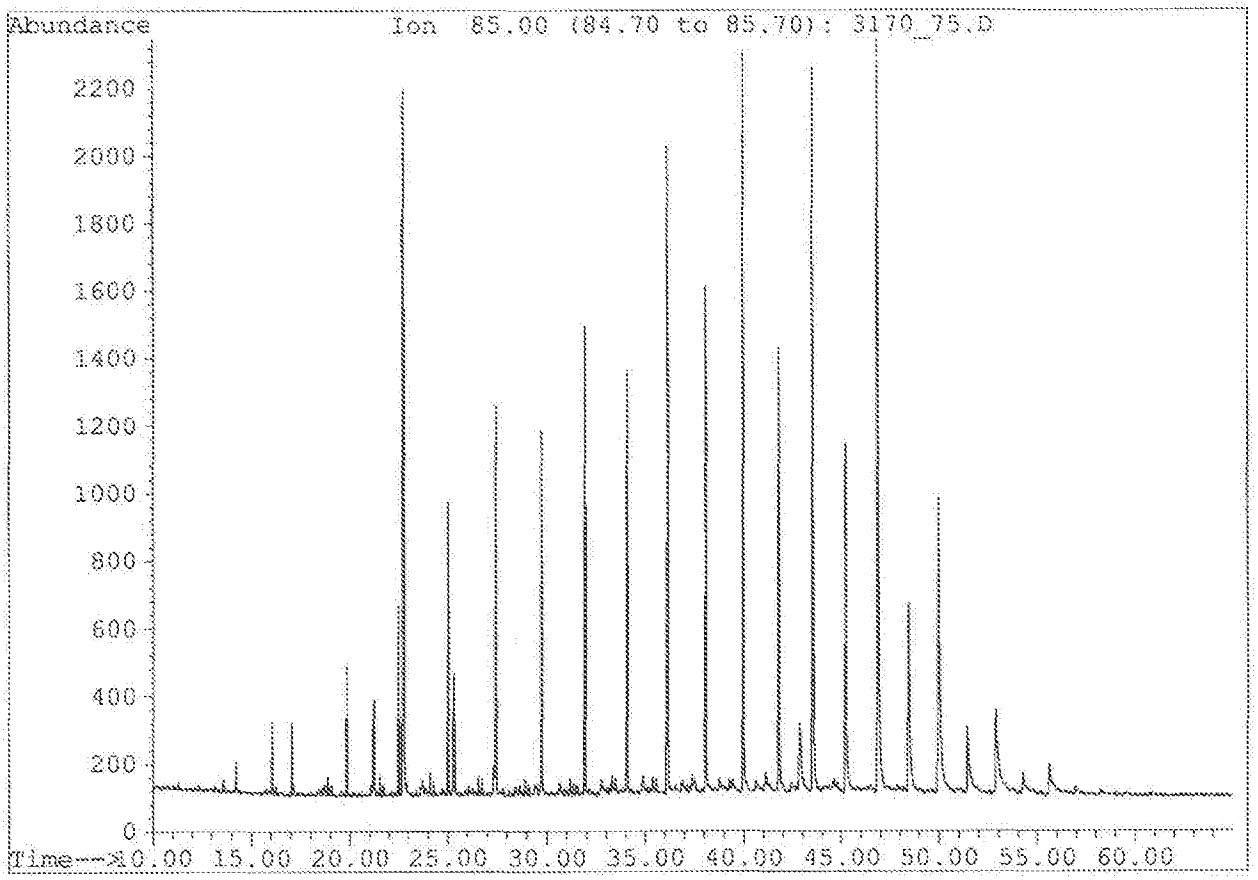
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993





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Misc:

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Quantitation database: SATURATE BIOMARKERS
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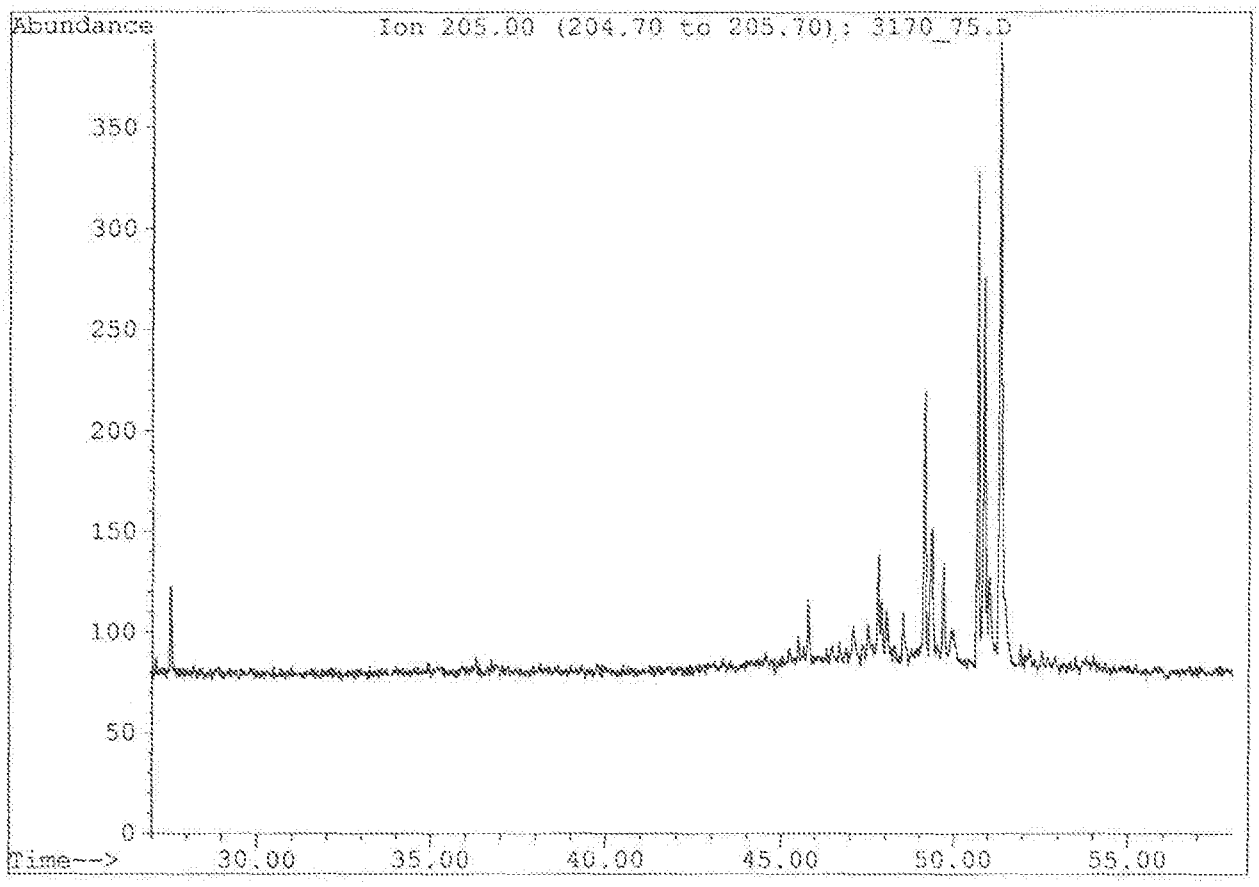

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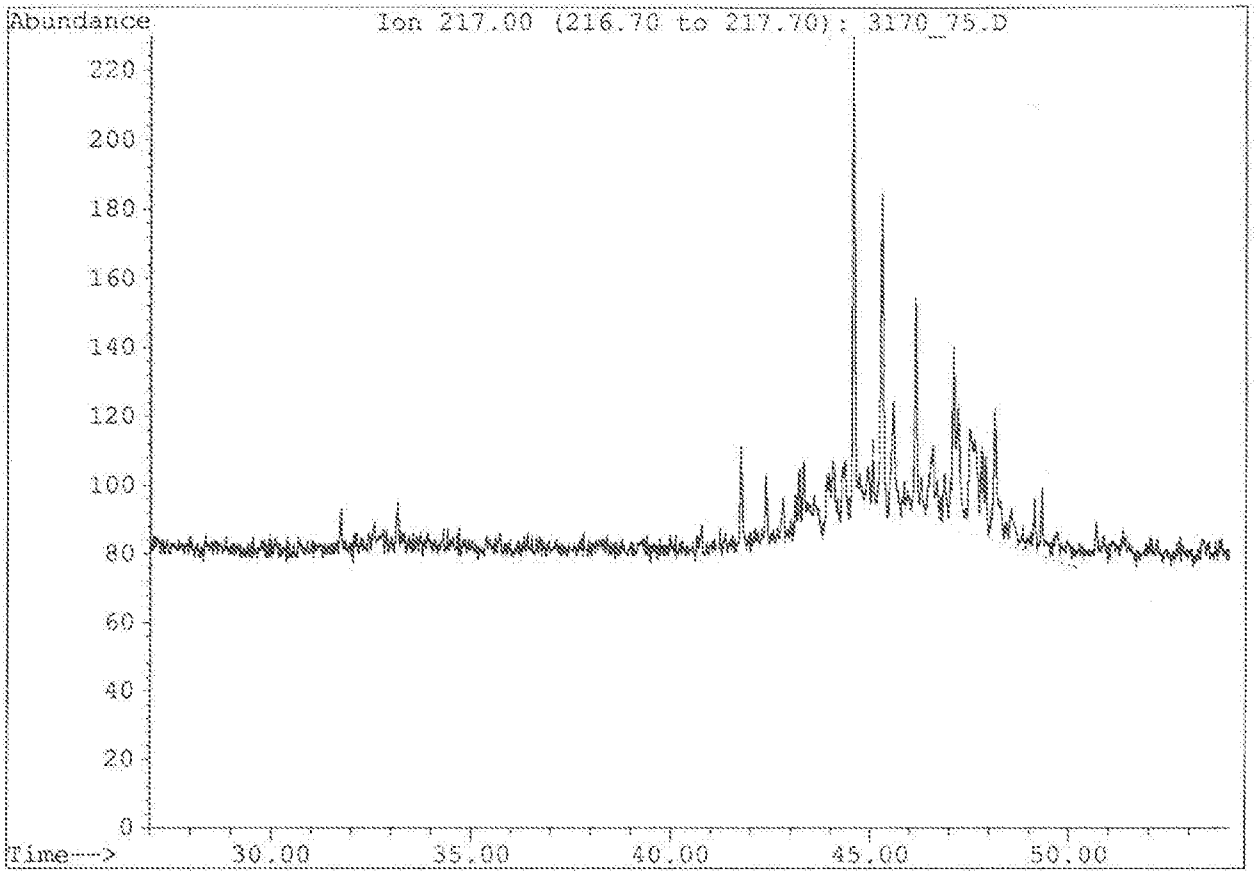
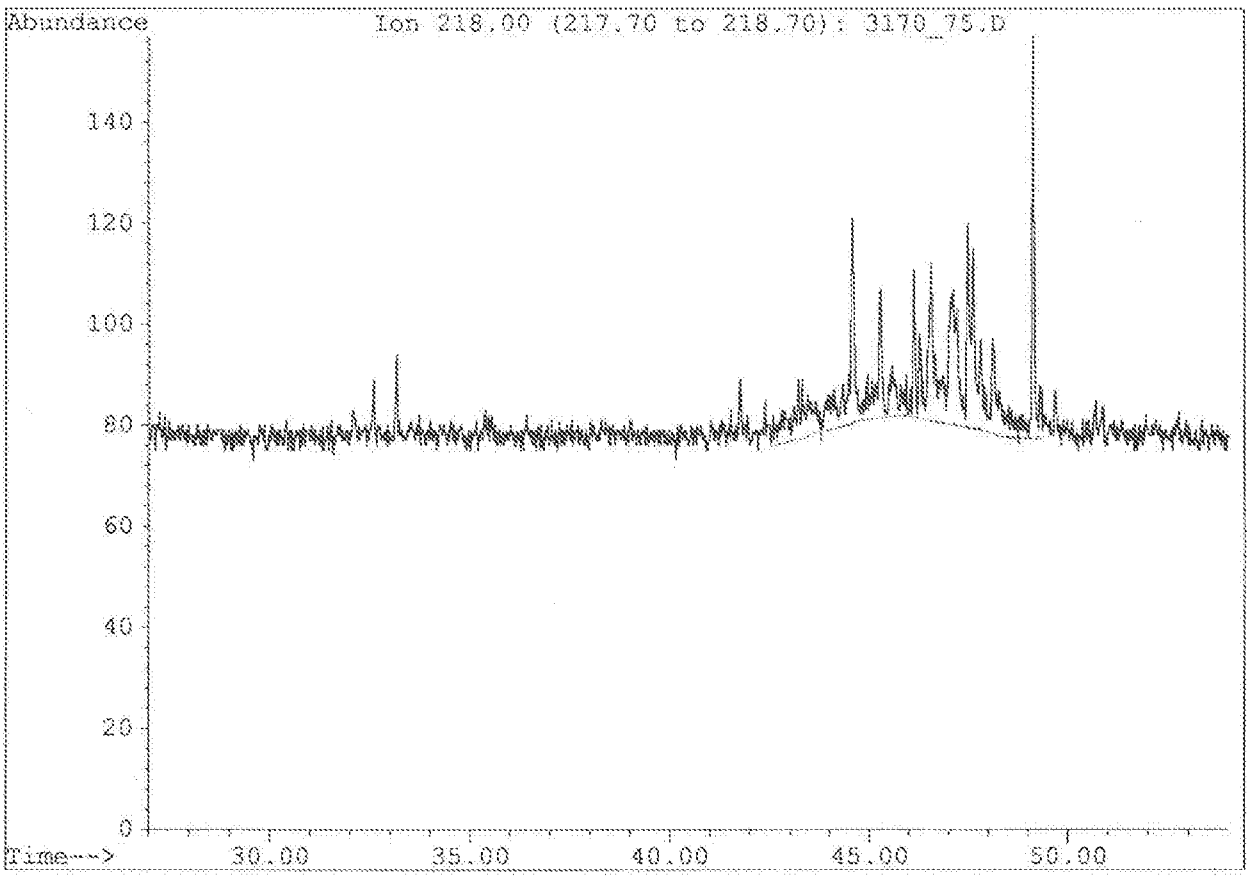
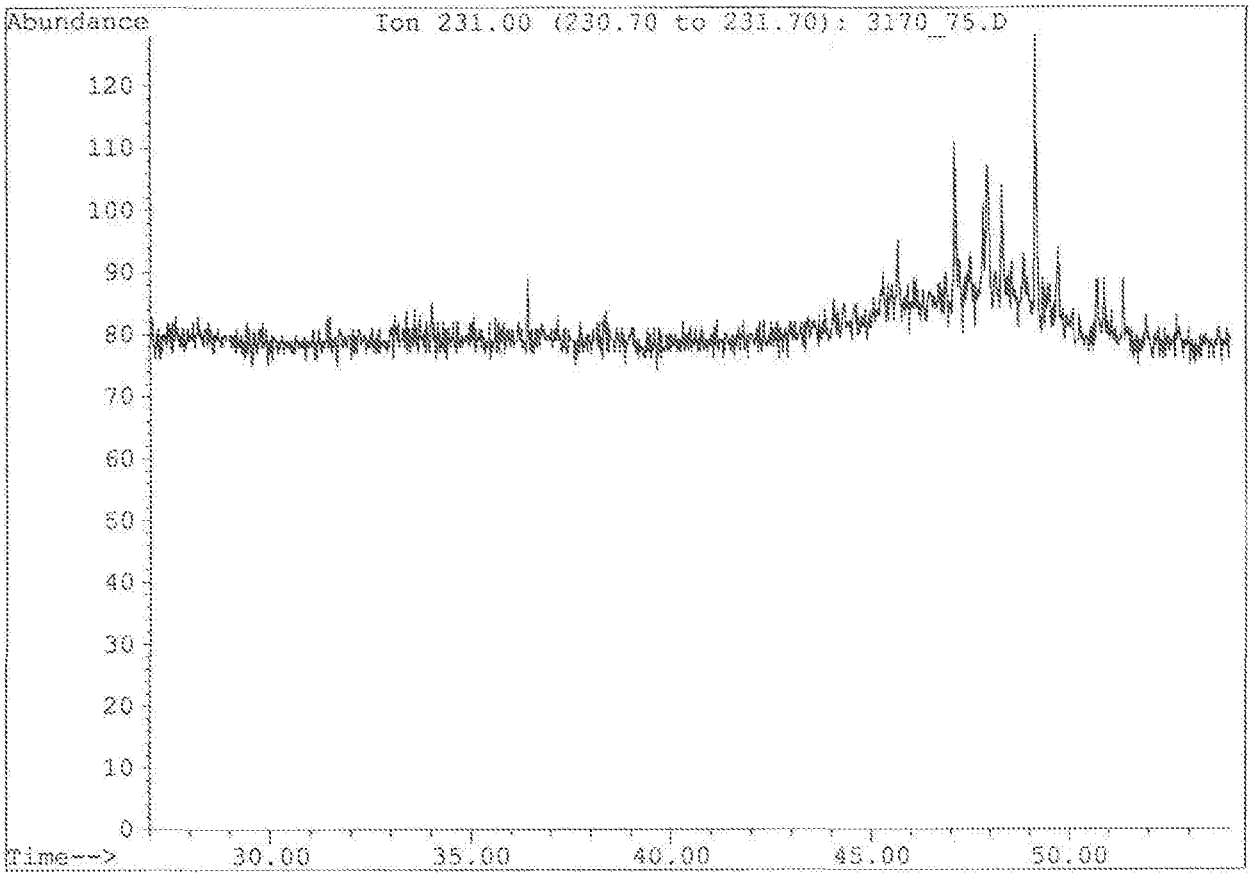
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993

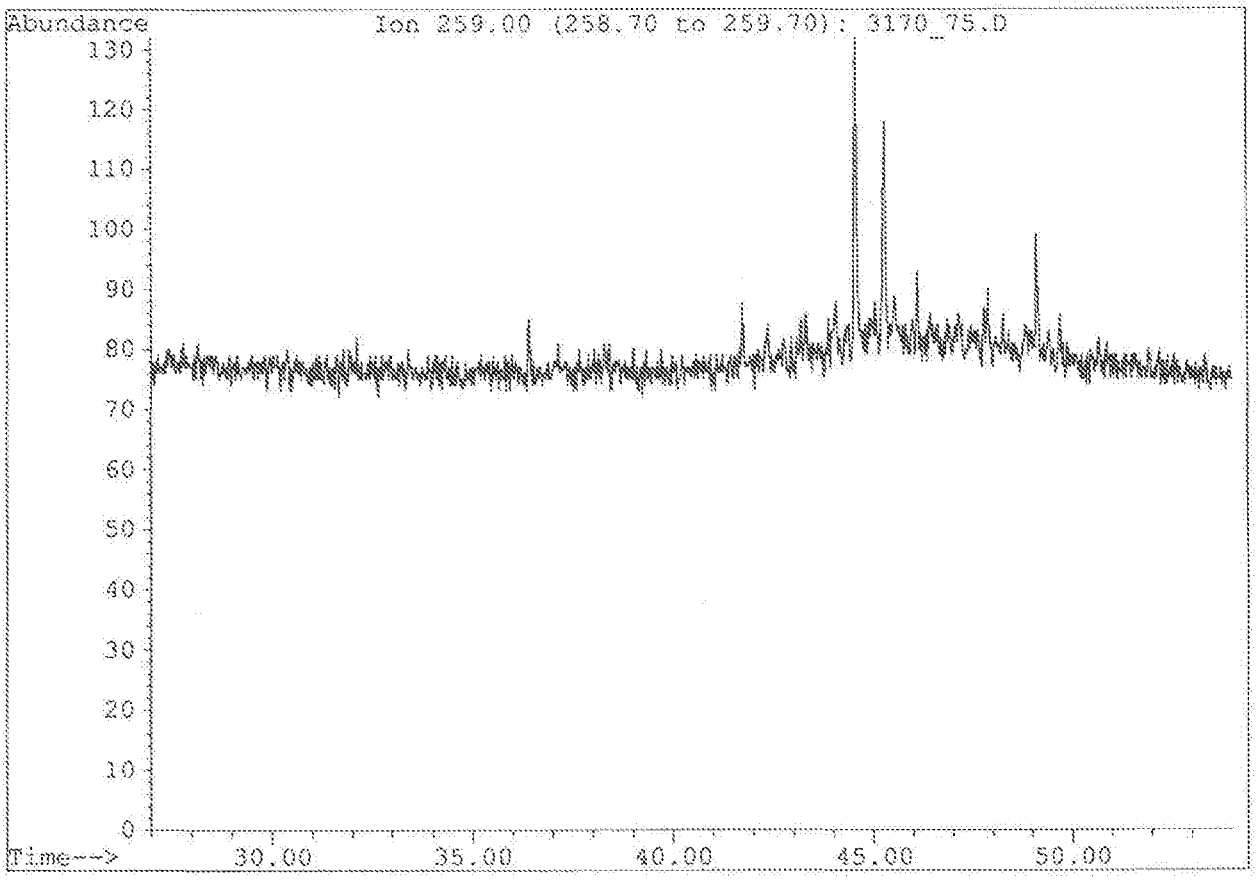




Data File: C:\HPCHEM\1\DATA\B3408098\3170_75.D
Name: sample 1
Misc:

Method: MSDS.M
Operator ID: jorunn kristine
Quantitation database: SATURATE BIOMARKERS
Last peak calibration: Thu Mar 18 14:42:11 1993

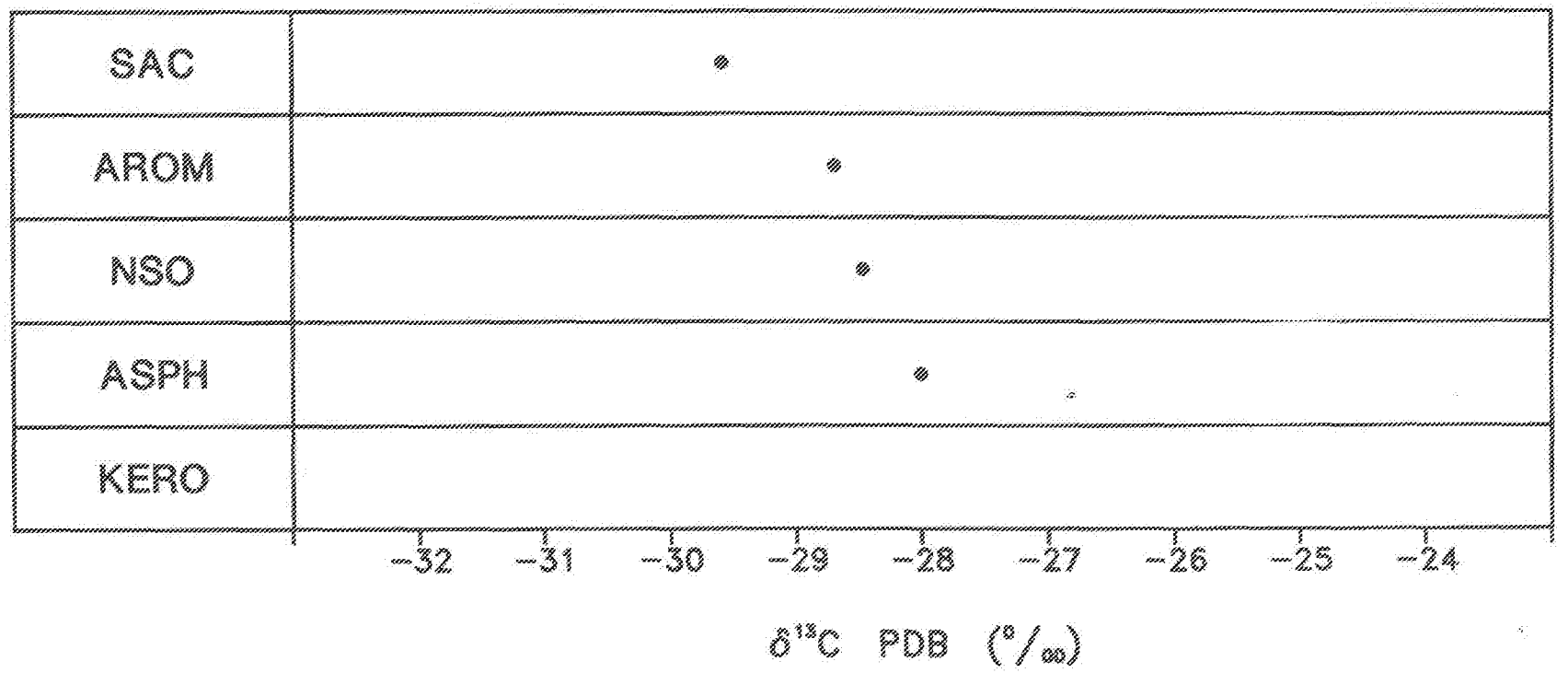




APPENDIX IV

Galimov plots.

WELL 34/8-9S Depth: 2925.00 m

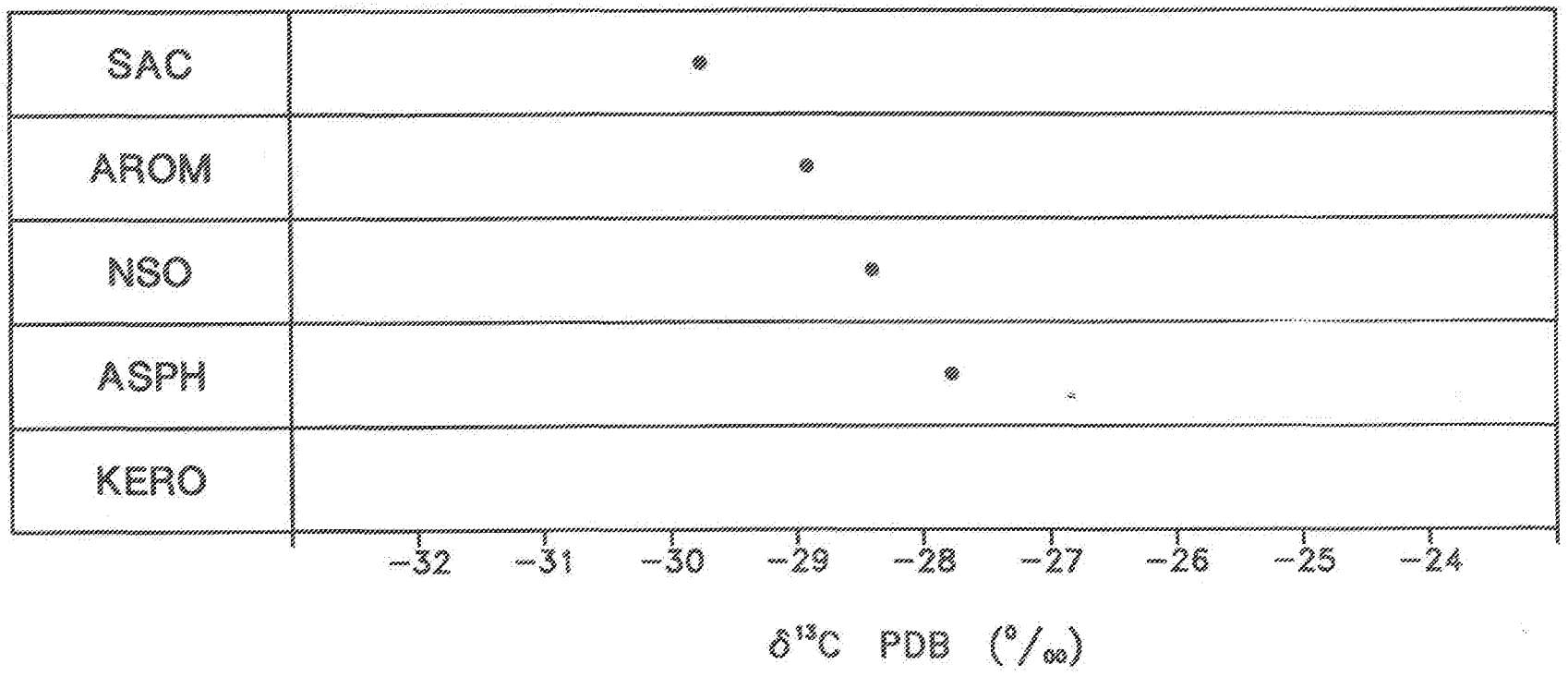


WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

WELL 34/8-9S Depth: 2926.30 m

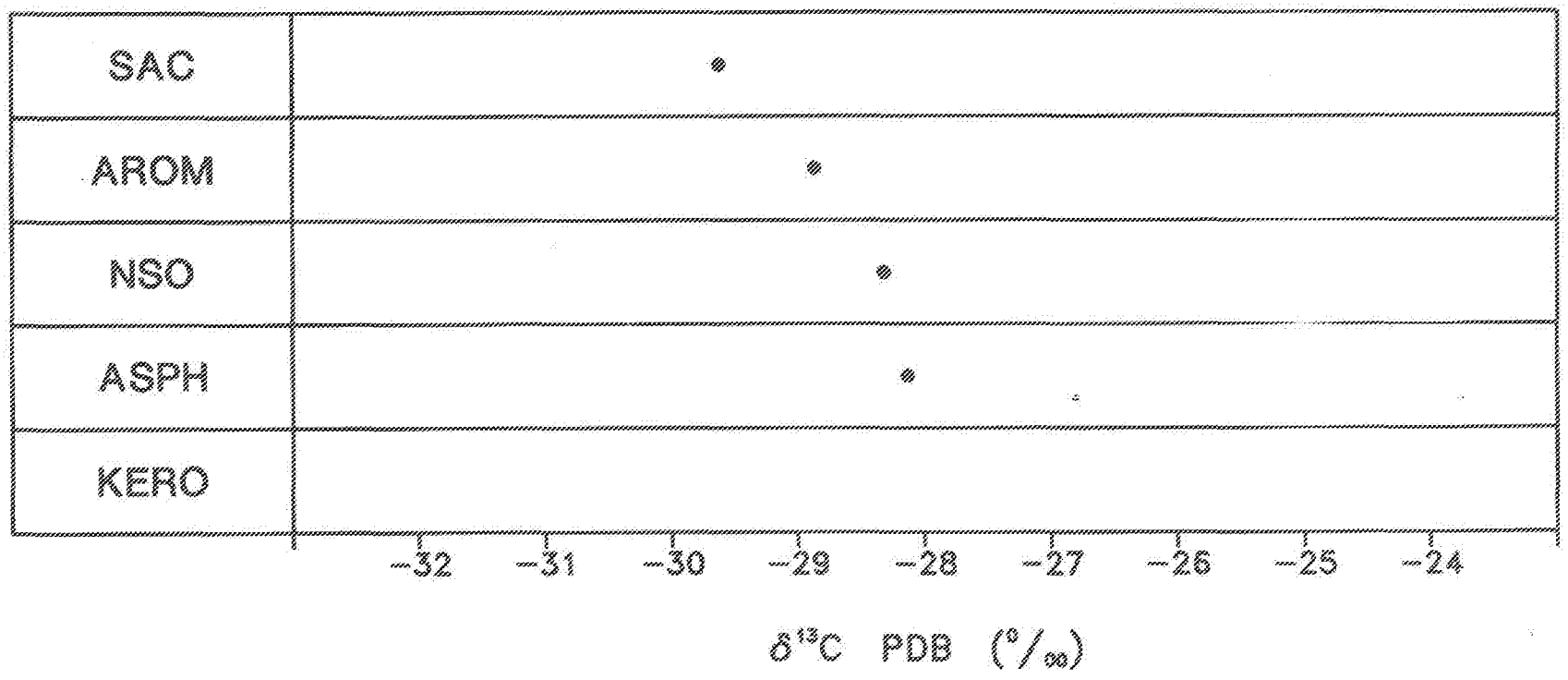


WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

WELL 34/8-9S Depth: 2932.00 m

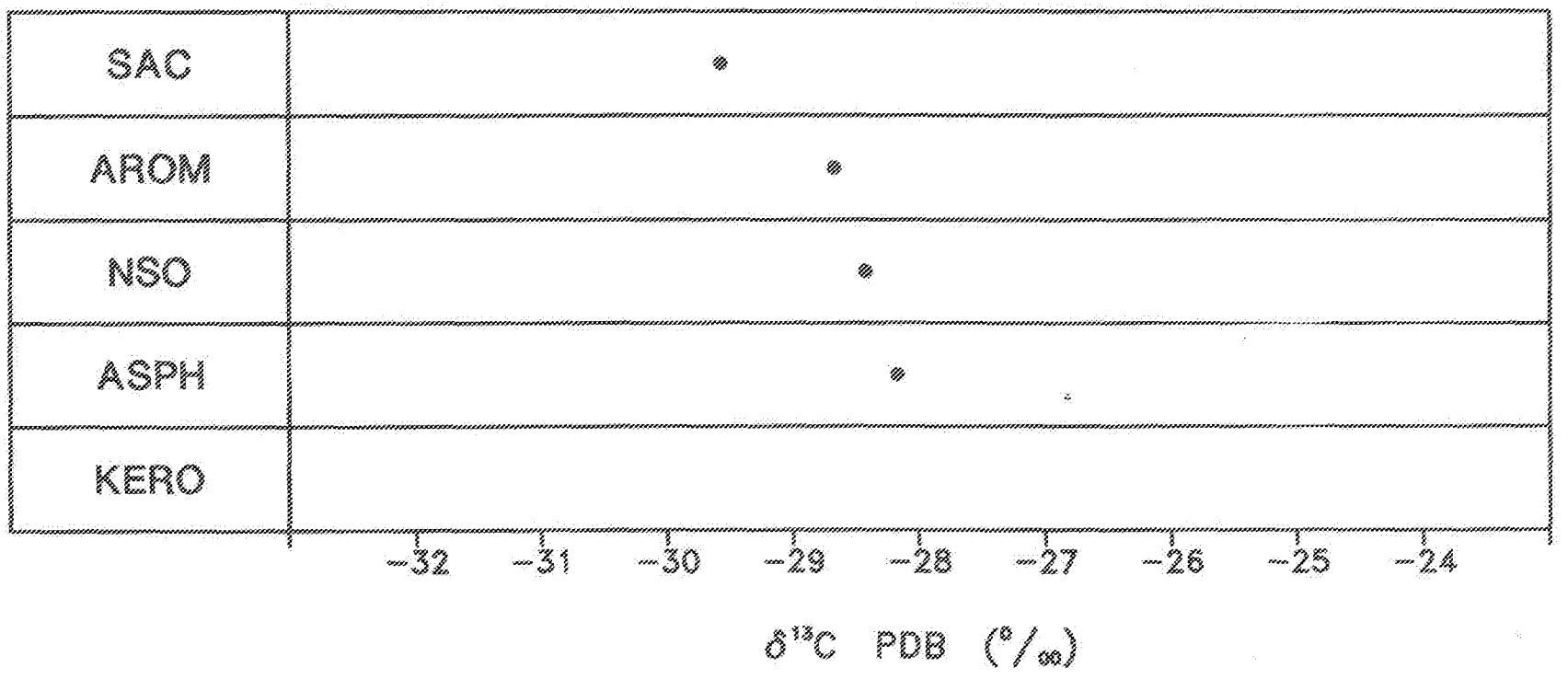


WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

WELL 34/8-9S Depth: 2942.00 m

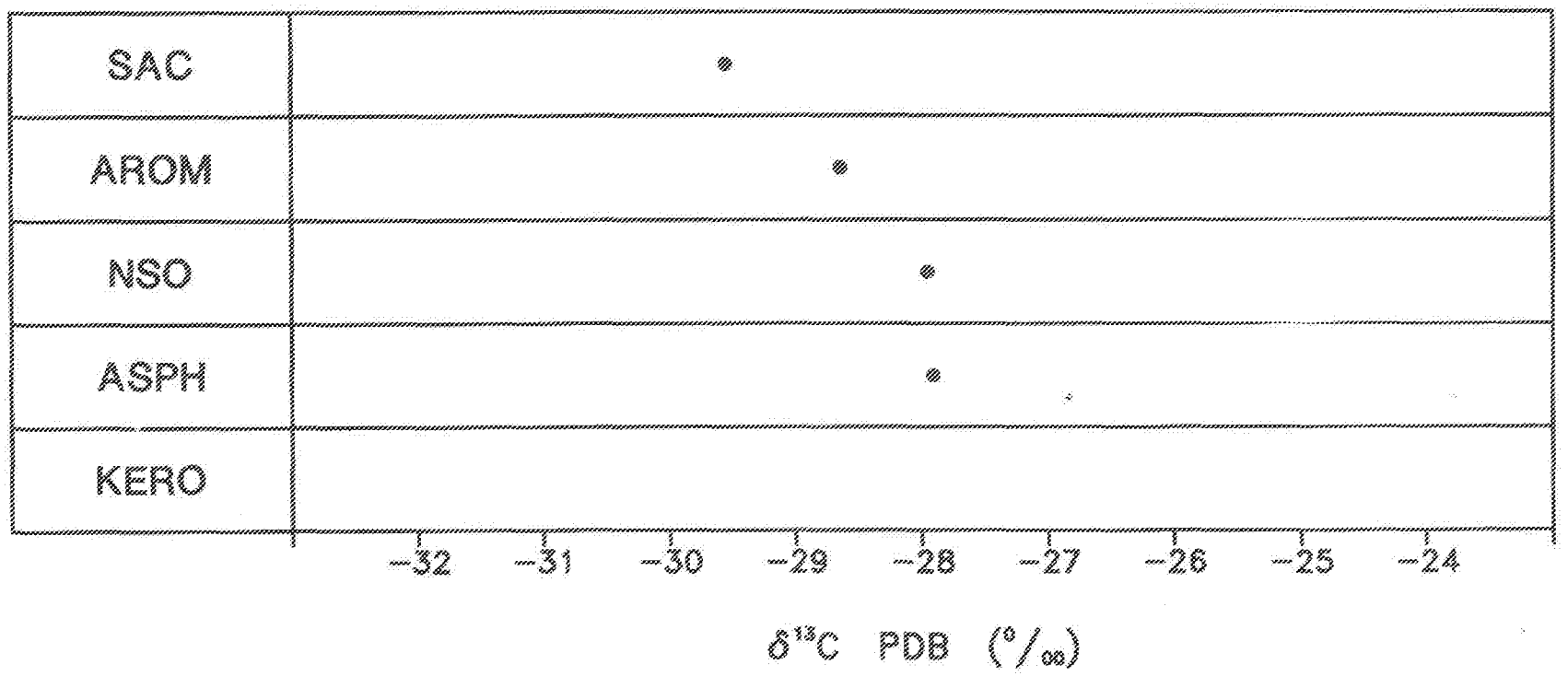


WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

WELL 34/8-9S Depth: 2952.00 m

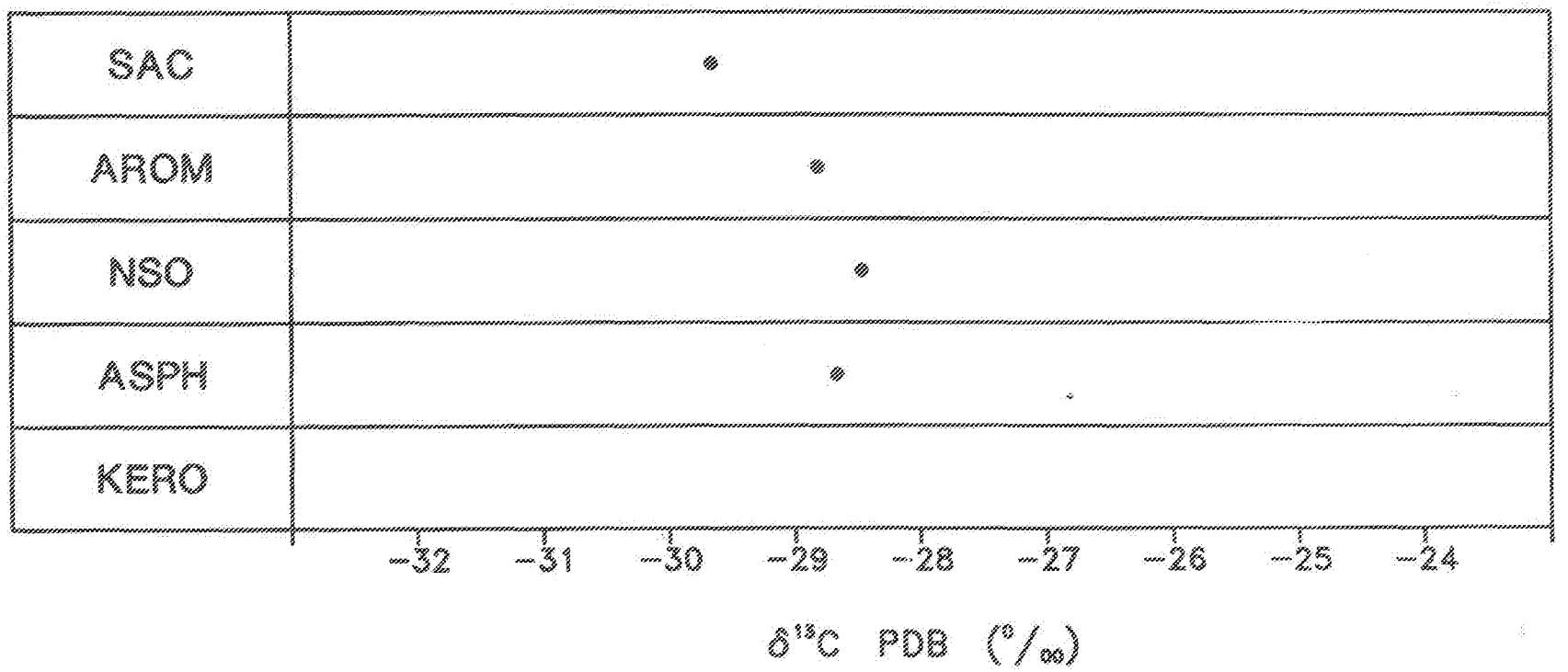


WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

WELL 34/8-9S Depth: 2965.00 m

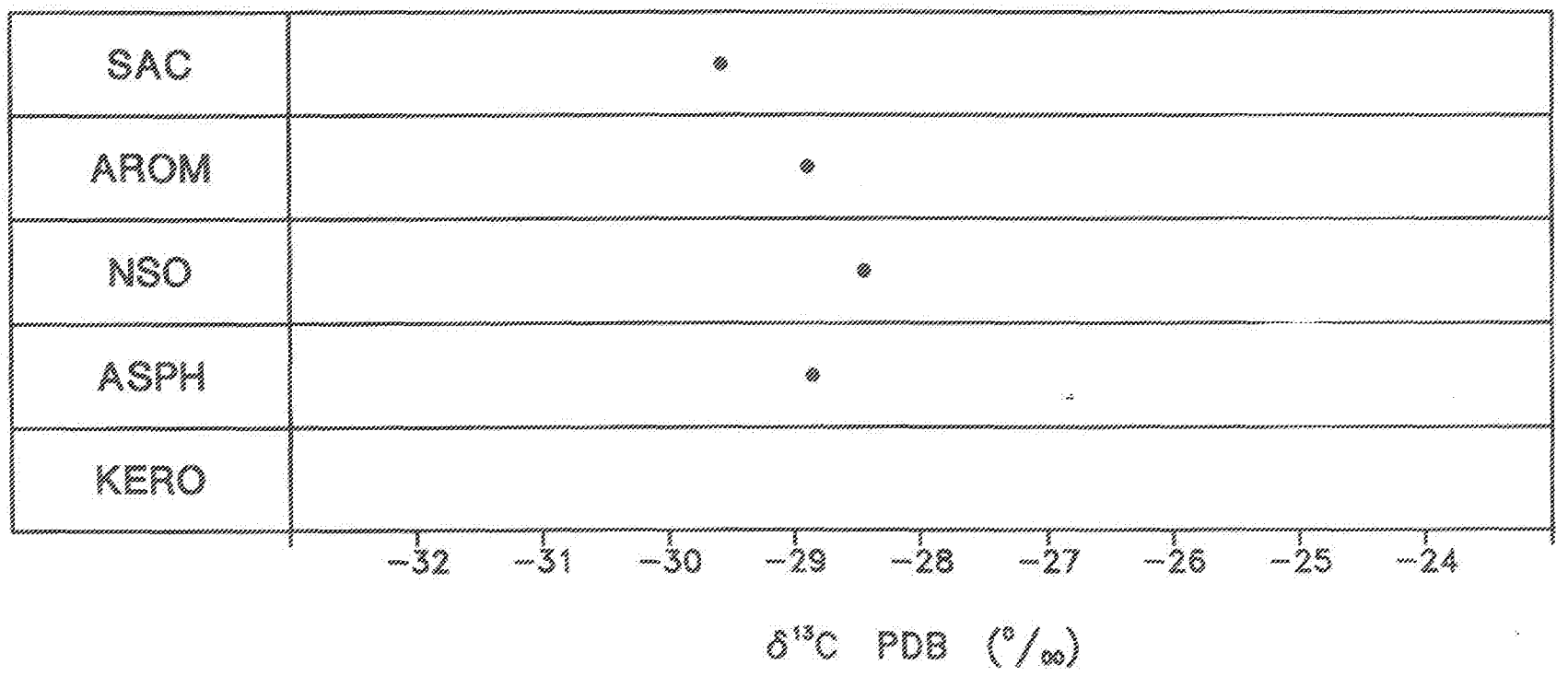


WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

WELL 34/8-9S Depth: 2978.00 m

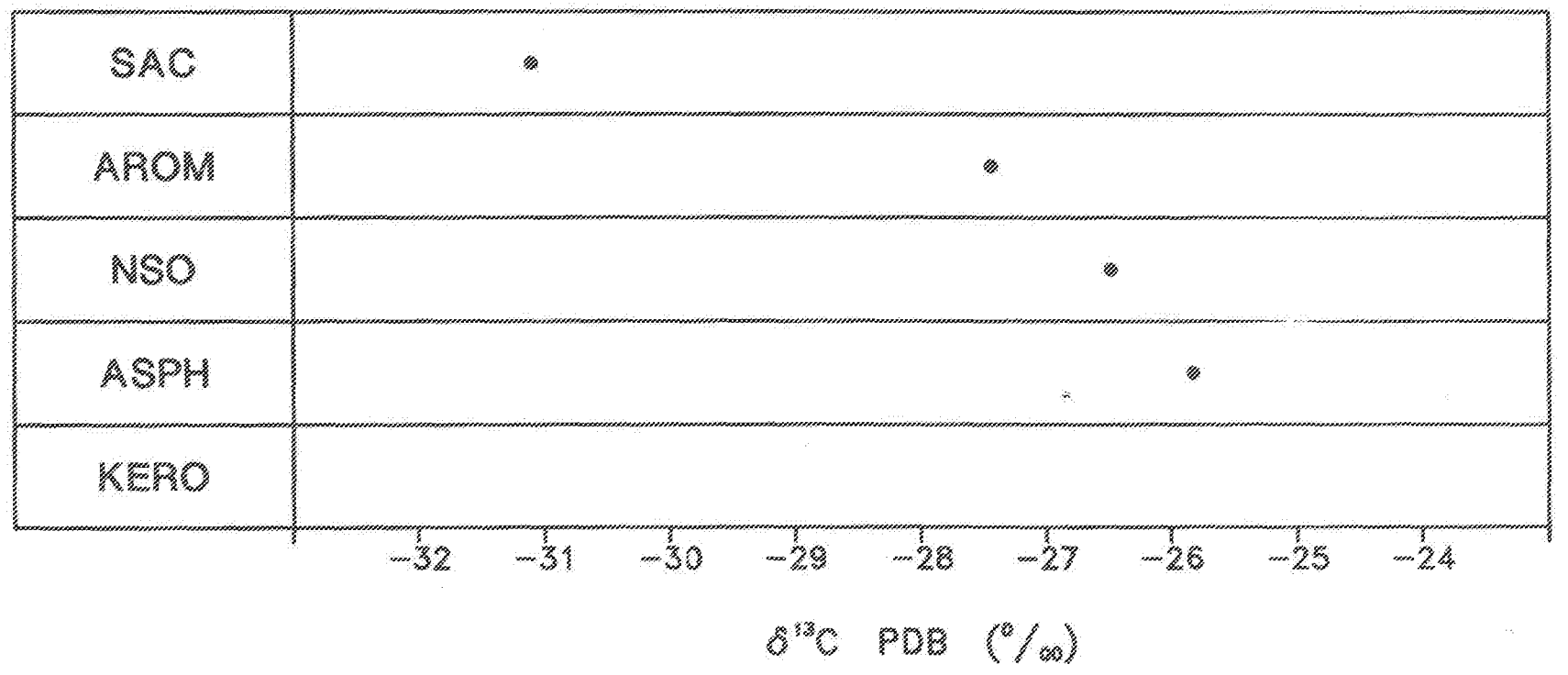


WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

WELL 34/8-9S Depth: 3170.80 m



WHOLE OIL $\delta^{13}C$ =

WHOLE EXTRACT $\delta^{13}C$ =

PYROLYSATE $\delta^{13}C$ =

APPENDIX V

Report on stable carbon isotopes
prepared by Geolab Nor.

REPORT: DATARAPPORT ISOTOPANALYSER FOR 34/8-9S	
CLIENTS: NORSK HYDRO Att: Elin Rein	
RESPONSIBLE SCIENTIST: Trine Øyås	
RESPONSIBLE TECHNICIAN: Trine Øyås Rita P. Moe	
DATE: 11.03.93	**GEOLAB PROJECT:** 62039 **CLIENTS REF.:** FB 26530

EXPERIMENTAL

Isotope Ratio Mass Spectrometry

The isotope analysis were performed on a dual inlet VG SIRA 10 instrument. The combustion of the samples were done by a Carlo Erba EA 1108 element analyser directly connected to the inlet system of the mass spectrometer.

The combustion temperature was 1020°C and the carries gas used was Helium. After the combustion H_2O and CO_2 were trapped in different cool traps. The CO_2 gas was then heated up before it was admitted to the mass spectrometer. The whole operation was controlled by a IBM PC50 computer system.

δ-values

The isotope ratios are given as δ-values in $^0/_{00}$ versus the PDB-standard:

$$\delta^{13}C = (R \text{ sample} - R \text{ standard} / R \text{ standard}) * 1000$$

$$R = {}^{13}C / {}^{12}C$$

The PDB standard (a marine chalk of the Pee Dee-formation, USA) was created by Craig 1957. All results of $^{13}C / ^{12}C$ - analysis of organic matter today are calculated (Craig correction) against this international standard.

Reproducebility

The presision of the combustion system and the mass spectrometer is controlled by determinations of an international calibrated standard, NBS22 oil and a house standard of carbon.

Double analysis on samples are also done.

Table 1: Tabulation of carbon isotope data for EOM/EOM - fractions for well NOCS 34/8-9S

Depth unit of measure: m

Depth	Typ	Lithology	EOM	Saturated	Aromatic	NSO	Asphaltenes	Kerogen	Sample
2925.00	ext	bulk	-	-29.59	-28.69	-28.47	-28.00	-	0001-0
2926.30	oil	bulk	-	-29.76	-28.91	-28.54	-27.76	-	0002-0
2932.00	ext	bulk	-	-29.62	-28.86	-28.32	-28.13	-	0003-0
2942.00	ext	bulk	-	-29.57	-28.67	-28.42	-28.17	-	0004-0
2952.00	ext	bulk	-	-29.55	-28.64	-27.95	-27.91	-	0005-0
2965.00	ext	bulk	-	-29.66	-28.82	-28.47	-28.67	-	0006-0
2978.00	ext	bulk	-	-29.58	-28.89	-28.44	-28.85	-	0007-0
3170.75	ext	bulk	-	-31.06 -31.14	-27.43	-26.47	-25.82	-	0008-0

Table 2: Tabulation of cv values from carbon isotope data for well NOCS 34/8-9S

Depth unit of measure: m

Depth	Typ	Lithology	Saturated	Aromatic	cv value	Interpretation	Sample
2925.00	ext	bulk	-29.59	-28.69	-0.48	Marine	0001-0
2926.30	oil	bulk	-29.76	-28.91	-0.54	Marine	0002-0
2932.00	ext	bulk	-29.62	-28.86	-0.78	Marine	0003-0
2942.00	ext	bulk	-29.57	-28.67	-0.49	Marine	0004-0
2952.00	ext	bulk	-29.55	-28.64	-0.47	Marine	0005-0
2965.00	ext	bulk	-29.66	-28.82	-0.59	Marine	0006-0
2978.00	ext	bulk	-29.58	-28.89	-0.95	Marine	0007-0
3170.75	ext	bulk	-31.06 -31.14	-27.43	6.04	Terrigenous	0008-0