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Summary/Conclusion/Recommendation

The section from 2291.10 m to 2304.20 m, representing Shetland Group, Heather and Tarbert Fm's, is invaded by mature migrated hydrocarbons of a marine origin, and has a biomarker distribution similar to the produced oil from this well.

The maturity parameters show that the analyzed horizons, mainly of Jurassic age are in the early stage of oil generation.

The source rock potential is poor throughout the analyzed intervals, except for the coal samples which have a good source rock potensial.

Keywords
Source Rocks, Maturity, Coals
Migrated Hydrocarbons.

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INTRODUCTION.

Well 30/9-9, located in the Oseberg area was spudded 26.09.89 and completed 06.11.89.
T.D. was reached at 2809 m., in the Statfjord Fm.
The location map is given in fig. 1.1., and a well summary is given in fig. 1.2.

A total of 34 samples, SWC's and CC's have been analyzed representing; Upper Cretaceous, Upper-, Middle- and Lower Jurassic.
In addition 13 DC's have been analyzed for Vitrinite reflectance.
The spore colour analysis has been undertaken both on DC's, SWC's and CC's, totally seventeen samples.

Table 1.1. gives a list of the samples investigated.

The Vitrinite reflectance measurements has been undertaken by Geo-optics Ltd., Newcastle upon Tyne, UK.
Stable isotope composition of fractions has been analyzed by Geolab Nor, Trondheim, Norway.
All other analytical work, the interpretation of data and the compilation of this report were undertaken by Norsk Hydro's Research Centre, Bergen, Norway.

2. MIGRATION.

Determination and evaluation of migrated hydrocarbons are based upon Rock Eval-, extraction- and biomarker data.

2.1. Rock Eval pyrolysis.

The results from this analysis are listed in Table 2.1. The Production Index (PI) values are plotted versus depth in Fig. 2.1.

The Tarbert Fm. samples, consisting mainly of sandstones, have PI values around 0.70, clearly indicating the presence of migrated hydrocarbons, with exception of the two coal samples.
The samples from Heather Fm. also exhibit high PI values, and may be affected by migrated hydrocarbons.
The rest of the samples have PI values ranging from 0.08 to 0.31, suggesting indigenous hydrocarbons.

2.2 Extraction and pyrolysis data.

The extraction data are given in table 2.2., and the ratio between EOM and TOC is plotted versus depth, Fig. 2.1.

The samples representing Heather and Tarbert Fm.'s have the highest values, except for the coals. This confirms that these samples are contaminated by migrated hydrocarbons.
Sample 2291.10m (Cromer Knoll) also has a high EOM/TOC value, 0.74.
The rest of the analyzed samples seems to consist mainly of indigeous hydrocarbons.

2.3. Biomarker data.

The biomarker ratios (saturated hydrocarbons) are given in table 2.4. and fragmentograms are given in Appendix IV.

The relative high values of the maturity parameters, %20S and %$\alpha\beta\beta$ steranes indicate presence of migrated hydrocarbons in the Heather and Tarbert Fms. samples.
The moretane/hopane ratio is also reflecting elevated maturity.
In addition these samples contain significant amounts of the C_{27} steranes which can indicate that these migrated hydrocarbons are partly of a marine origin.

2.4. Correlation with the produced oil.

The gas chromatograms of the saturated hydrocarbons are given in Appendix II, and the gas chromatograms of the aromatic fractions are given in Appendix III.

The Pristane/Phytane ratios (3.28, 3.20) and Pristane/N-C17 ratios (0.96, 0.98) from the two produced oils (DST#1 and DST#2) are very similar to those of the sandstone extracts from the Heather/Tarbert Fms (Table 3.1.).

The biomarker ratios from the oil of well 30/9-9 DST#1 and DST#2, are given in table 2.4. and the fragmentograms are given in Appendix IV.

The ratios from the extracted Heather and Tarbert Fm.'s samples are very similar to the two produced oils, suggesting a positive correlation between the oils and these extracts. The composition of the sandstone extracts appear to be relatively homogeneous, based on the distribution of biological markers.

3. SOURCE ROCK EVALUATION.

Rock Eval data, pyrolysis gas chromatography, gas chromatography, biomarker contents, stable isotope measurements and kerogen composition have been used to evaluate the source rock potential of the investigated horizons, mainly of Jurassic age.

3.1. Rock Eval.

The results from the Rock-Eval pyrolysis are given in table 2.1., and are plotted versus depth in fig. 3.1.

Throughout the whole sequence, except for the coals, the S2 and TOC values are very low. The TOC values are generally below 1% and the S2 values below 2 kg/tonne. These data are suggesting a poor source rock potential. There is no systematic increase in these values towards depth and no positive correlation with the different geological formations present.
The HI values range from 33 to 154 indicating the organic matter mainly to be gas prone, type III kerogen.

The six analyzed coal samples naturally show higher S2 and TOC results. The HI, ranging from 165 to 319, indicate some potential for gas/condensate.

3.2. Pyrolysis gas chromatography.

Extracted material has been used for this programmed pyrolysis gas chromatography. A total of thirteen samples have been selected based on the Rock Eval results.

The pyrograms are given in Appendix I.

All the coals apart from the sample at 2408.50m are dominated by aromatic hydrocarbons like toluene and xylenes in addition to a series of phenols. These features clearly suggest a terrestrially derived organic matter with a potential for gas only. The sample from 2408.5 m contains some liptinitic material based on the homologous series of n-alkanes/alkenes extending up beyond n-C25. This might suggest a lagoonal setting for this sample, and gives a potential for condensate and gas.

The rest of the samples analysed by pyrolysis-GC contain low amounts of organic matter, but shows a mixture of liptinitic material, mixed with humic, terrestrially derived kerogen, typical of marine settings. The kerogen has a potential for both liquid and gaseous hydrocarbons, but due to the low contents of organic matter, it is questionable wether these will act as effective source rocks for oil.

3.3. Gas chromatography of saturated hydrocarbons.

The gas chromatograms of the saturated fractions are given in Appendix II., and molecular ratios are given in table 3.1.

There is a distinct difference between the samples above 2308.60 m and those below this depth, which coincides with top Ness Fm. The upper samples (Heather and Tarbert Fms.) have a unimodal n-alkane distribution with a maximum around n-C_{17} - n-C_{19}, which decreases with increasing carbon number. This is a typical feature of marine organic matter. However, these samples are affected by migrated hydrocarbons.
Most of the samples below 2308.60 m have a bimodal distribution, which indicate input from terrestrial material. This is supported by the pronounced odd/even n-alkane predominance in the n-C_{23} to n-C_{33} region. The pristane/n-C_{17} ratios are usually less than unity.
For all the analyzed samples the pristane/phytane ratio is higher than 1, indicating a dysaerobic depositional environment. Some of the coal samples have higher pristane/phytane ratios (7.10) indicating a partially oxic depositional environment.

3.4. Gas chromatography of aromatic hydrocarbons.

The gas chromatograms of the aromatic fractions are given in appendix III.

3.5. Biological markers, saturated hydrocarbons.

The fragmentograms of the steranes (m/z 217) and terpanes (m/z 191) are given in appendix IV and biomarker ratios are listed in table 2.4.

The samples above top Ness Fm. all contain significant amount of C_{27} steranes which are believed to originate from marine algae. This suggest that these samples contain migrated hydrocarbons of a marine origin.
All samples from Ness Fm. contains almost exclusivly C_{29} steranes, indicating that the organic material is predominantly terrestrial derived.
The samples 2424.70m, 2727.0m and 2778.0m are also dominated by C_{29} steranes, but also contain some C_{27} steranes. This can indicate that the dominating terrestrial organic material have a minor contribution from marine derived organic material.

3.6. Biological markers, aromatic hydrocarbons.

The fragmentograms of the monoaromatic steranes (Ion m/z 253) and the triaromatic steranes (Ion m/z 231) are given in Appendix V.

3.7. Stable isotope measurements.

A total of eight extracts have been analyzed for $\delta^{13}C$ contents, the results are given in table 3.2.

The material from upper Cretaceous, Heather and Tarbert Fm's. are isotopic lighter than the other investigated samples. Indicating that the samples above top Ness Fm. have some marine input, which can be related to the migrated hydrocarbons.
The deeper samples are more influenced by terrestrial organic matter.

3.8. Kerogen composition.

A total of fourteen samples were analyzed for semi-quantitative kerogen description. Apart from the coal samples, all samples were treated according to the internal Norsk Hydro standard method. Analysis of each kerogen concentrate was based on observations involving both transmitted light as well as fluorescence.
The results are given in Fig.3.2.
The following groups were recognized by visual kerogen analysis:

1. 2291.75m, 2295.75m, 2297.40m, 2313.50m, 2356.50m, 2408.50m:

High productivity. Dominated by fine grained vitrinite of low intensity fluorescence, embedding variable proportions of sometimes very coarse inertinite and woody particles; some cutinite and sporonite. The 2313.50m sample differs by its major proportion of coarse inertinitic and fusinitic woody fragments. The 2356.50m sample differs by its higher fluorescence intensity of the vitrinite and larger proportion of cutinite and sporonite. No visible pyrite. Strong background fluorescence of the mounting medium caused by hydrocarbons.

Note the uncertainty in composition due to the vitrinitic character.

Interpretation: Presumably orthohydrous vitrinitic coals, formed by humification of organic matter under mildly oxidative terrestrial conditions (cf. Khavary Khorasani, 1989). Gas/Condensate-prone.

2. 2292.5m and 2293.0m:

Very low productivity. Upper sample dominated by sporinite (S+P+Cy), lower sample by inertinite. Pyrite abundant, coarse crystals in upper, finegrained in lower sample.

Interpretation: Marine, aerobic environment of deposition. Gas-prone.

3. 2299.02m:

Low productivity. Large flakes of spongy, slightly structured material dominate (?cutinite); some resinite?

Interpretation: A similar kind of organic mattter has been recorded from shallow marine, nearshore deposits (P. V. Veen's observations).

4. 2308.60m, 2355.75m, 2424.70m, 2727.0m, 2778.0m:

Low productivity. Rather low amount of often fluorescing finely disseminated material. Coarse fraction consists of a mixture of inertinite, woody particles, cutinite and sporonite. Traces of AOM at 2355.75m and 2424.70m; marine microplankton at 2424.70; **Botryococcus** present at 2424.70m, common at 2727.0m. Some small pyrite framboids on woody and cutinite particles. Some background fluorescence. Heavy minerals present at 2308.60 and 2355.75m.

Interpretation: Shallow marine, aerobic to slightly dysaerobic (2355.75m?, 2424.70m, 2727.0m) with strong fresh water influx, to deltaic (2308.60, 2778.0m). Gas/Condensate prone.

4. THERMAL MATURITY.

Determination of the degree of maturity is based upon T_{max} values from Rock Eval, Vitrinite reflectance (Ro), biomarker data and spore colour.

4.1. T-$_{max}$ from Rock Eval.

The results are given in Table 2.1. and the T-max values have been plotted versus depth, Fig. 3.1.

The analyzed sequence range from 417^0 C to 445^{0}C, with a slight increase towards depth. The Tarbert samples have an average value of 427^{0}C, while the Ness samples have an average value of 437^{0}C. The deepest samples have values above 440^{0}C.
The investigated intervals are ranging from immature to early mature.

4.2. Vitrinite reflectance, Ro.

The results from the vitrinite measurements are given in table 4.1., and the vitrinite readings are given in Appendix V. The Ro values are plotted versus depth in fig. 4.1.

In addition to the CC's and SWC's, this analysis also include some DC-samples from the intervals 1000-2200m and 2500-2600m.

The values increase slightly from 0.34 (1000m) to 0.60 (2778.0m) indicating that the Jurassic sequence of Well 30/9-9 contain marginally mature to mature samples.

4.3. Biomarker ratio.

The calculated biomarker ratio's are listed in table 2.4., and the fragmentograms are given in Appendix IV.

% 20S C_{29} ααα Sterane.
This parameter monitors the isomerisation which occurs at carbon atom in position #20 on the sterane sidechain. The ratio in immature sediments is zero, and reach a value of about 60% at equilibrium, which is in the peak oil-generating zone.
The uppermost samples representing Cromer Knoll Grp., Heather Fm. and Tarbert Fm. have values ranging from 42%-47% (except 2295.75m). Whilst the lower Ness Fm. and Drake Fm. have values varying from 20%-29%, (two exceptions).
Taken into account that the Heather and Tarbert samples contain migrated hydrocarbons, this parameter indicate immature to early mature samples.
When entering the Amundsen Fm. and Statfjord Fm. the % 20S value increases to 44%, which indicate that these lower samples have a higher degree of maturity.

% αββ C_{29} Steranes.

With increasing thermal stress, the αββ 20S configuration is generated. When the sediment enters the principal zone of oil generation this parameter will show a 20% conversion, and increase to 75% at the peak oil generating zone.

The contaminated samples displays the highest amount of αββ C_{29} sterane, with values above 55%. The rest of the analyzed interval have values around 30%, indicating early mature samples. Samples 2727.0m and 2778.0m do not show higher values compared to the other analyzed sample, which can be explained with coeluation of the βαα and αββ steranes.

Moretan/hopane.

This ratio can be used as a maturity parameter as moretane is thought to be less thermal stable than hopane. However, this ratio is also affected by the origin of the organic matter. Terrestrially derived plant material have a higher relative abundance of moretanes than marine organic matter.

Again the Heather Fm. and Tarbert Fm. samples show the highest level of maturity, probably due to migrated hydrocarbons.

However, this ratio then increase towards depth, which reflects the change in the composition of the organic matter with a higher terrestrial influence.

4.4. Spore colour.

The results from spore colour analysis are given in Fig.4.2.

The analysed interval, 1750-2809m show a slight increase in maturity versus depth. Starting with immature samples, and when entering the Jurrasic sequence the samples are mainly early mature.
Due to the fact that this analysis was made upon oxidized DC's, these samples can indicate some higher values (towards orange) than what is real.

5. CORRELATION WITH COAL FROM THE NESS FM.OF WELL 30/9-8.

Only one coal sample representing Ness Fm. have been analyzed from Well 30/9-8, 2930.30m.
Based upon the results from pyrolysis gas chromatography the sample 2408.50m from 30/9-9 seem to be quite similar to the sample 2930.30m from 30/9-8. Both samples contain homologous series of n-alkanes/alkenes originating from liptinitic organic matter, indicating some potential for liquid hydrocarbons.
Based upon the gas chromatograms these two samples are relative similar, except for the pristane content. They both have an odd dominance over even n-alkanes in the C_{25} to C_{33} region, indicating terrestrial derived organic matter.
The biomarker distributions and ratios for these two samples are quite similar, except for the fact that the sample 2930.30m from 30/9-8 is more mature than the sample 2408.50m from 30/9-9.

6. SUMMARY.

The section from 2291.10m to 2304.20m, representing Shetland Group, Heather and Tarbert Fm.'s, is invaded by mature migrated hydrocarbons of a marine origin, and have a biomarker distribution similar to the produced oil from this well.

The maturity parameters show that the analyzed horizons, mainly of Jurassic age are in the early stage of oil generation.

The source rock potential is poor throughout the analyzed intervals, except for the coal samples which have a good source rock potensial.

Table 1.1. List of samples analyzed.

0	Depth, m	1 Rock-Eval	2 TOC	3 PyGC	4 Extr.	5 GCMSD sat.	6 GCMSD aro	7 ISOTOPE	8 Ro, Vitr. Reflec.	9 Visual kerogen	10 SPORE COLOUR
1	1000.00								*		
2	1100.00								*		
3	1200.00								*		
4	1300.00								*		
5	1400.00								*		
6	1500.00								*		
7	1600.00								*		
8	1700.00								*		
9	1750.00										*
10	1800.00								*		*
11	1900.00								*		*
12	2000.00								*		
13	2100.00								*		
14	2196.50										*
15	2200.00								*		
16	2236.00	*	*								*
17	2291.10	*	*		*	*	*	*		*	
18	2291.75	*	*	*	*	*	*				
19	2292.50	*	*	*	*	*	*		*	*	*
20	2293.00	*	*		*	*	*	*		*	
21	2293.02	*	*		*	*	*	*			
22	2293.70	*	*								
23	2295.75	*	*	*	*	*	*			*	
24	2297.40	*	*	*	*	*	*			*	
25	2299.02	*	*		*	*	*	*		*	*
26	2301.35	*	*								
27	2304.20	*	*								
28	2308.60	*	*	*	*	*	*		*	*	*
29	2312.30	*	*		*	*	*				
30	2313.50	*	*	*	*	*	*	*		*	
31	2315.05	*	*								
32	2318.50	*	*		*	*	*				
33	2325.60	*	*								
34	2347.02	*	*								
35	2352.50	*	*		*	*	*				
36	2355.75	*	*	*	*	*	*			*	*
37	2356.50	*	*	*	*	*	*	*		*	
38	2405.10	*	*								
39	2407.80	*	*								
40	2408.50	*	*	*	*	*	*			*	
41	2409.02	*	*								
42	2411.40	*	*								
43	2415.20	*	*								
44	2424.70	*	*	*	*	*	*	*	*	*	*
45	2500.00	*	*						*		
46	2505.00										*
47	2600.00	*	*						*		
48	2605.00										*
49	2695.00										*
50	2727.00	*	*	*	*	*	*	*		*	
51	2761.50	*	*								
52	2778.00	*	*	*	*	*	*		*	*	*

Table 2.1.   Source rock screening data.

Table 2.1. **SOURCE ROCK SCREENING DATA WELL 30/9-9**

Depth (m)	Group/Fm	%	Lithology	Sample	S1 Kg/t	S2 Kg/t	S3 Kg/t	TOC %	HI	OI	PI	Tmax Deg.c	Company
2236.00	SHETLAND			SWC	0.0	0.2		0.5	33		0.15	431	F-BG
2291.10	SHETLAND			CC	3.9	0.8		0.9	92		0.83	412	F-BG
2291.75	SHETLAND			CC	38.1	213.6		66.8	320		0.15	417	F-BG
2292.50	HEATHER			SWC	0.3	0.4		0.5	88		0.39	429	F-BG
2293.00	HEATHER			SWC	2.7	0.3		0.6	55		0.90	403	F-BG
2293.02	HEATHER			CC	3.4	0.5		0.4	111		0.87	590	F-BG
2293.70	TARBERT			CC	3.2	1.0		1.4	74		0.75	430	F-BG
2295.75	TARBERT			CC	40.1	204.7		74.3	276		0.16	419	F-BG
2297.40	TARBERT			CC	31.9	203.9		69.1	295		0.14	423	F-BG
2299.02	TARBERT			CC	3.5	1.2		0.9	132		0.74	431	F-BG
2301.35	TARBERT			CC	2.4	1.1		0.7	155		0.69	430	F-BG
2304.20	TARBERT			CC	0.5	0.3		0.4	58		0.67	431	F-BG
2308.60	NESS			CC	0.2	1.2		0.8	149		0.16	438	F-BG
2312.30	NESS			CC	0.4	1.1		1.4	83		0.25	440	F-BG
2313.50	NESS			CC	46.8	132.2		80.4	164		0.26	429	F-BG
2315.05	NESS			CC	0.1	0.3		0.6	50		0.31	440	F-BG
2318.50	NESS			SWC	0.1	0.7		0.6	131		0.10	445	F-BG
2325.60	NESS			CC	0.1	0.4		0.6	64		0.20	438	F-BG

Table 2.1. **SOURCE ROCK SCREENING DATA WELL 30/9-9** (cont'd)

Depth (m)	Group/Fm	%	Lithology	Sample	S1 Kg/t	S2 Kg/t	S3 Kg/t	TOC %	HI	OI	PI	Tmax Deg.c	Company
2347.02	NESS			CC	0.0	0.1		0.1	70		0.13	442	F-BG
2352.50	NESS			CC	0.2	1.4		0.9	146		0.11	439	F-BG
2355.75	NESS			CC	0.2	2.1		1.4	148		0.09	440	F-BG
2356.50	NESS			CC	13.0	142.7		71.9	198		0.08	425	F-BG
2405.10	NESS			CC	0.2	0.5		0.4	107		0.29	438	F-BG
2407.80	NESS			CC	0.1	0.3		0.4	85		0.13	441	F-BG
2408.50	NESS			CC	20.2	152.7		78.2	195		0.12	431	F-BG
2409.02	NESS			CC	0.2	0.7		1.0	72		0.23	439	F-BG
2411.40	NESS			CC	0.3	0.9		1.3	65		0.25	438	F-BG
2415.20	DRAKE			CC	0.1	0.6		1.0	60		0.18	440	F-BG
2424.70	DRAKE			CC	0.3	1.6		1.7	96		0.15	441	F-BG
2727.00	BURTON			SWC	0.3	1.7		1.3	134		0.14	444	F-BG
2761.50	AMUNDSEN			SWC	0.1	0.4		0.3	141		0.14	565	F-BG
2778.00	STATFJORD			SWC	0.3	1.8		1.8	97		0.17	442	F-BG

Table 2.2. Extraction data.

Table 2.2. **SOURCE ROCK EXTRACTION DATA II WELL 30/9-9**

Depth(m)	Group/Fm	TOC (%)	EOM(%)/TOC(%)	SAT(%)/TOC(%)	SAT(%)/ARO(%)	HC/non HC
2291.10	SHETLAND	0.86	0.74	69.77	3.24	3.67
2291.75	SHETLAND	66.79	0.11	0.20	3.05	0.22
2293.00	HEATHER	0.55	1.38	86.55	4.03	1.46
2293.02	HEATHER	0.44	1.07	146.82	3.36	5.20
2293.70	TARBERT	1.41	0.35	35.32	2.91	2.03
2295.75	TARBERT	74.30	0.07	0.29	1.31	0.62
2297.40	TARBERT	69.14	0.08	0.10	0.30	0.42
2299.02	TARBERT	0.90	0.68	67.67	3.48	3.66
2308.60	NESS	0.83	0.06	28.07	1.22	0.74
2312.30	NESS	1.39	0.04	8.56	1.00	0.31
2313.50	NESS	80.39	0.05	0.43	1.30	1.56
2318.50	NESS	0.55	0.04	6.00	1.00	0.07
2352.50	NESS	0.94	0.07	16.49	1.17	0.40
2355.75	NESS	1.40	0.07	6.64	1.00	0.23
2356.50	NESS	71.89	0.06	0.05	0.22	0.28
2408.50	NESS	78.21	0.03	0.04	0.13	0.41
2424.70	DRAKE	1.67	0.05	8.98	1.00	0.43
2727.00	BURTON	1.26	0.08	12.30	1.25	0.39

Table 2.2. **SOURCE ROCK EXTRACTION DATA II WELL 30/9-9** (cont'd)

Depth(m)	Group/Fm	TOC (%)	EOM(%)/TOC(%)	SAT(%)/TOC(%)	SAT(%)/ARO(%)	HC/non HC
2778.00	STATFJORD	1.81	0.05	5.03	0.81	0.26

Table 2.3. Extraction data

Table 2.3. SOURCE ROCK EXTRACTION DATA I WELL 30/9-9

Depth(m)	Group/Fm	EOM(mg)	EOM(%)	Hydrocarbons SAT(%)	Hydrocarbons ARO(%)	Hydrocarbons TOTAL(%)	Non Hydrocarbons NSO(%)	Non Hydrocarbons ASPH(%)	Non Hydrocarbons TOTAL(%)
2291.10	SHETLAND	79.00	0.64	60	19	79	7	14	21
2291.75	SHETLAND	65.00	7.20	13	4	18	28	54	82
2293.00	HEATHER	79.70	0.76	48	12	59	11	29	41
2293.02	HEATHER	52.90	0.47	65	19	84	11	5	16
2293.70	TARBERT	52.30	0.50	50	17	67	7	26	33
2295.75	TARBERT	57.30	5.40	22	17	38	25	37	62
2297.40	TARBERT	62.80	5.20	7	23	30	17	54	70
2299.02	TARBERT	65.10	0.61	61	18	78	9	12	21
2308.60	NESS	3.70	0.05	23	19	42	32	26	58
2312.30	NESS	5.50	0.06	12	12	24	18	58	76
2313.50	NESS	47.90	4.13	34	27	61	17	22	39
2318.50	NESS	4.80	0.02	3	3	7	4	90	93
2352.50	NESS	7.40	0.07	16	13	29	27	45	71
2355.75	NESS	5.90	0.10	9	9	19	20	61	81
2356.50	NESS	43.80	4.10	4	18	22	20	58	78
2408.50	NESS	21.00	2.04	3	26	29	19	52	71
2424.70	DRAKE	5.20	0.09	15	15	30	12	58	70
2727.00	BURTON	6.00	0.10	16	12	28	16	57	72

Table 2.3. **SOURCE ROCK EXTRACTION DATA I WELL 30/9-9** (cont'd)

Depth(m)	Group/Fm	EOM(mg)	EOM(%)	Hydrocarbons SAT(%)	ARO(%)	TOTAL(%)	Non Hydrocarbons NSO(%)	ASPH(%)	TOTAL(%)
2778.00	STATFJORD	5.00	0.09	9	11	20	14	66	80

Table 2.4. Biomarker ratios.

0 depth,end	1 TS/TM	2 % 20S	3 ABB STER.	4 MOR/HOP	5 NO/NO+HO
1 2291.10	1.17	47	60	0.13	0.30
2 2291.75	1.12	42	55	0.14	0.32
3 2292.50	1.16	42	58	0.14	0.33
4 2293.00	1.25	46	59	0.12	0.31
5 2293.02	1.18	45	59	0.13	0.32
6 2293.70	1.11	43	59	0.13	0.31
7 2295.75	1.26	29	46	0.14	0.32
8 2297.40	1.35	44	55	0.14	0.33
9 2299.02	1.25	47	58	0.13	0.31
10 2308.60	0.60	21	30	0.18	0.32
11 2312.30	0.05	29	28	0.39	0.35
12 2313.50	0.48	35	46	0.21	0.36
13 2318.50	0.26	20	29	0.20	0.16
14 2352.50	0.17	22	34	0.31	0.30
15 2355.75	0.10	38	25	0.27	0.31
16 2356.50	0.01	28	34	0.37	0.35
17 2408.50	0.01	21	20	0.54	0.38
18 2424.70	0.08	21	25	0.54	0.39
19 2727.00	0.10	44	31	0.38	0.44
20 2778.00	0.04	44	32	0.41	0.45
21 DST#1	1.18	46	60	0.14	0.32
22 DST#2	1.31	46	62	0.13	0.31

Table 3.1. Molecular ratios.

Table 3.1. **SATURATED FRAC., MOLECULAR RATIOS WELL 30/9-9**

Depth	Group/Fm	Pr/n-C17	Pr/Ph	CPI-I	CPI-II	n-C15+/Total	n-C20/n-C25
2291.10	SHETLAND	1.11	2.87	1.07	1.02		
2291.75	SHETLAND	0.89	2.84	1.07	1.04		
2292.50	HEATHER	1.09	2.53	1.10	1.07		
2293.00	HEATHER	1.00	2.96	1.09	0.98		
2293.02	HEATHER	1.26	2.80	1.07	1.05		
2293.70	TARBERT	1.14	2.96	1.08	0.98		
2295.75	TARBERT	0.78	3.14	1.10	1.04		
2299.02	TARBERT	1.05	2.33	1.08	1.03		
2308.60	NESS	0.93	3.14	1.40	1.49		
2312.30	NESS	1.77	3.52	1.77	1.65		
2313.50	NESS	0.94	3.05	1.13	1.01		
2318.50	NESS	0.56	1.99	2.31	1.77		
2352.50	NESS	1.76	3.61	1.69	1.80		
2355.75	NESS	1.63	3.49	1.67	1.96		
2356.50	NESS	3.90	7.10	1.85	1.63		
2408.50	NESS		0.27	1.67	1.48		
2424.70	DRAKE	1.90	4.89	1.70	1.69		
2727.00	BURTON	1.27	4.59	1.49	1.47		

Table 3.1. **SATURATED FRAC., MOLECULAR RATIOS WELL 30/9-9** (cont'd)

Depth	Group/Fm	Pr/n-C17	Pr/Ph	CPI-I	CPI-II	n-C15+/Total	n-C20/n-C25
2778.00	STATFJORD	1.55	4.09	1.52	1.42		

Table 3.2. Stable isotope measurements.

0 depth		1 ISOTOP
1	2291.10	-27.94
2	2291.75	
3	2292.50	
4	2293.00	-27.82
5	2293.02	-27.86
6	2293.70	
7	2295.75	
8	2297.40	
9	2299.02	-27.92
10	2301.35	
11	2304.20	
12	2308.60	
13	2312.30	
14	2313.50	-27.02
15	2315.05	
16	2318.50	
17	2325.60	
18	2347.02	
19	2352.50	
20	2355.75	
21	2356.50	-25.58
22	2405.10	
23	2407.80	
24	2408.50	
25	2409.02	
26	2411.40	
27	2415.20	
28	2424.70	-26.09
29	2500.00	
30	2600.00	
31	2727.00	-25.75
32	2761.50	
33	2778.00	

Table 3.3. Kerogen composition.

Depth	C/F	Inert	Wood/Vitrinite	Liptinite	AOM	Remarks
2291.75m		20?	70 (10/60)	10 (S)		
2292.50m	50/50	20	5	70 (S+P 60, Cy 10)		Py abd.
2293.0m	50/50	70	15	15 (C 10, S+P 5)		Py abd. Pterospermella rare
2295.75		30	70 (10/60)			
2297.40		20	65 (10/55)	15 (C 5, P+S 10)		
2299.02m		10	5	75 (?C)		Resinite ?10
2308.60	70/30	30	15	55 (C 25, S+P 30)		Heavy minerals
2313.50		60?	35 (10/25)	5? (C)		tr. S+P
2355.75	40/60	(5)	20	75 (C 25, S+P 50)		tr. AOM Heavy minerals
2356.50		(5)	65 (5/60)	30 (C 10, S+P 20)		
2408.50		15	60 (10/50)	20 (C 10, S+P 10)		
2424.70	50/50	20	30	45 (C 20, S+P 20, Cy 5)	(5)	tr. Botryococcus picoplankton abd.
2727.0	40/60	15	40	45 (C 30, S+P 15)		common Botryococcus
2778.0	40/60	30	35	[illegible] (C 25, S+P 10)		

Explanation:

C/F: coarse fraction over finely disseminated

(5) Notable traces; C-Cutinite, S+P-Sporonite, Cy-Thinwalled Cysts

Picoplankton: acritarchs <5 micron.

Table 4.1. Vitrinite reflectance values.

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Research Center Bergen
HYDRO

Table 4.1. **VITRINITE REFLECTANCE DATA WELL 30/9-9**
Average values

Depth	Group/Fm	Population I	Population II	Population III	SCI
1000.00	HORDALAND	0.34 (20)			
1100.00	HORDALAND	0.35 (20)			
1200.00	HORDALAND	0.36 (13)			
1300.00	HORDALAND	0.39 (11)			
1400.00	HORDALAND	0.35 (20)			
1500.00	HORDALAND	0.37 (20)			
1600.00	HORDALAND	0.39 (19)			
1700.00	HORDALAND	0.50 (4)			
1800.00	HORDALAND	0.52 (4)			
1900.00	HORDALAND	0.45 (20)			
2000.00	HORDALAND	0.50 (7)			
2100.00	HORDALAND	0.51 (6)			
2200.00	SHETLAND	0.49 (20)			
2292.50	HEATHER	0.50 (21)			
2308.60	NESS	0.49 (20)			
2424.70	DRAKE	0.50 (21)			
2500.00	DRAKE	0.54 (22)			
2600.00	DRAKE	0.55 (21)			

Table 4.1. **VITRINITE REFLECTANCE DATA WELL 30/9-9** (cont'd)
Average values

Depth	Group/Fm	Population I	Population II	Population III	SCI
2778.00	STATFJORD	0.60 (21)			

Figure 1.1. Well location map.

PROSPECT OVERVIEW, BLOCK 30/9

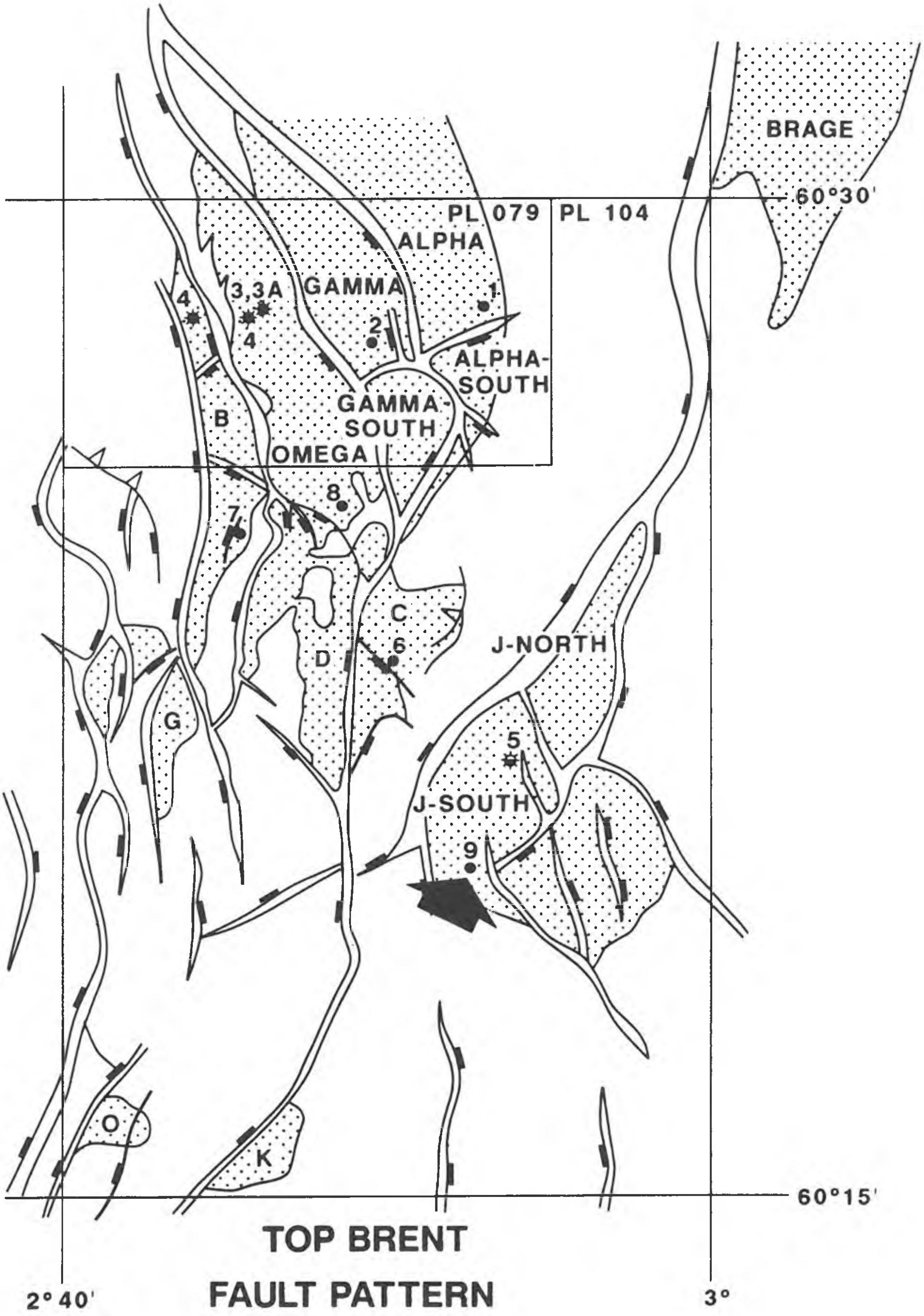
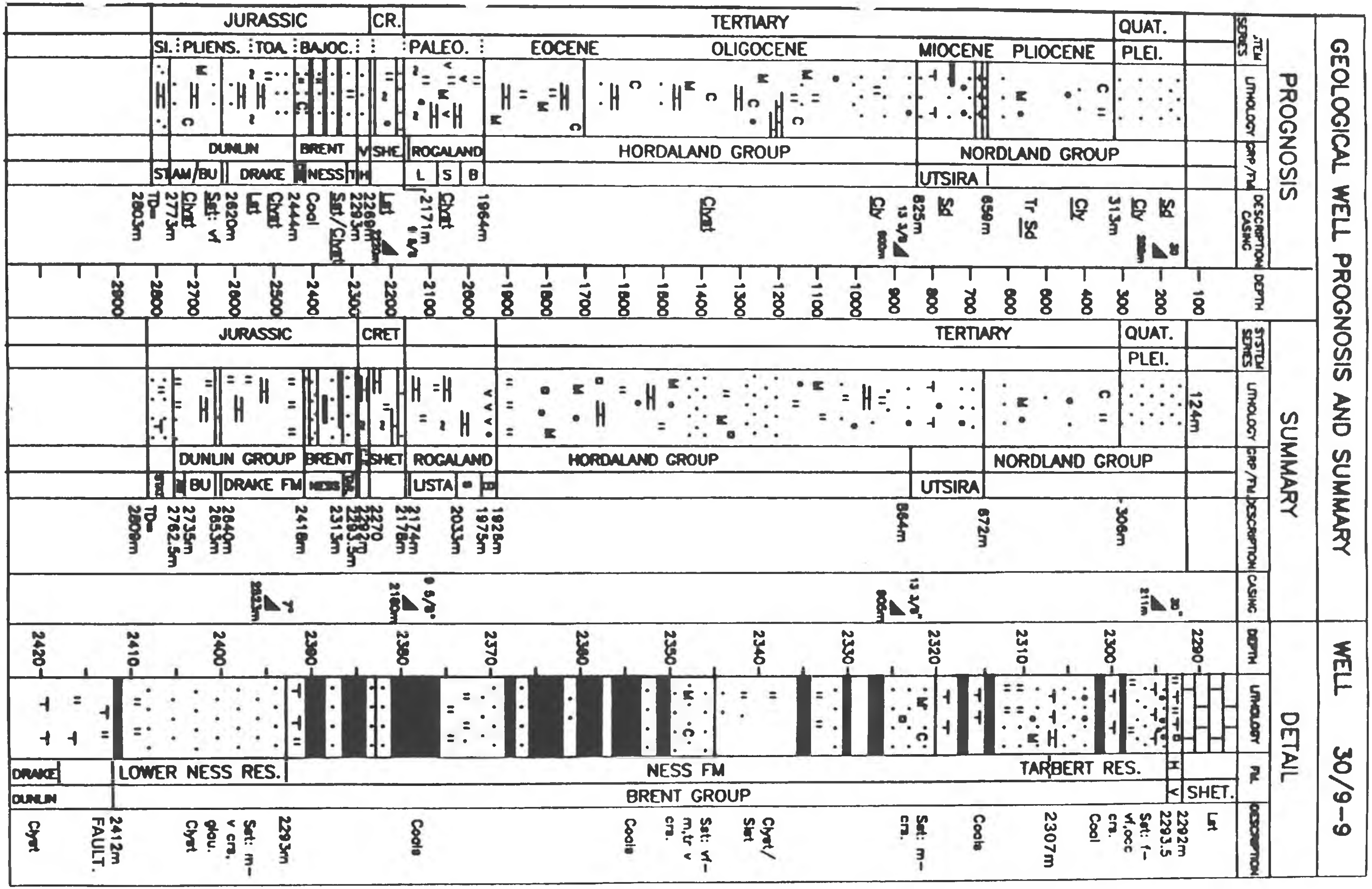


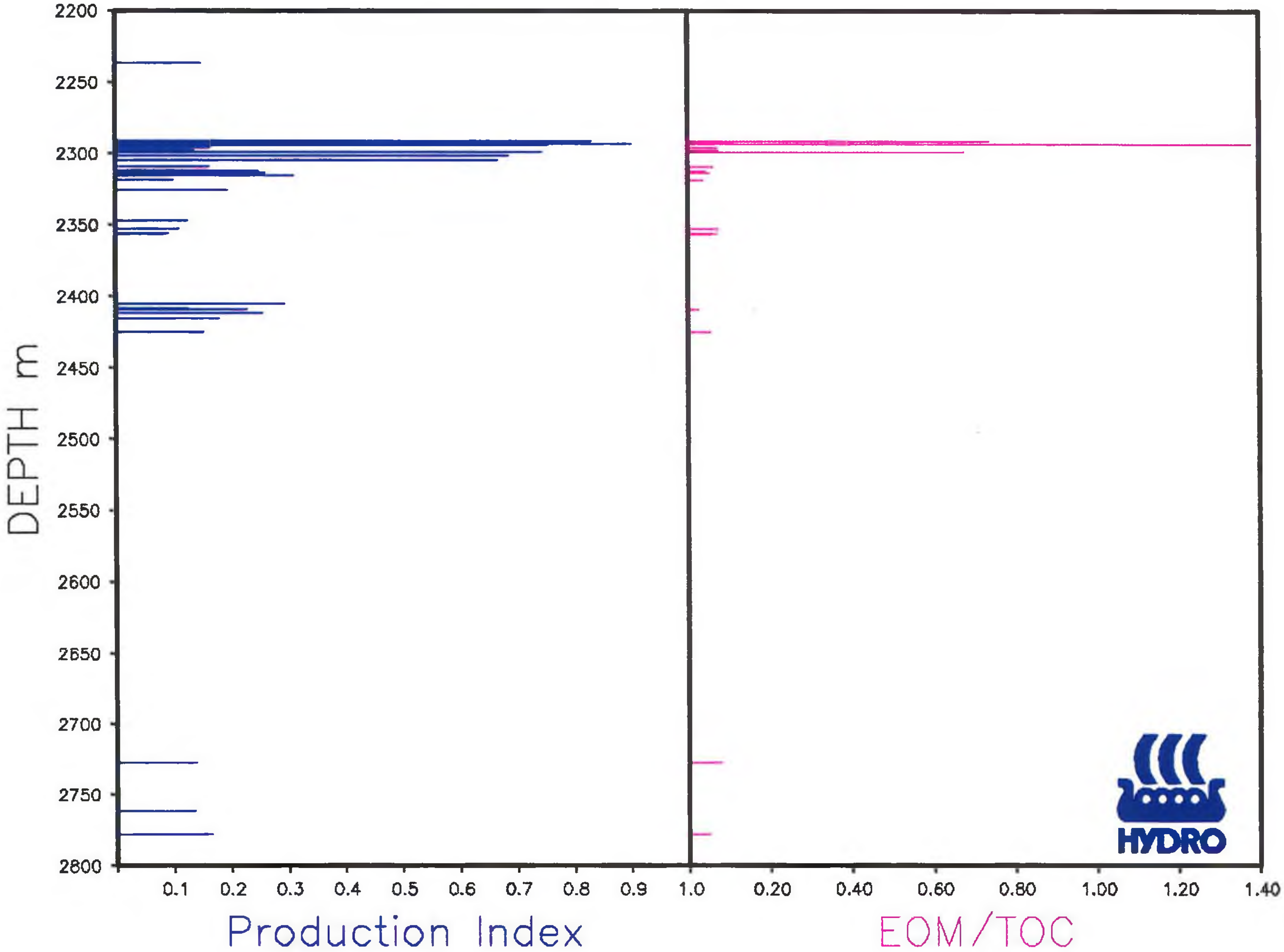
Figure 1.2. Well summary.



GEOLOGICAL WELL PROGNOSIS AND SUMMARY
PROGNOSIS
SUMMARY
DETAIL
WELL 30/9-9
SYSTEM SERIES
LITHOLOGY
GRP/FM
DESCRIPTION CASING
DEPTH
JURASSIC
CR.
TERTIARY
QUAT.
SI.
PLIENS.
TOA.
BAJOC.
PALEO.
EOCENE
OLIGOCENE
MIOCENE
PLIOCENE
PLEI.
DUNLIN
BRENT
SHE
ROGALAND
HORDALAND GROUP
NORDLAND GROUP
STAM/BU
DRAKE
NESS
L
S
B
UTSIRA
TD=2803m
2773m
2620m
2444m
2293m
2269m
2171m
1964m
825m
659m
313m
CRET
DUNLIN GROUP
SHET
LISTA
DRAKE FM
TD=2809m
2762.5m
2735m
2653m
2640m
2418m
2313m
2270m
2178m
2174m
2033m
1975m
1926m
864m
672m
306m
124m
DRAKE
LOWER NESS RES.
NESS FM
TARBERT RES.
SHET.
DUNLIN
BRENT GROUP
2412m FAULT.
2393m
2307m
2293.5
2292m
Clyst
Coals
Cool
Lst

Figure 2.1. PI and EOM/TOC versus depth.

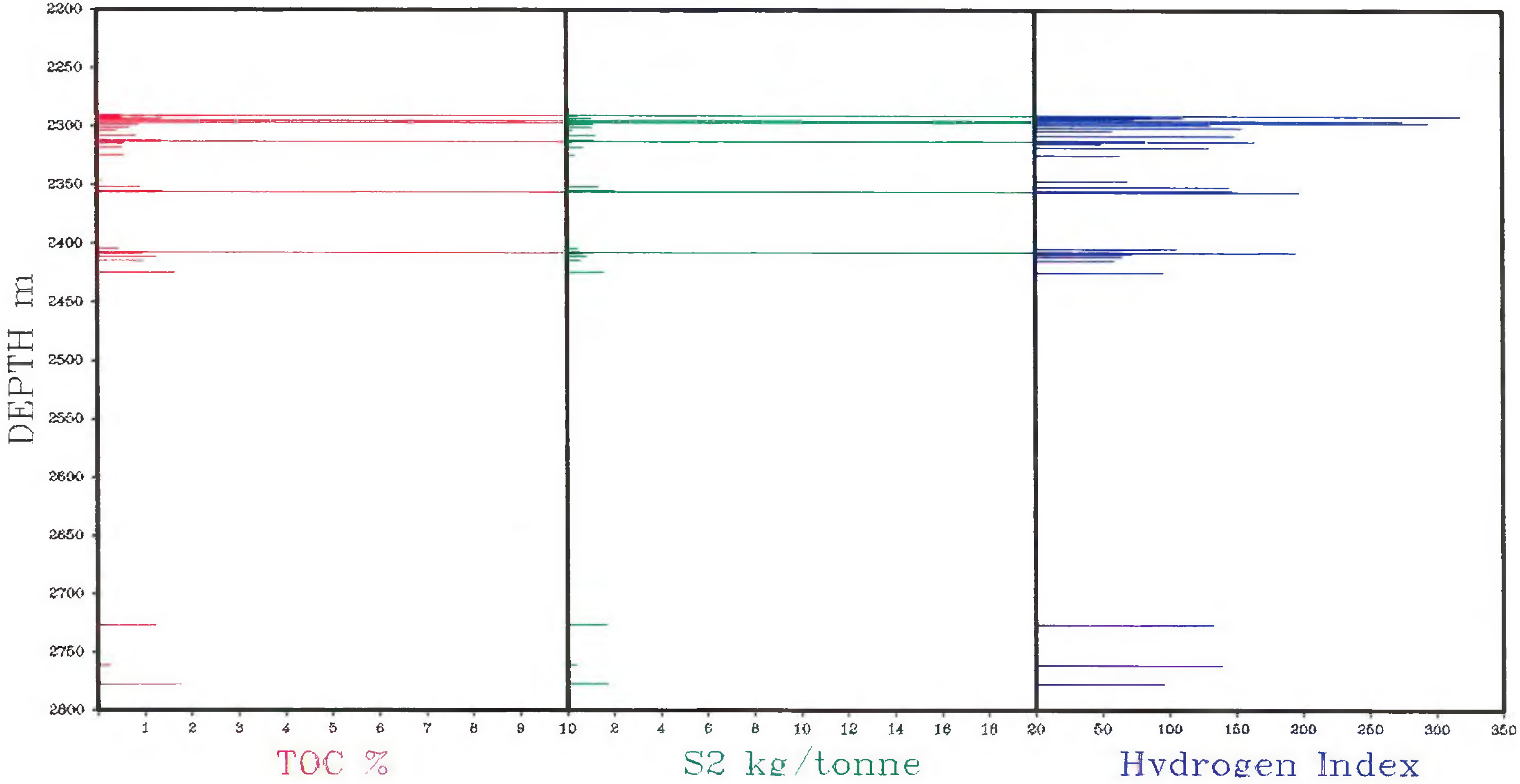
WELL: 30/9-9



2200
2250
2300
2350
2400
2450
2500
2550
2600
2650
2700
2750
2800
DEPTH m
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
0.20 0.40 0.60 0.80 1.00 1.20 1.40
Production Index
EOM/TOC
HYDRO

Figure 3.1. TOC, S2 and HI versus depth.

WELL 30/9-9



DEPTH m
2200
2250
2300
2350
2400
2450
2500
2550
2600
2650
2700
2750
2800
1 2 3 4 5 6 7 8 9 10
2 4 6 8 10 12 14 16 18 20
50 100 150 200 250 300 350
TOC %
S2 kg/tonne
Hydrogen Index

Figure 3.2. Kerogen composition.

KEROGEN COMPOSITION
30/9-9

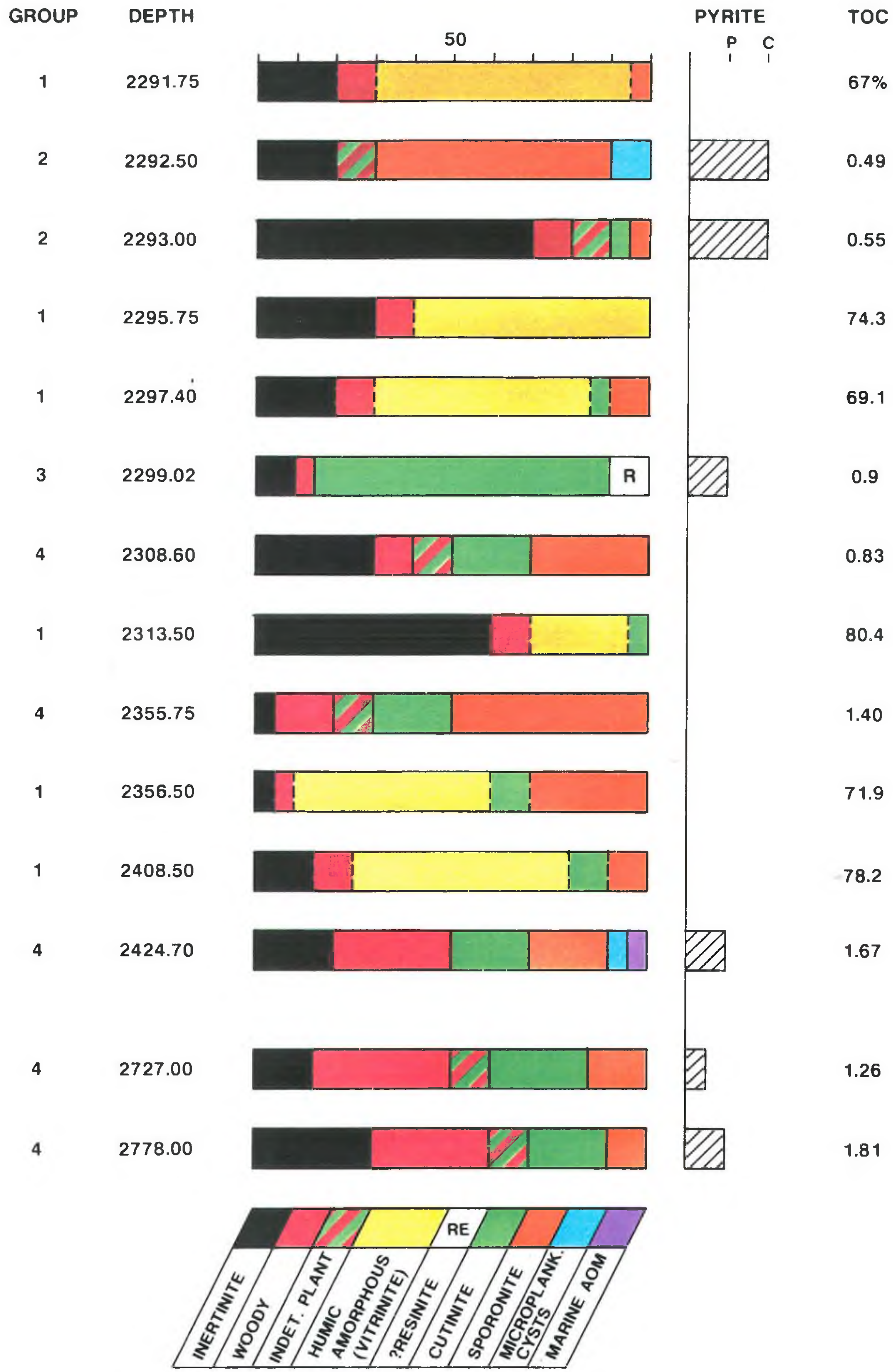
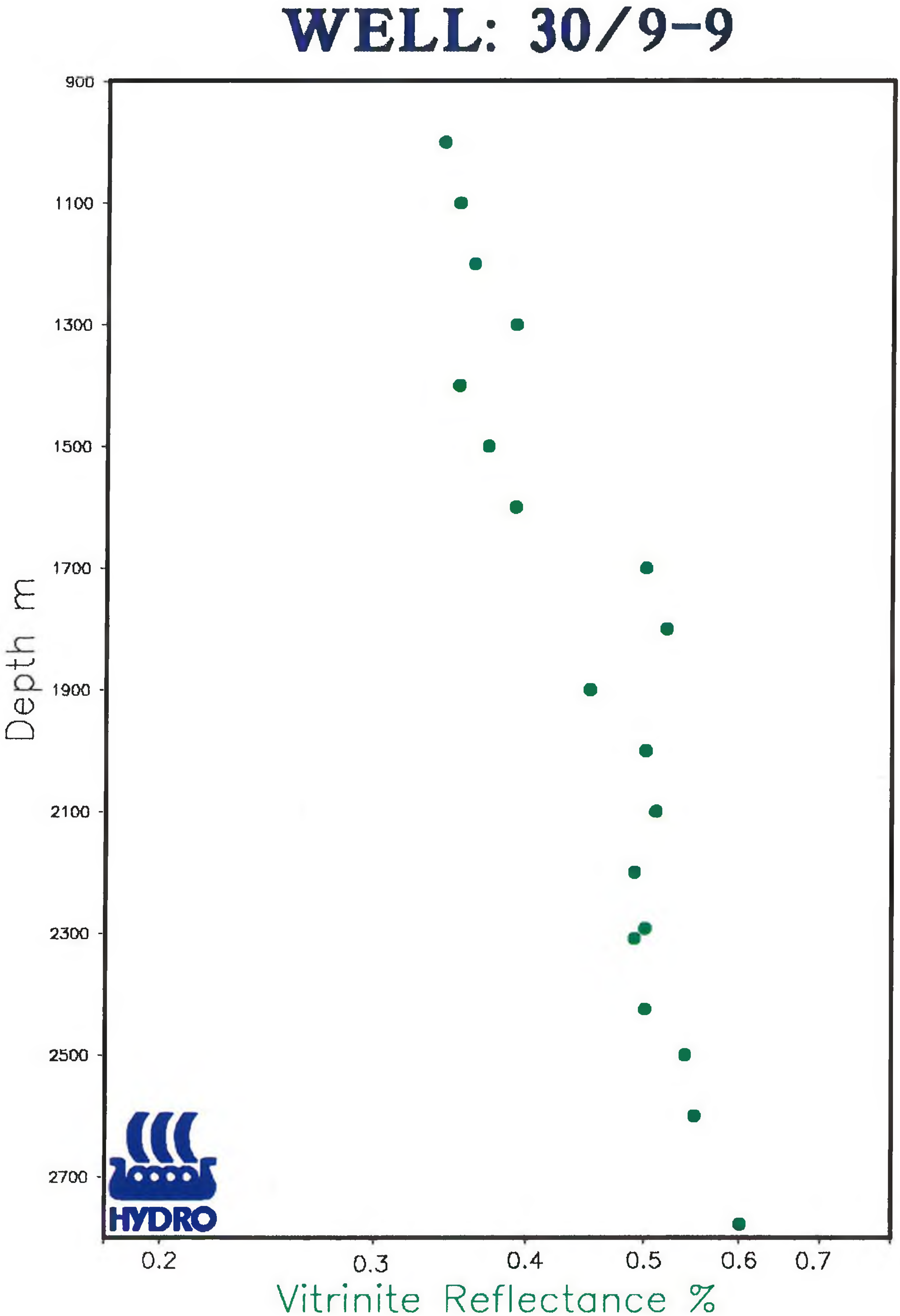


Figure 4.1. Vitrinite reflectance versus depth.



WELL: 30/9-9
900
1100
1300
1500
1700
1900
2100
2300
2500
2700
Depth m
0.2
0.3
0.4
0.5
0.6
0.7
Vitrinite Reflectance %
HYDRO

Figure 4.2. Spore colour.

WELL
30/9-9

SPORE COLOUR INDEX

IMMATURE			EARLY	MATURE		LATE	OVER MATURE		STR. ALTERED				
Greenish Yellow	Pale Yellow	Yellow	Amber Yellow	Orange	Orange - Red Brn.	Red Brown	Deep Red Brown to Dark Brown	Brown to Dark Brown	Dark Brown	Brown Black	Dark Brn.	Black	Black (Opaque)

Stoplin Scale

%Ro: .30, .36, .50, .65, .83, 1.25 1.48, 1.70 1.93, 2.55, 2.80, 3.30 3.51, 3.80, 4.00

Index: 1.2, 1.5, 1.7, 1.8, 2.3, 2.6, 3.0-3.1, 3.3-3.4, 3.6, 3.8, 3.8-3.9, 4.0-4.4, 4.8

DEPTH

1750 DC — X BISAC — (X —— X) REWORKED

1800 DC — X —— X BISAC

1900 DC — X —— X BISAC

2010 DC — X —— X (P i situ)

2100 DC — X - - - - - X - - - S+P

2196.5 DC — X —— X (P, dino) (X) WOOD S

2236 SWC — X —— X (P, dino) (X) WOOD S

2292.5 SWC — X —— X (S+P)

2299.02 CC — —— X —— (AOM)

2308.6 CC — (P) X —— X —— X (S, VIT)

2355.75 CC — X (S) X (VIT)

2424.7 CC — (X —— X) P, M X (S) X (VIT, VIT)

2505 DC — X (S)

2605 DC — - - - X (S) —

2695 DC — X (S) —— X

2778 SWC — (X —— X) P, M X (S)

2809 DC — —— X (S) ——

AUTHOR:

DATE:

APPENDIX I

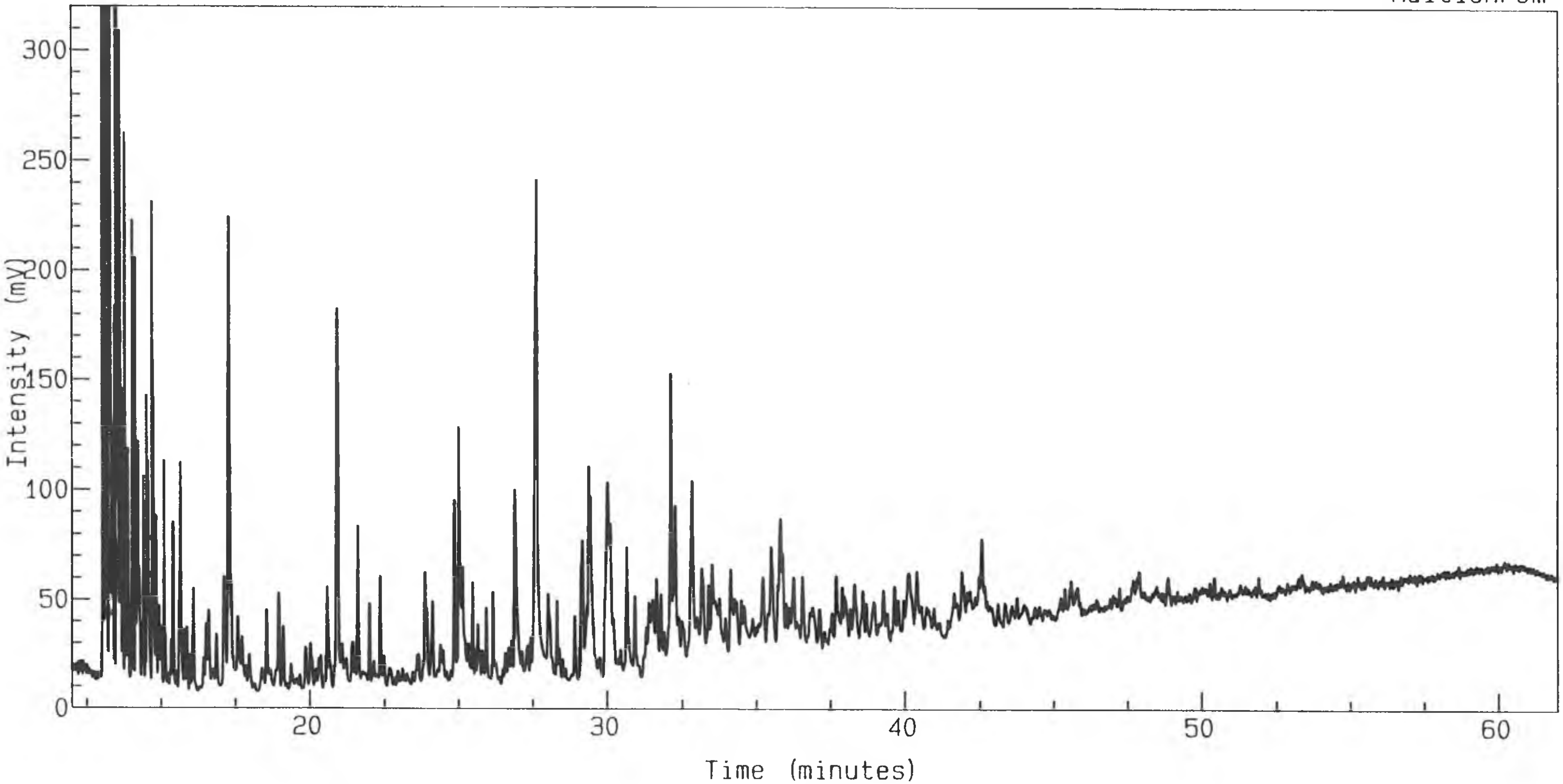
Pyrolysis Gas Chromatograms.

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 A300909P, 5, 1.

30/9-9 2291.75 Amount : 3.300

PROGRAMMED PYROLYSIS FID



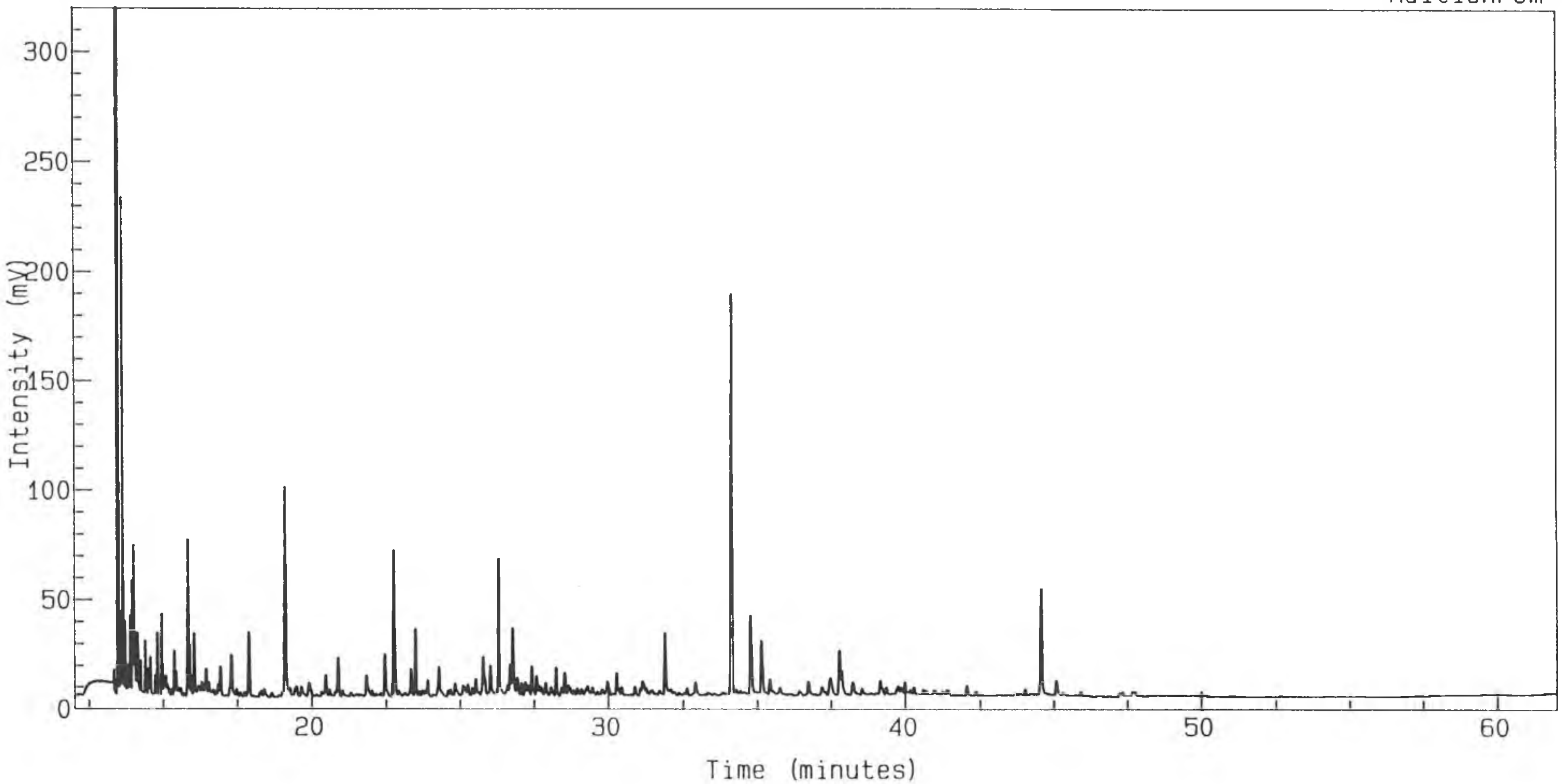
Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 13-FEB-1990 at 22:35
Reported on 2-MAR-1990 at 10:11

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 C300909P, 2, 1.
2292.5 Amount : 128.400
PROGRAMMED PYROLYSIS FID

Multichrom

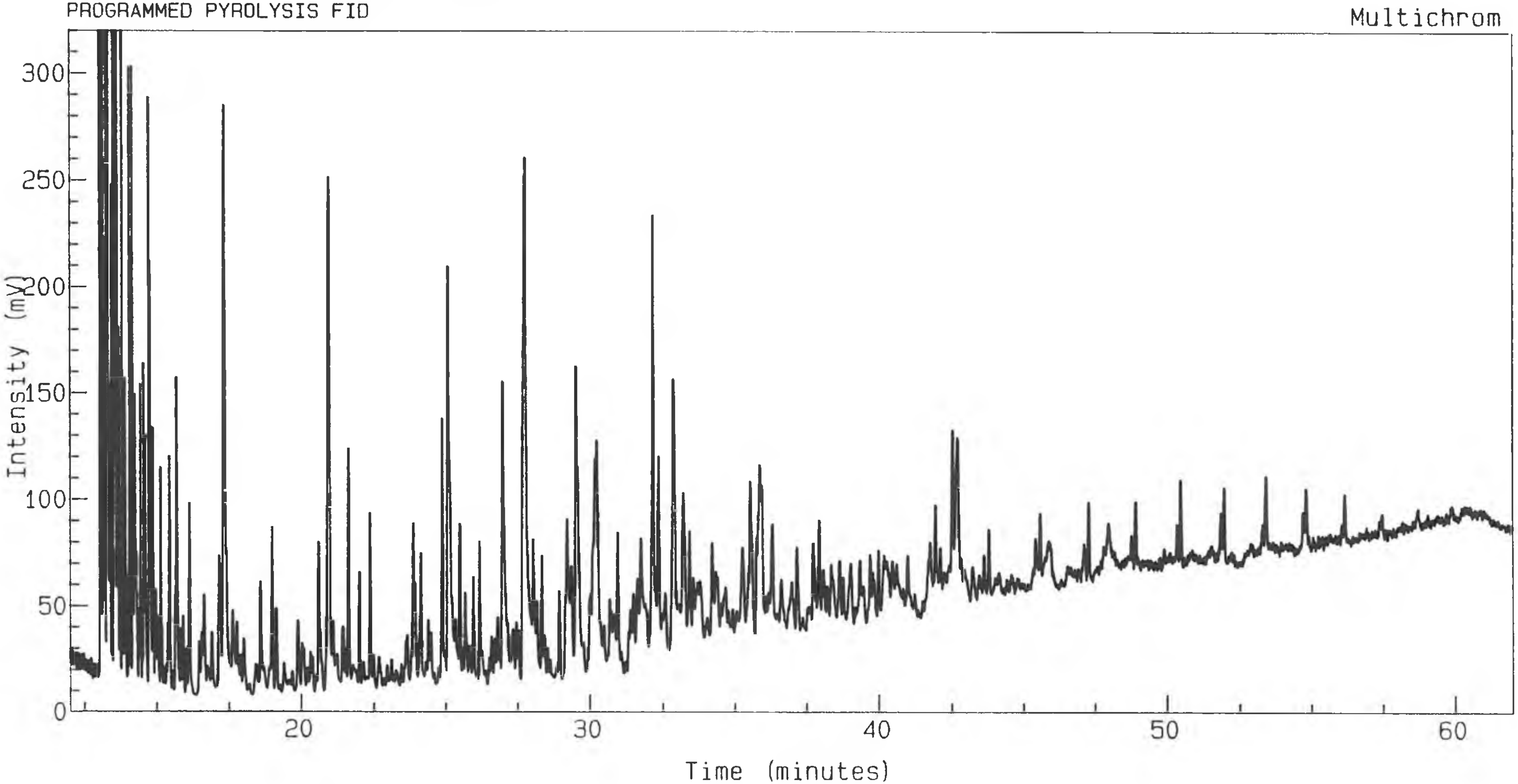


Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 12-MAR-1990 at 16:35
Reported on 13-MAR-1990 at 09:09

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 A300909P.6.1.
30/9-9 2295.75 Amount : 4.300
PROGRAMMED PYROLYSIS FID



Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 14-FEB-1990 at 00:10
Reported on 2-MAR-1990 at 10:12

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

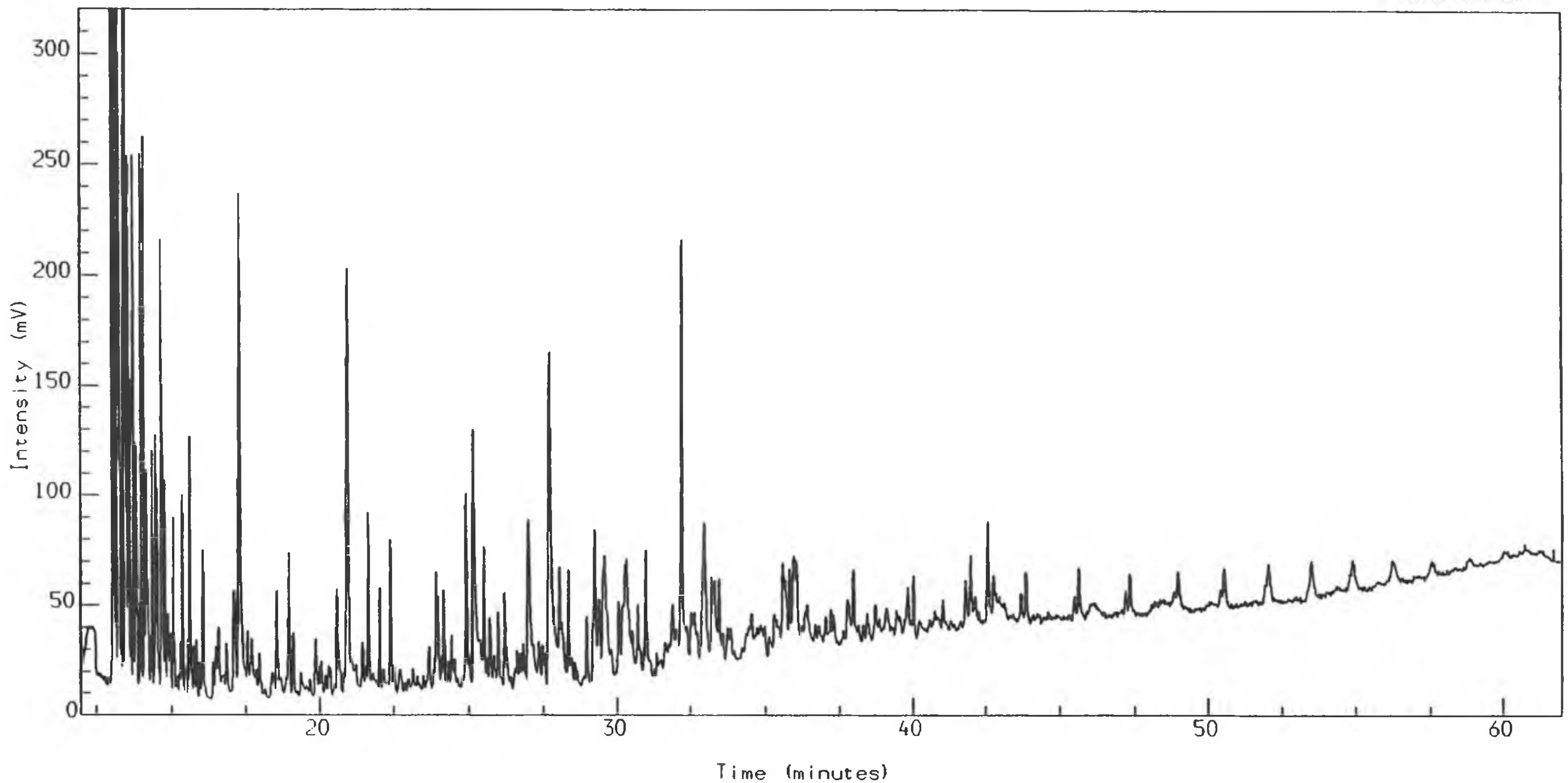
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 B30090908P.7.1.

30/9-9. 2297.40   Amount : 3.700

PROGRAMMED PYROLYSIS FID

Multichrom



Instrument : V 3700

Channel Title : PYROLYSIS FID

Lims ID :

Acquired on 14-FEB-1990 at 20:13

Reported on 2-MAR-1990 at 12:40

Method : PYRO

Calibration : PYRO

Run Sequence : PYRO

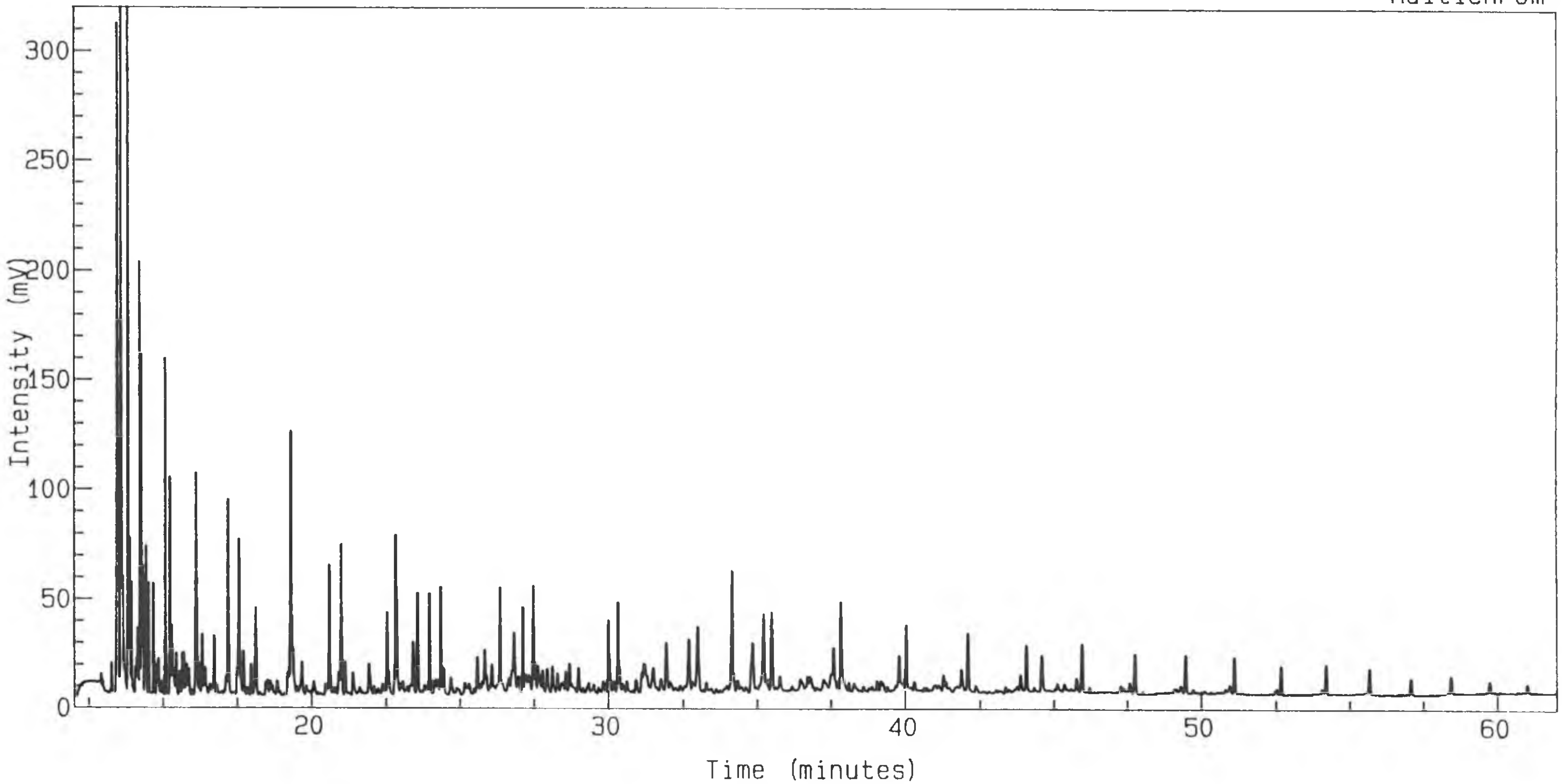
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 C300909P, 3, 1.

2308.60 Amount : 101.900

PROGRAMMED PYROLYSIS FID

Multichrom



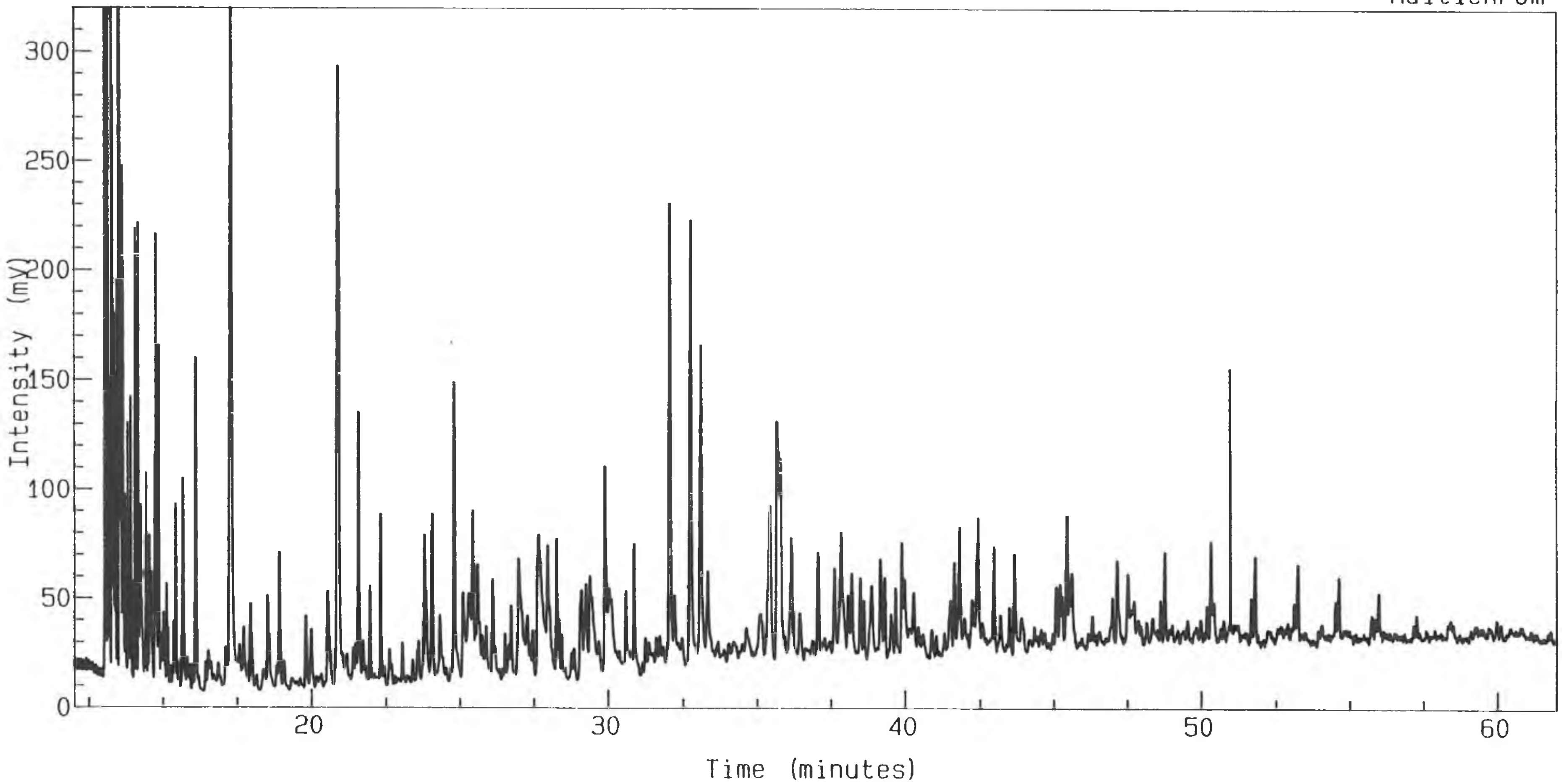
Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 12-MAR-1990 at 18:07
Reported on 13-MAR-1990 at 09:09

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 A300909P, 2, 1.
30/9-9 2313.5, KULL Amount : 4.000
PROGRAMMED PYROLYSIS FID

Multichrom

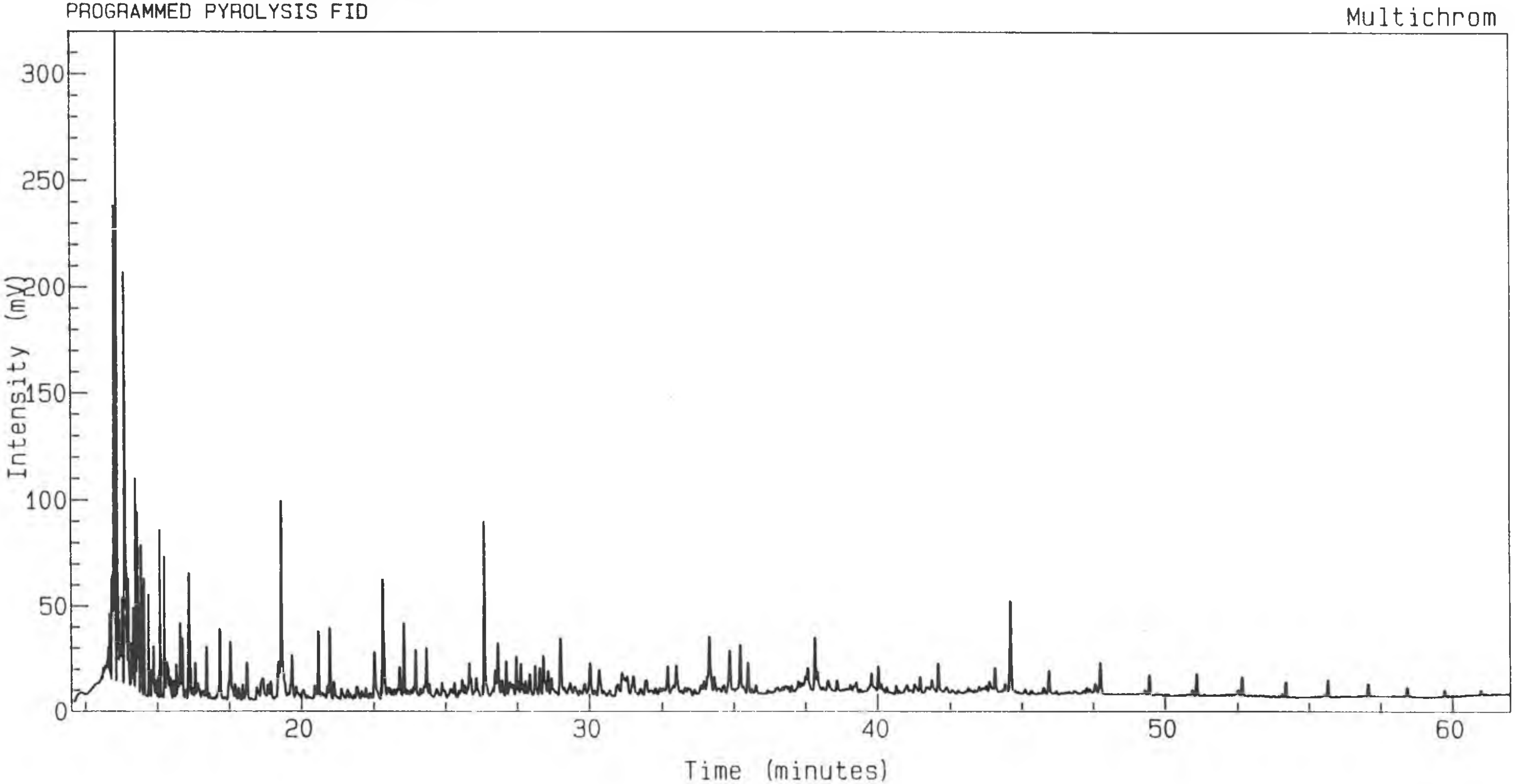


Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 13-FEB-1990 at 17:49
Reported on 2-MAR-1990 at 10:08

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 C300909P, 4, 1.
2355.75 Amount : 101.700
PROGRAMMED PYROLYSIS FID



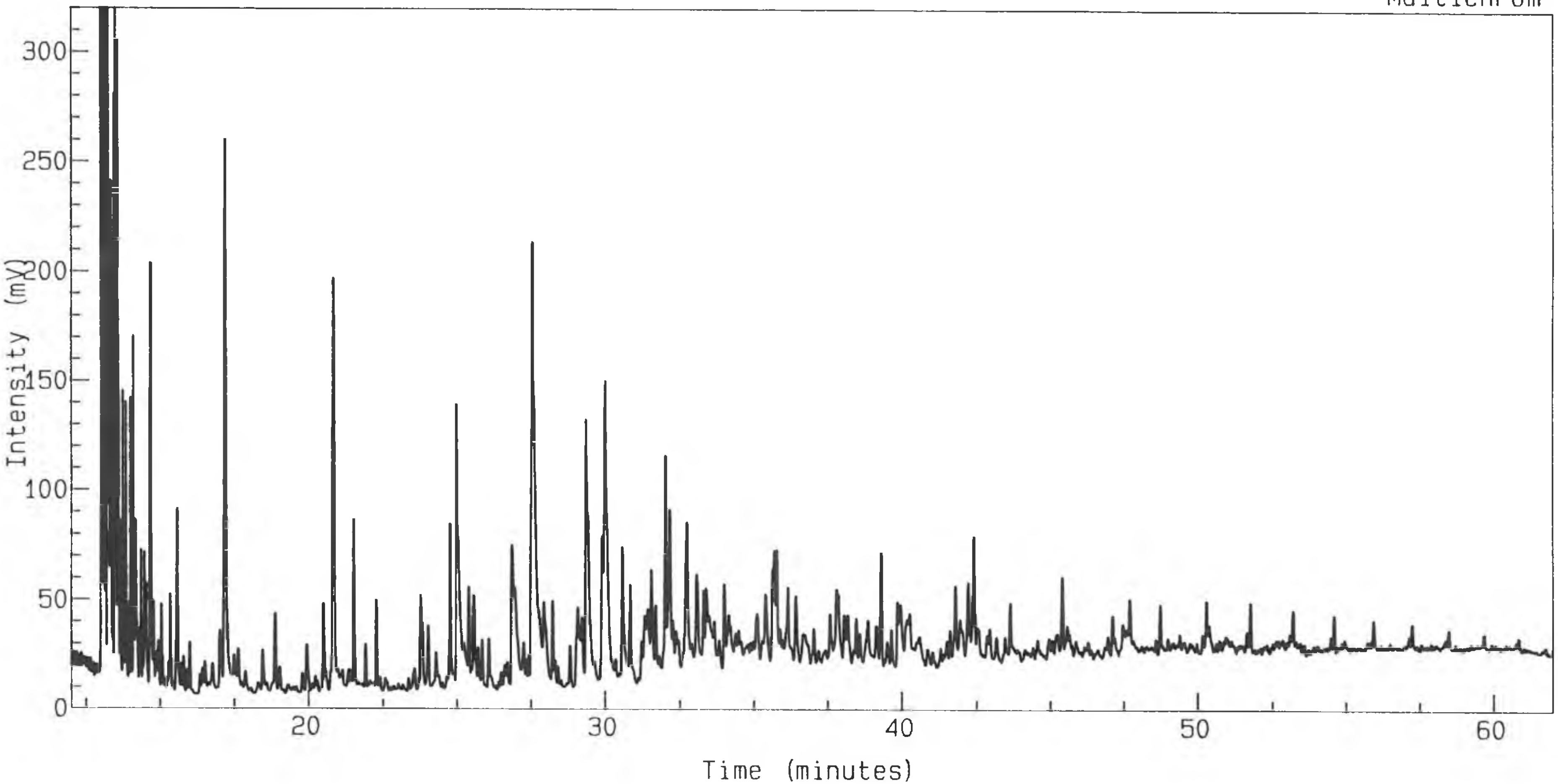
Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 12-MAR-1990 at 19:39
Reported on 13-MAR-1990 at 09:10

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 A300909P, 3, 1.
30/9-9 2356.5 Amount : 3.500
PROGRAMMED PYROLYSIS FID

Multichrom

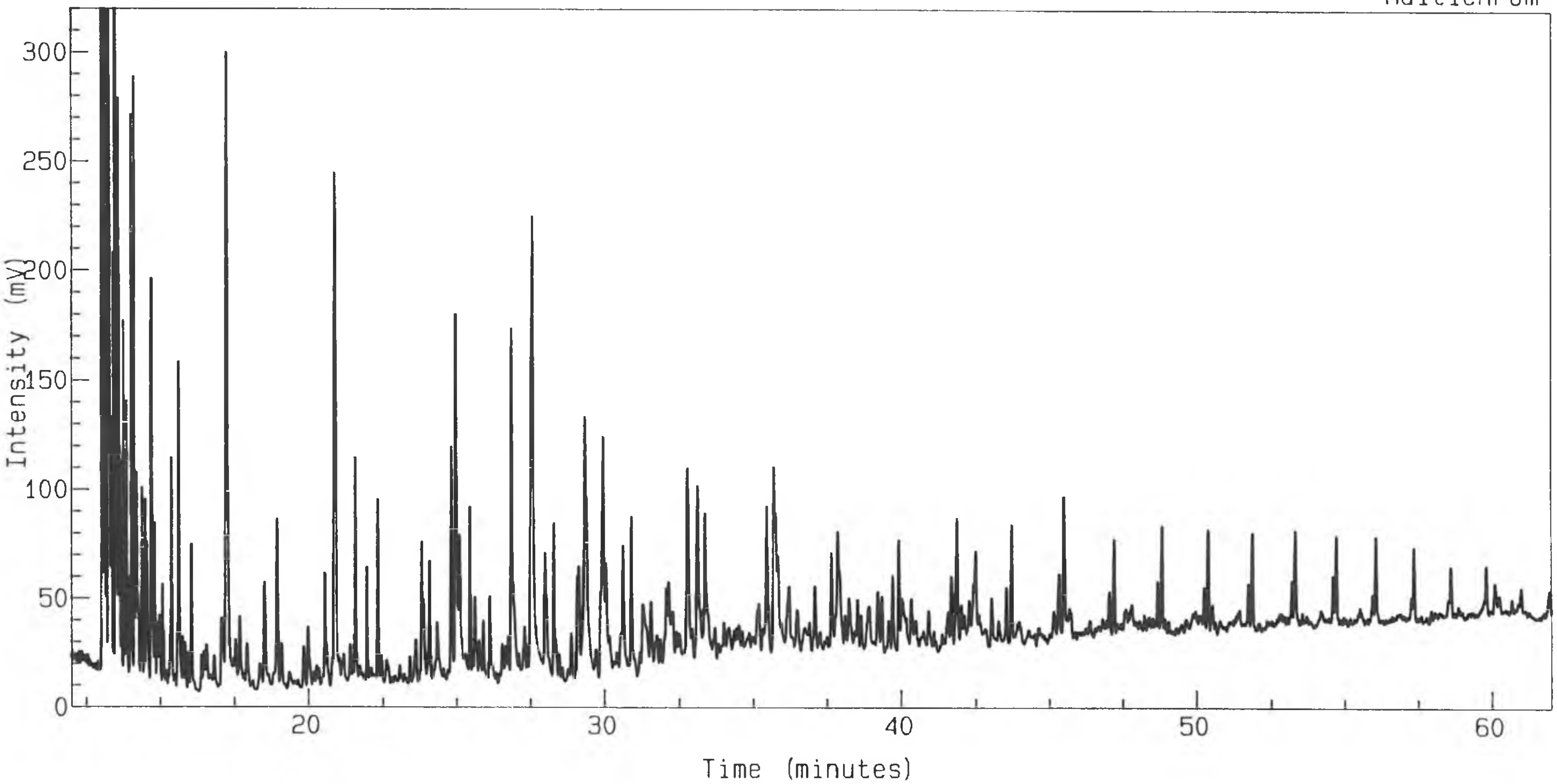


Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 13-FEB-1990 at 19:24
Reported on 2-MAR-1990 at 10:09

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 A300909P, 4, 1.
30/9-9 2408.5 Amount : 3.900
PROGRAMMED PYROLYSIS FID



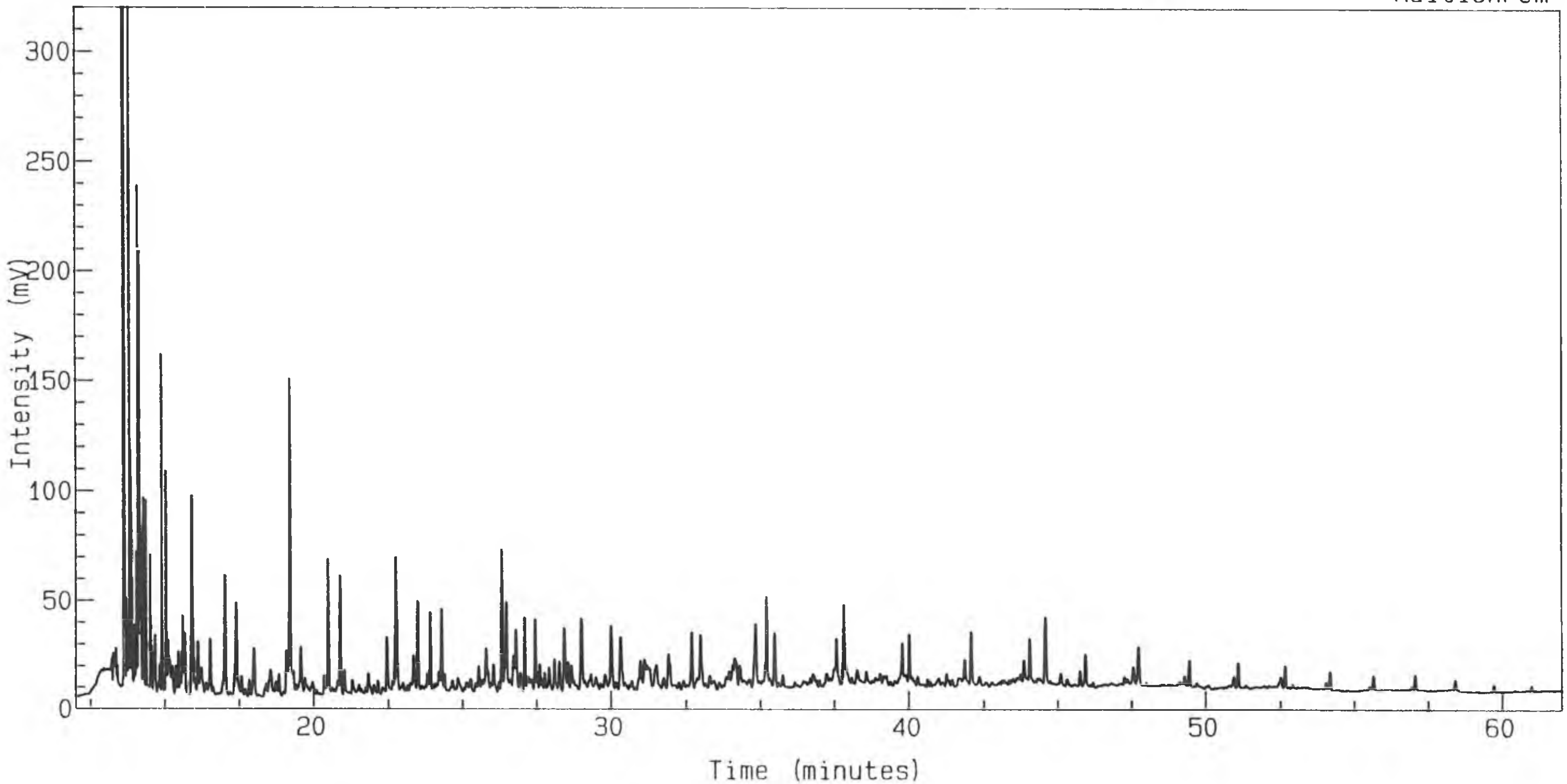
Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 13-FEB-1990 at 21:00
Reported on 2-MAR-1990 at 10:10

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 C300909P, 5, 1.
2424.7 Amount : 103.200
PROGRAMMED PYROLYSIS FID

Multichrom



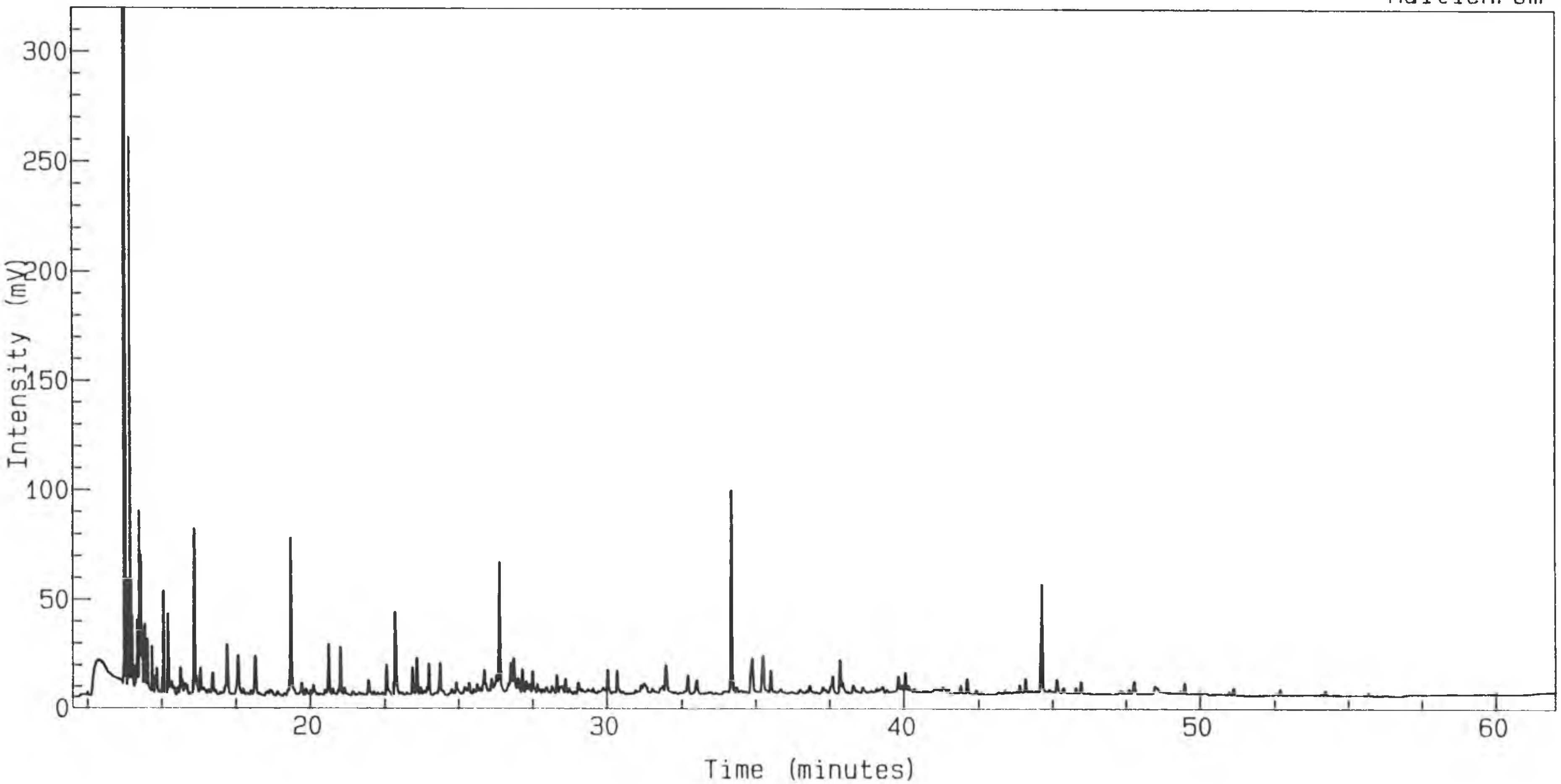
Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 12-MAR-1990 at 21:12
Reported on 13-MAR-1990 at 09:11

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 C300909P, 6, 1.
2727.0 Amount : 113.600
PROGRAMMED PYROLYSIS FID

Multichrom

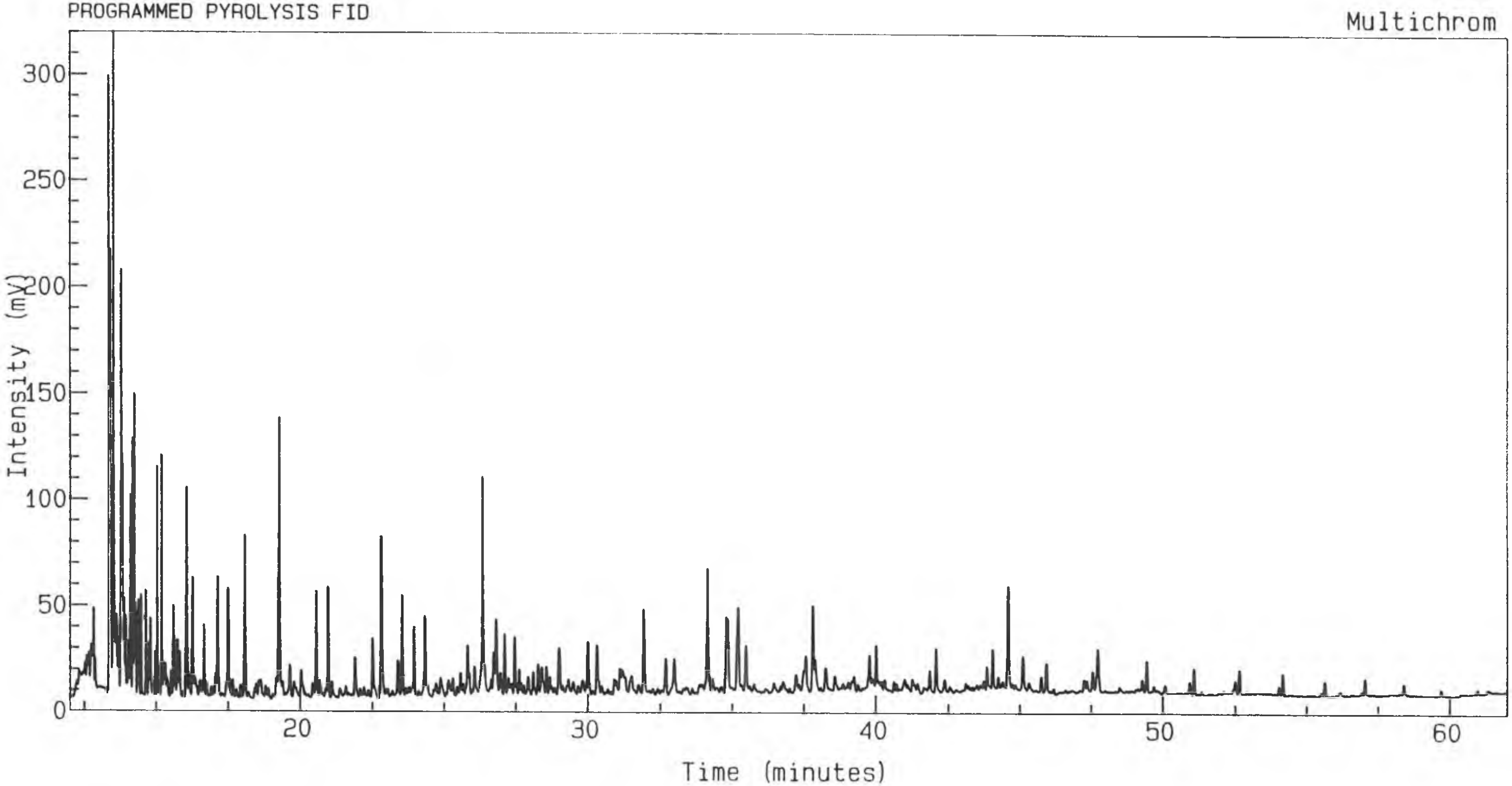


Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 12-MAR-1990 at 22:52
Reported on 13-MAR-1990 at 09:12

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 6 C300909P.7.1.
2778.0 Amount : 110.800
PROGRAMMED PYROLYSIS FID



Instrument : V 3700
Channel Title : PYROLYSIS FID
Lims ID :
Acquired on 13-MAR-1990 at 00:25
Reported on 13-MAR-1990 at 09:12

Method : PYRO
Calibration : PYRO
Run Sequence : PYRO

APPENDIX II

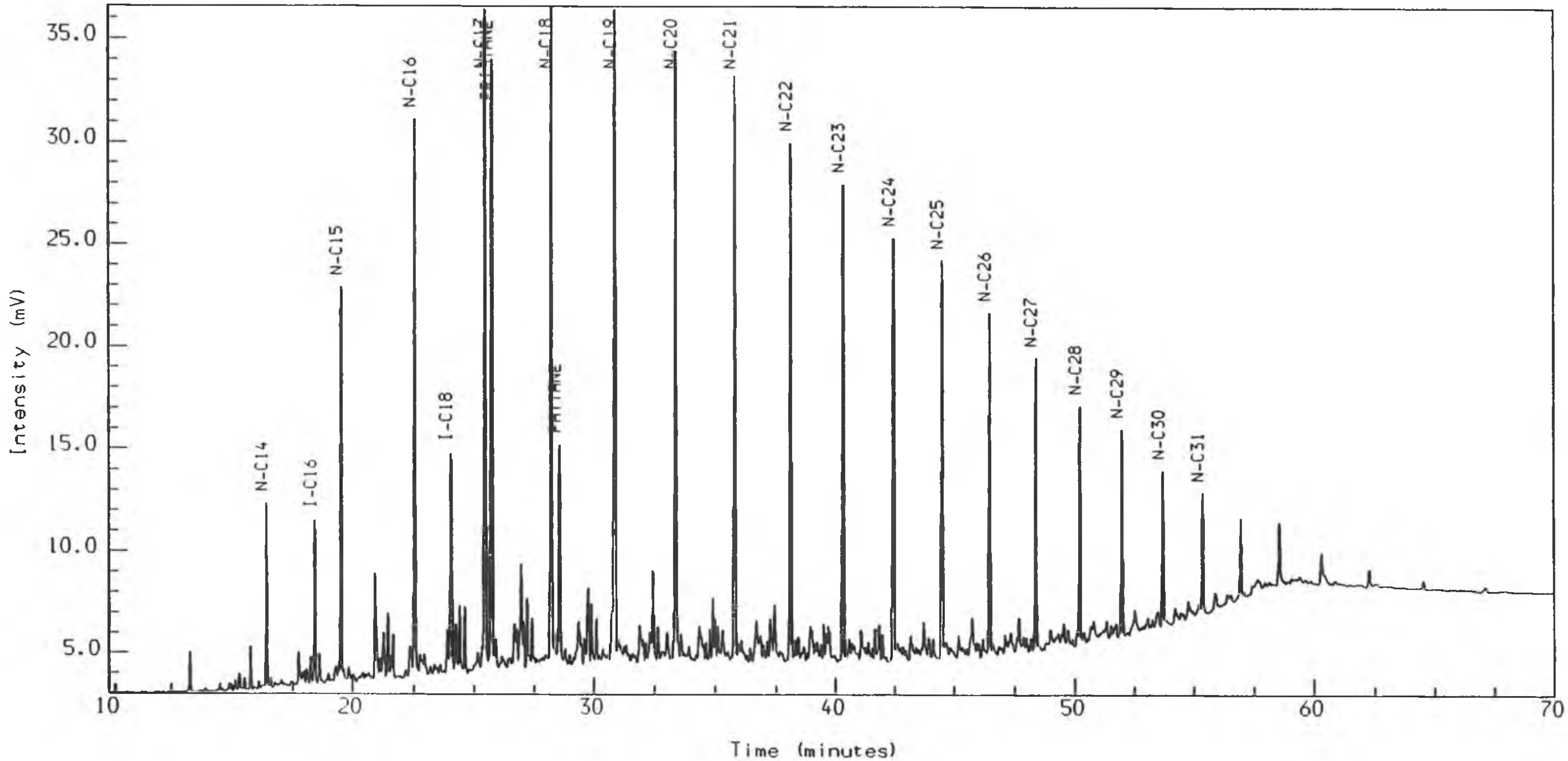
Gas Chromatograms of Saturated Hydrocarbons.

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A300909S.6.1.

30/9-9 2291.1

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 12-FEB-1990 at 22:11

Reported on 5-MAR-1990 at 13:53

Method : MSDS

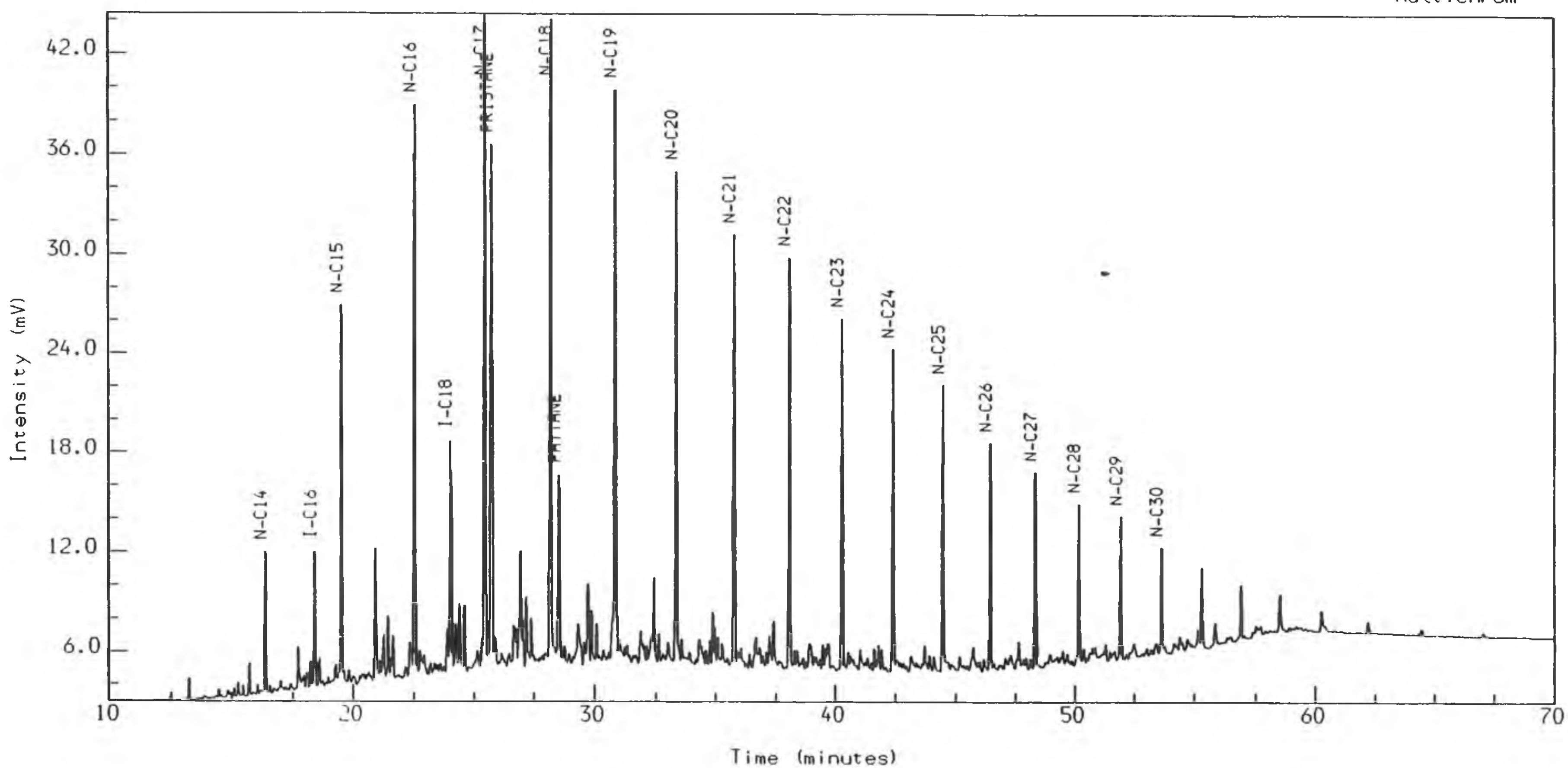
Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A30090955.9.1.
30/9-9 2291.75

Multichrom

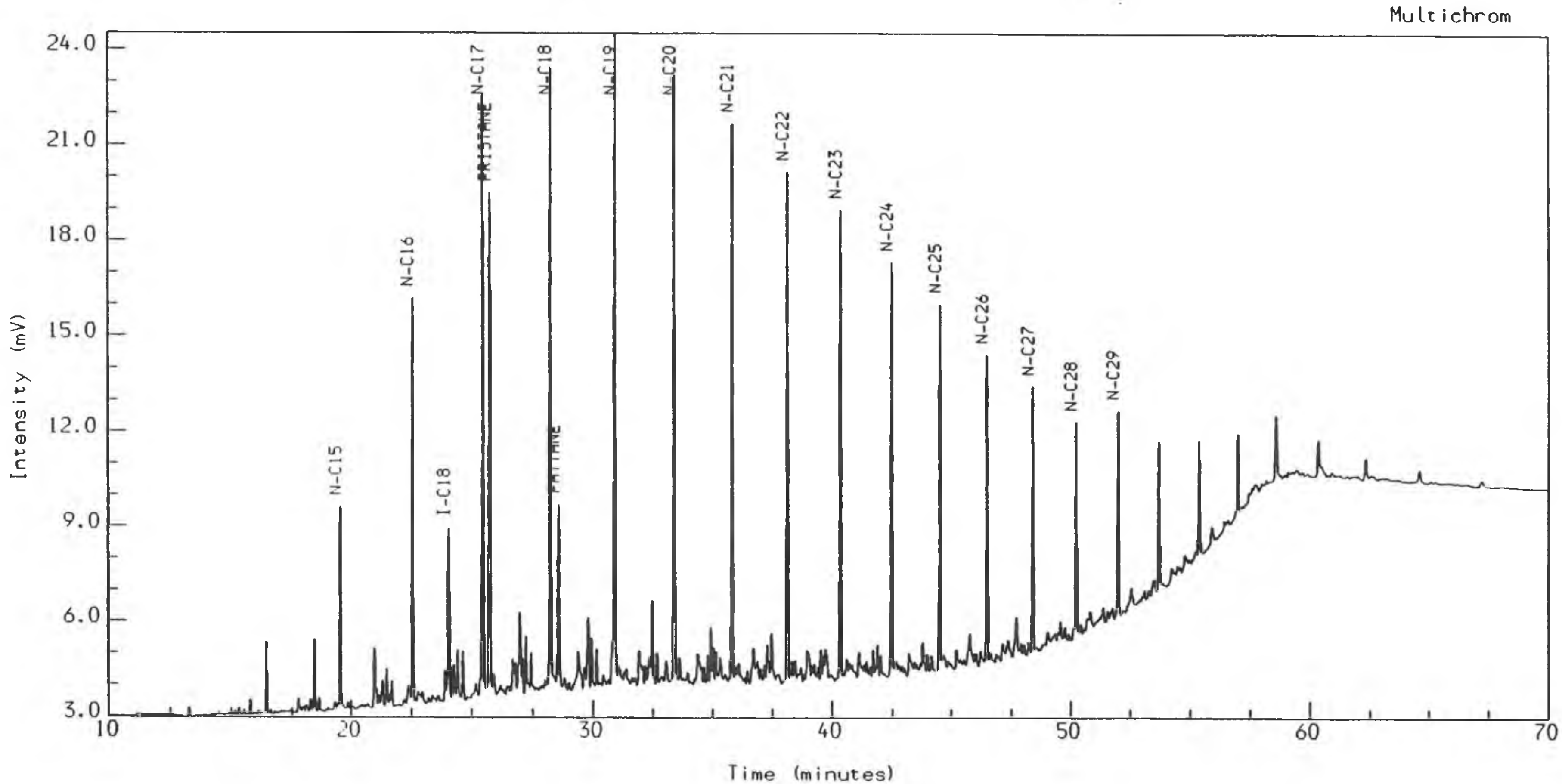


Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 13-FEB-1990 at 02:47
Reported on 5-MAR-1990 at 13:58

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A300909S.3.1.
30/9-9 2292.5



Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 12-FEB-1990 at 17:36
Reported on 5-MAR-1990 at 13:47

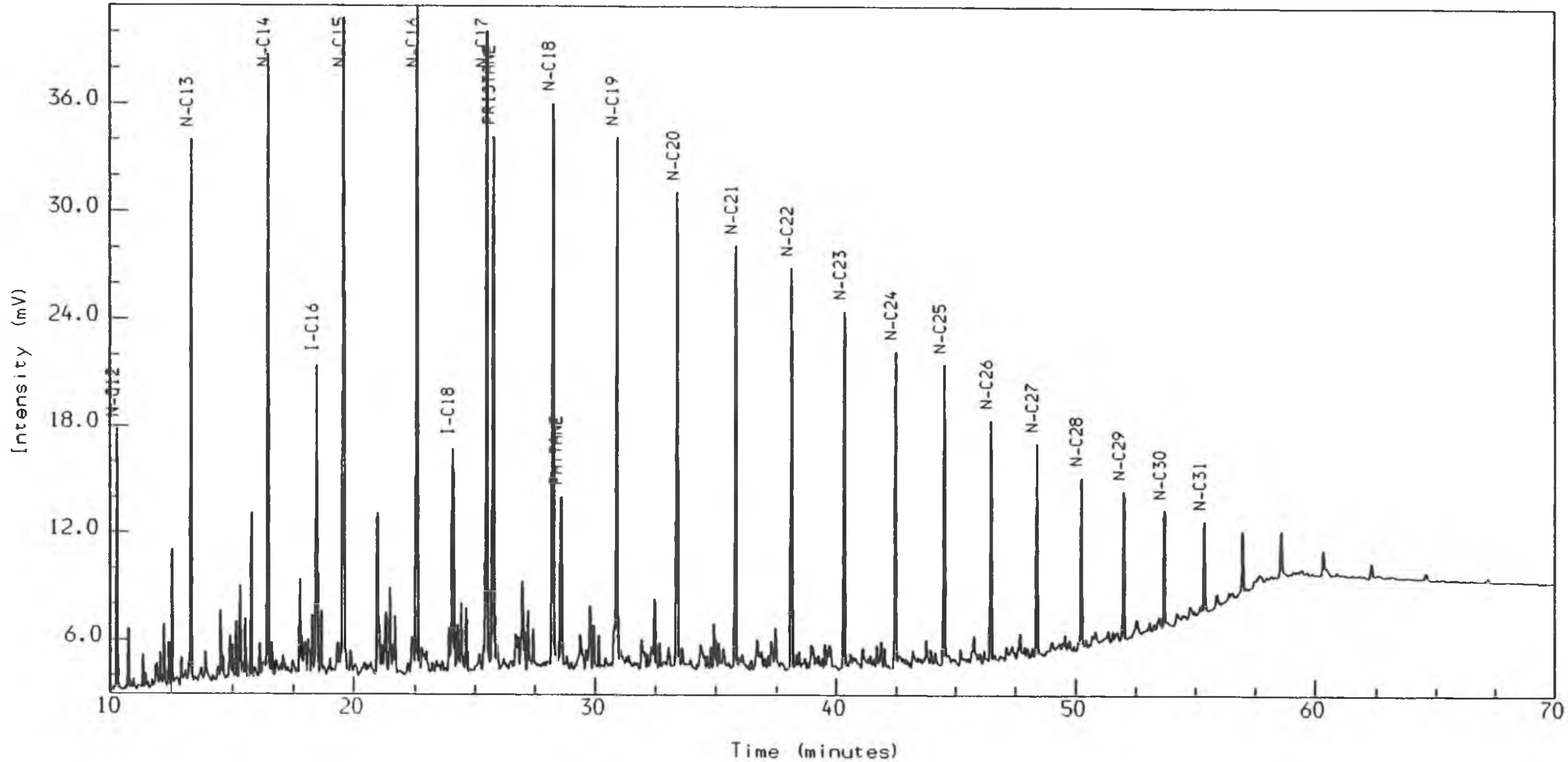
Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A300909S.4.1.

30/9-9 2293.0

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 12-FEB-1990 at 19:08

Reported on 5-MAR-1990 at 13:49

Method : MSDS

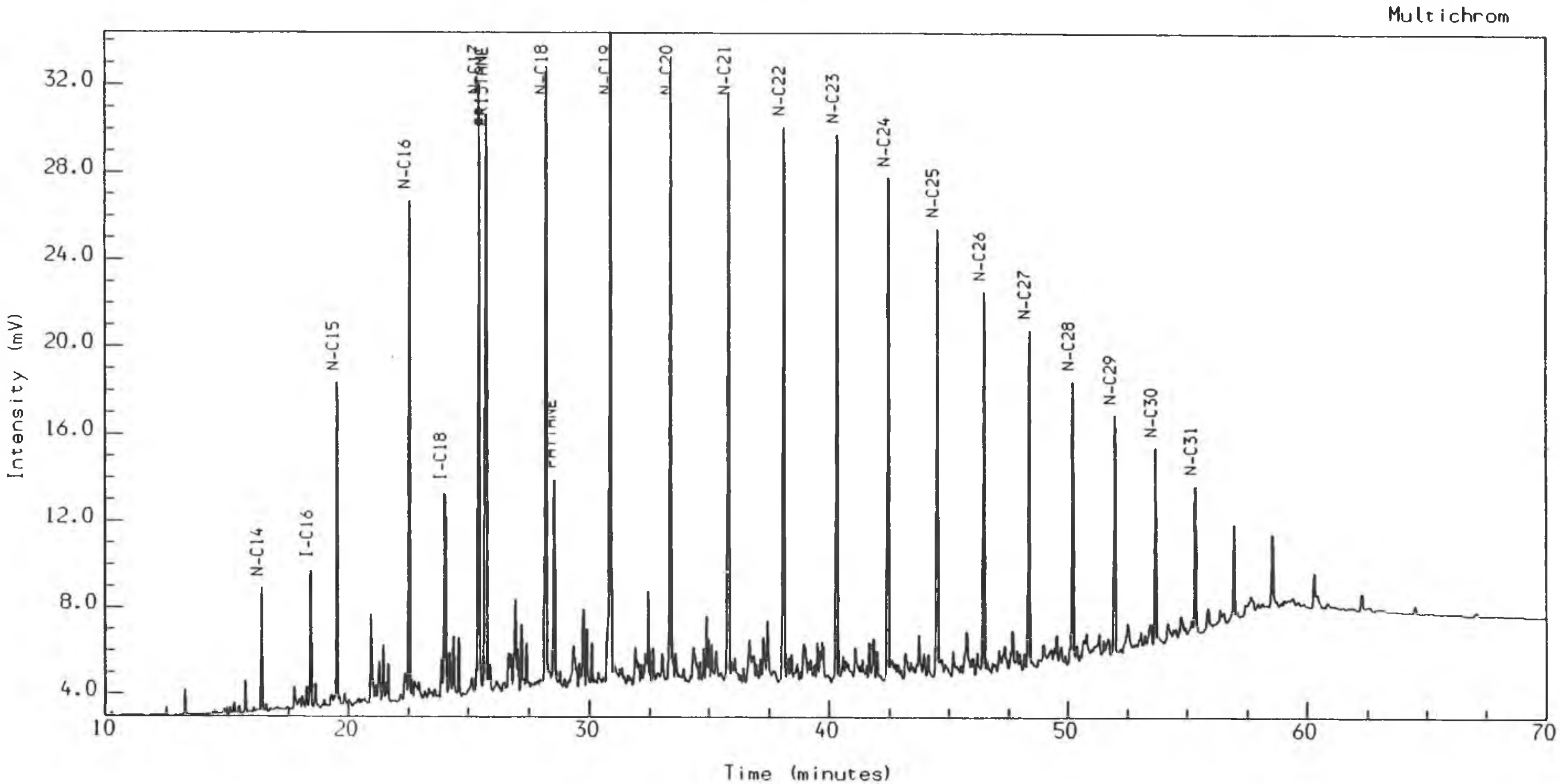
Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A300909S.7.1.

30/9-9 2393.02



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 12-FEB-1990 at 23:43

Reported on 5-MAR-1990 at 13:55

Method : MSDS

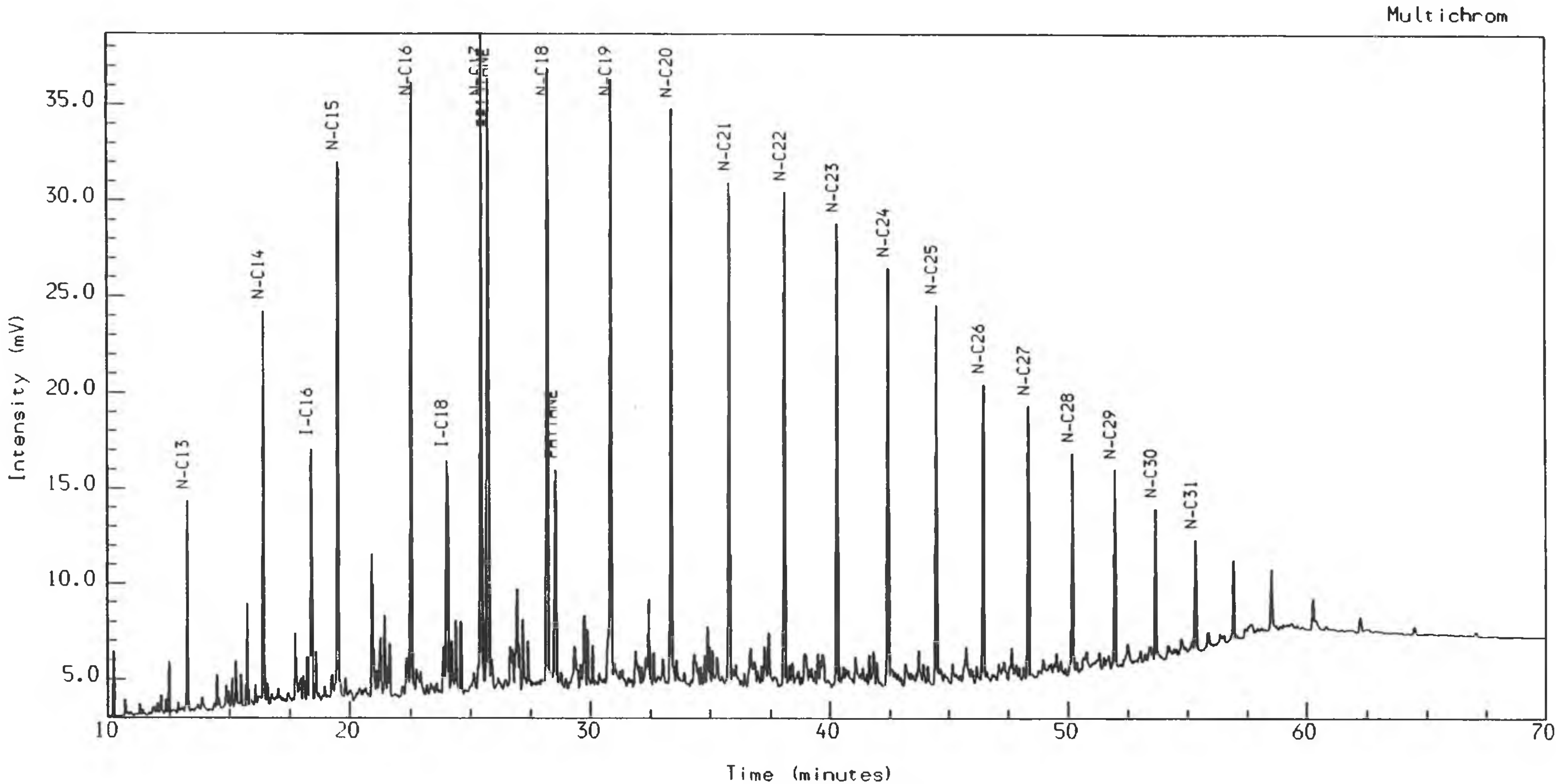
Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A300909S.8.1.

30/9-9 2293.7



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 13-FEB-1990 at 01:15

Reported on 5-MAR-1990 at 13:57

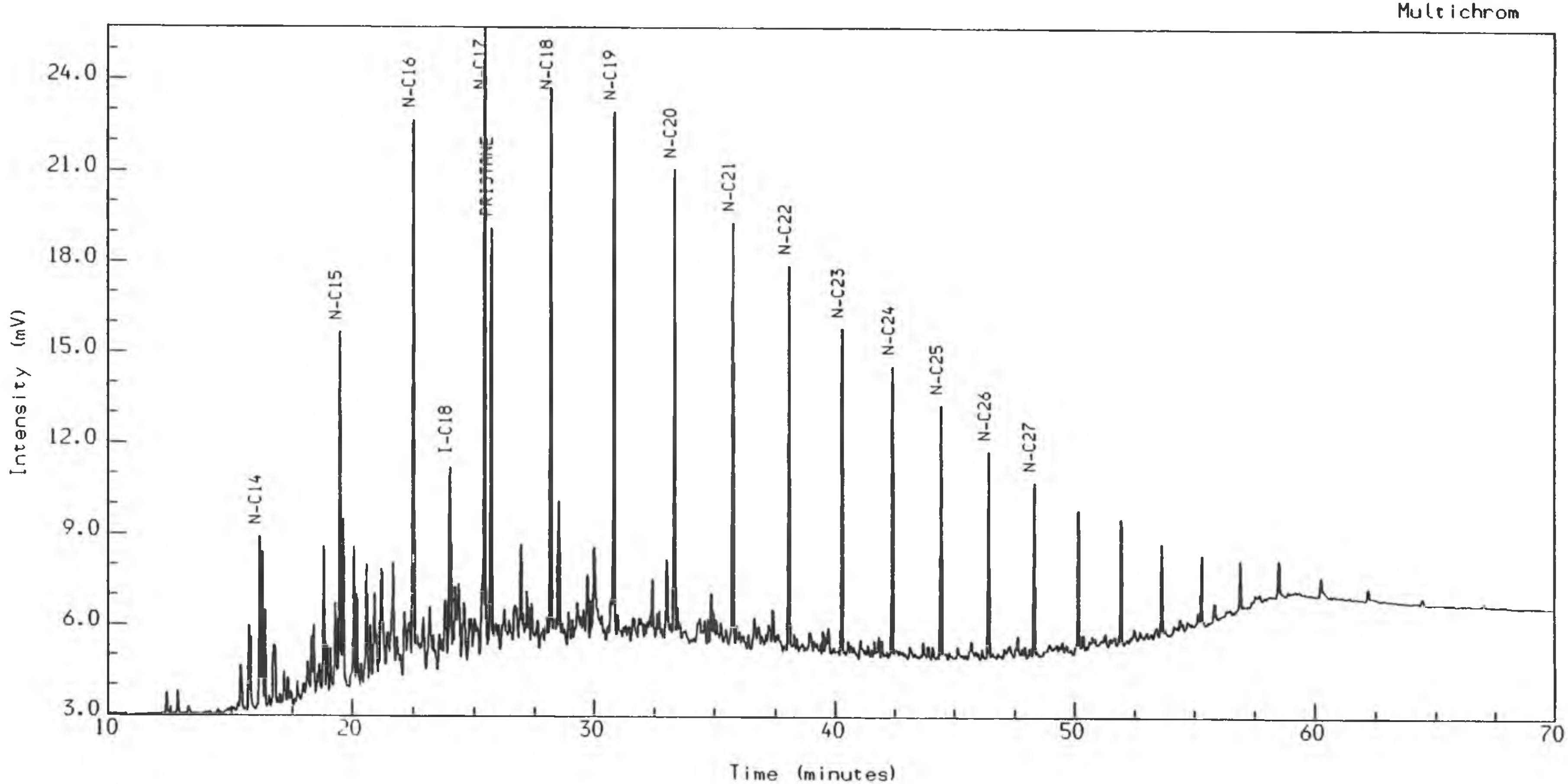
Method : MSDS

Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A3009095.10.1.
30/9-9 2295.75



Instrument	: HP5890	Method	: MSDS
Channel Title	: MSD	Calibration	: MSDS
Lims ID	:	Run Sequence	: MSDS

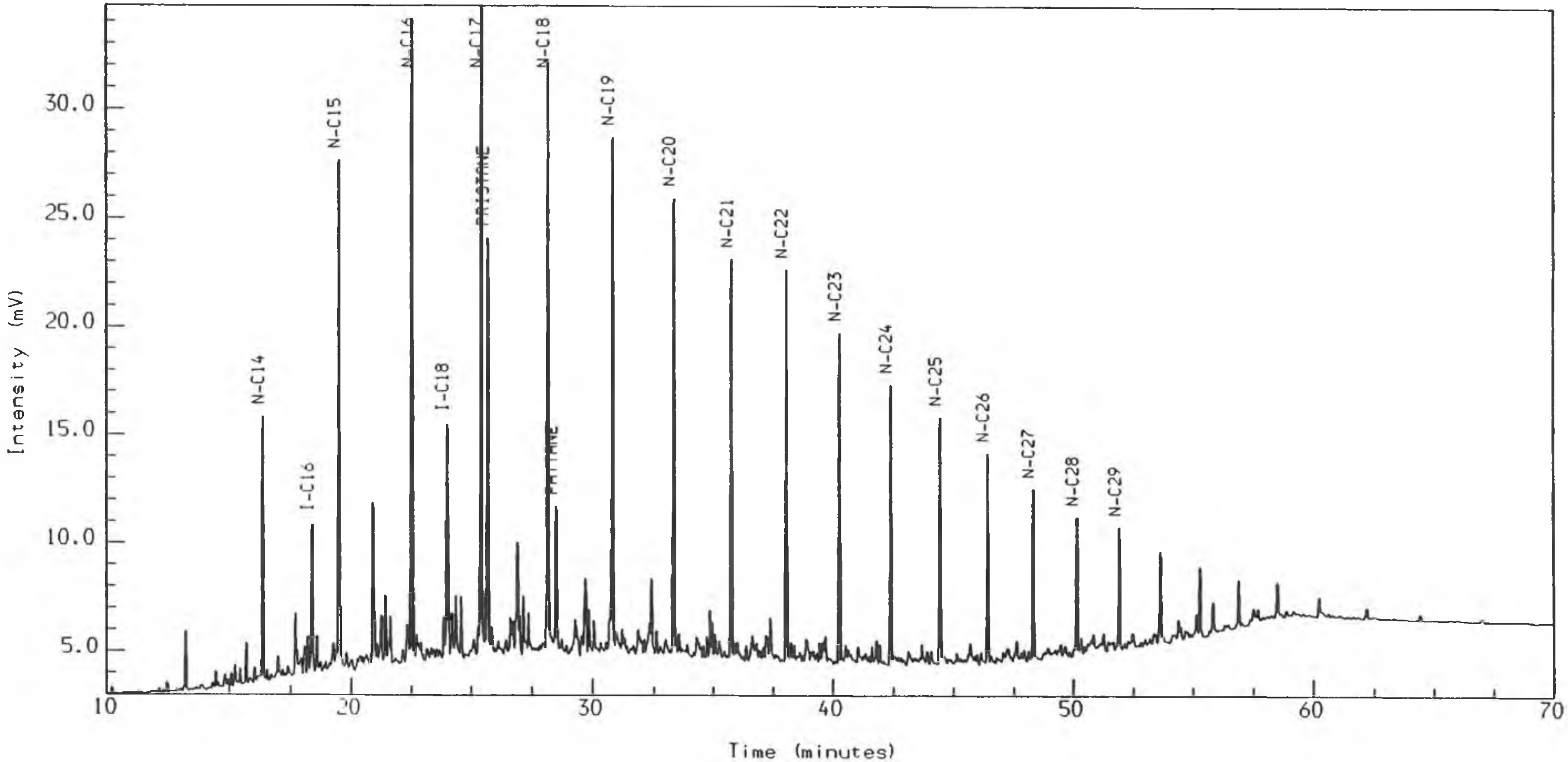
Acquired on 13-FEB-1990 at 04:19
Reported on 5-MAR-1990 at 14:00

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A3009095,11,1.

30/9-9 2297.4

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 13-FEB-1990 at 05:51

Reported on 5-MAR-1990 at 14:02

Method : MSDS

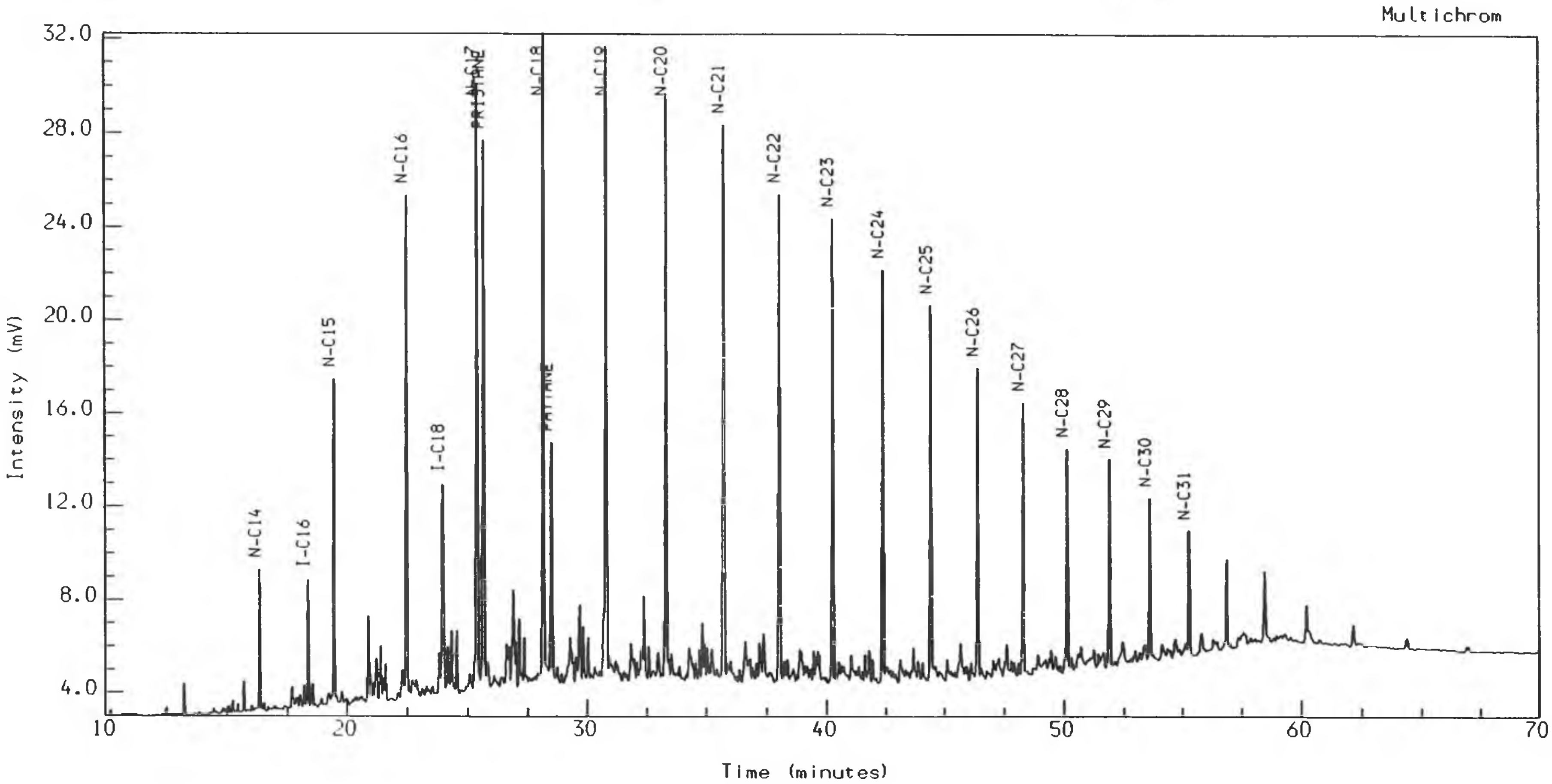
Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.15.1.

30/9-9 2299.02



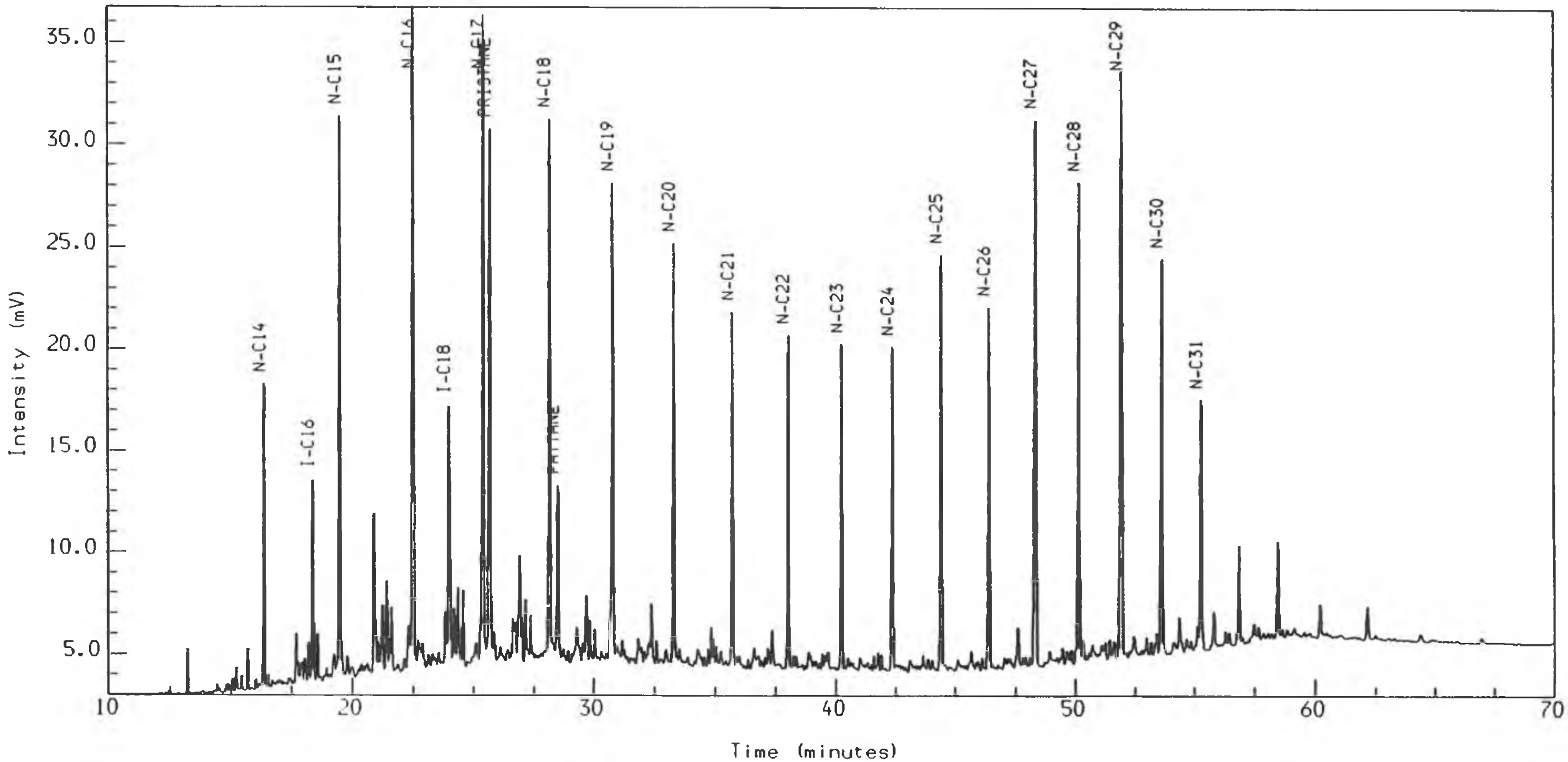
Instrument : HP5890	Method : MSDS
Channel Title : MSD	Calibration : MSDS
Lims ID :	Run Sequence : MSDS
Acquired on 13-FEB-1990 at 11:58	
Reported on 13-FEB-1990 at 13:42	

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.16.1.

30/9-9 2308.6

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 13-FEB-1990 at 13:30

Reported on 13-FEB-1990 at 14:52

Method : MSDS

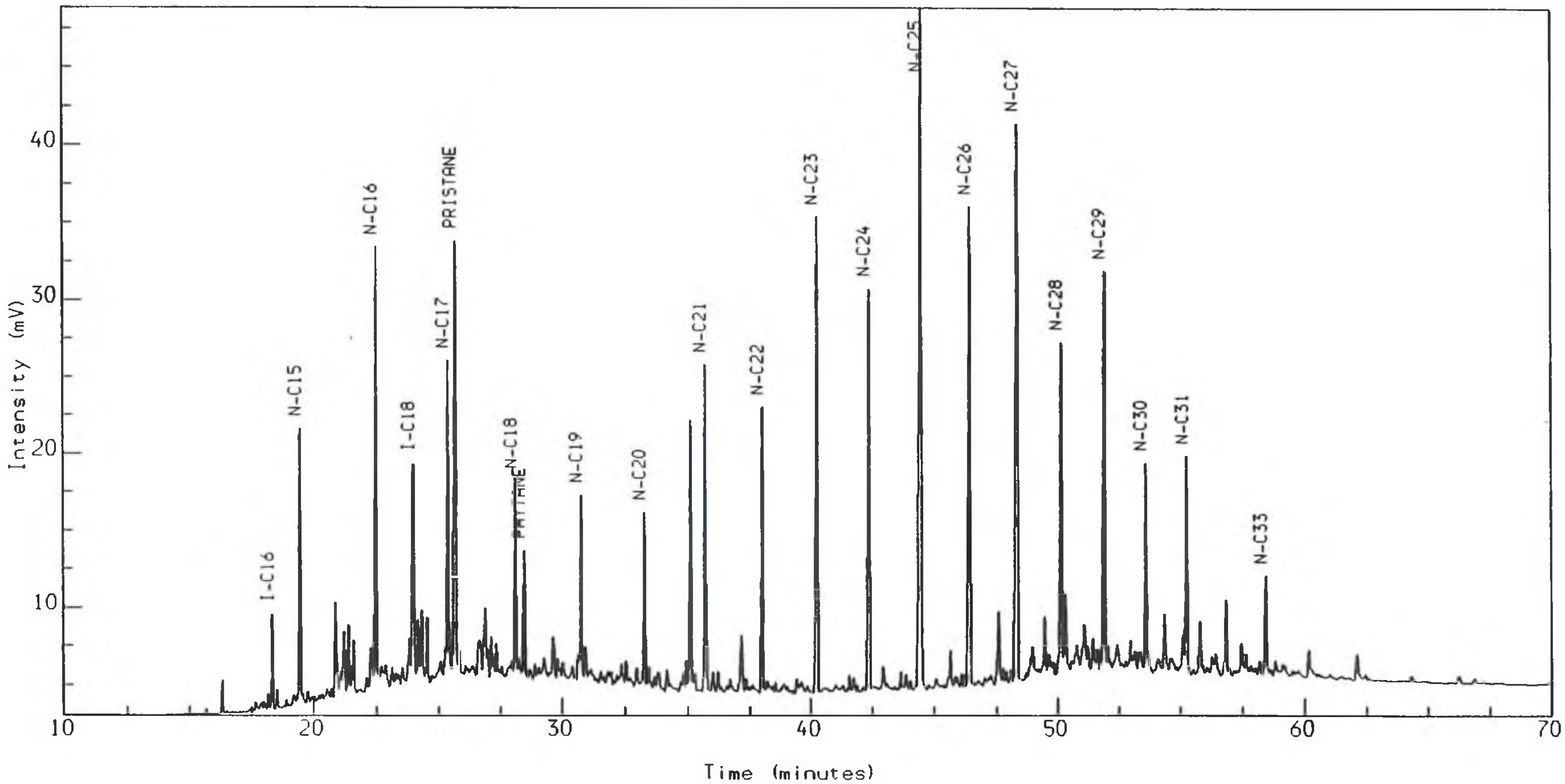
Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s,22,1.
30/9-9 2312.3

Multichrom



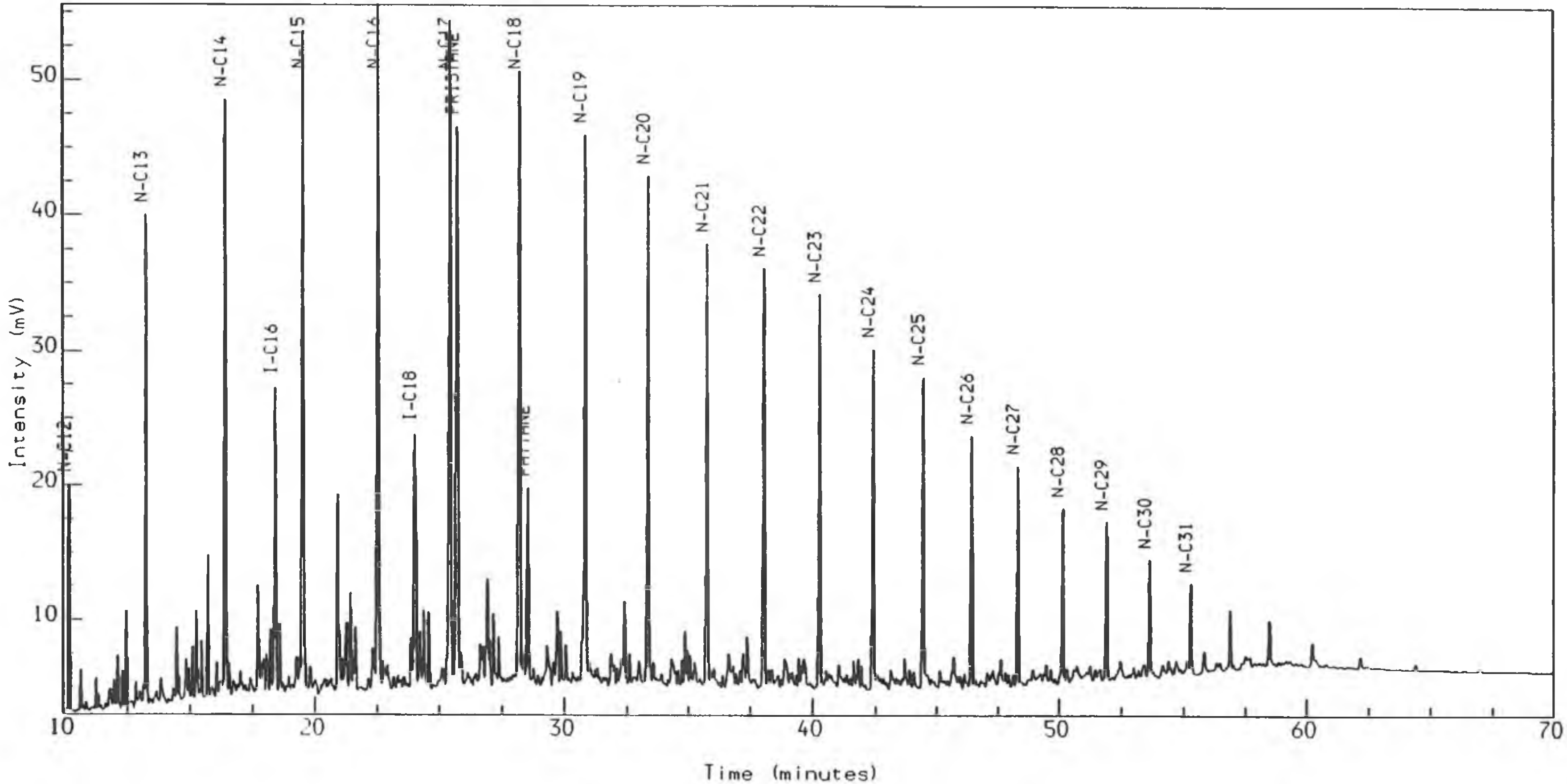
Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 13-FEB-1990 at 22:40
Reported on 14-FEB-1990 at 00:03

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.12.1.
30/9-9 2313.5

Multichrom

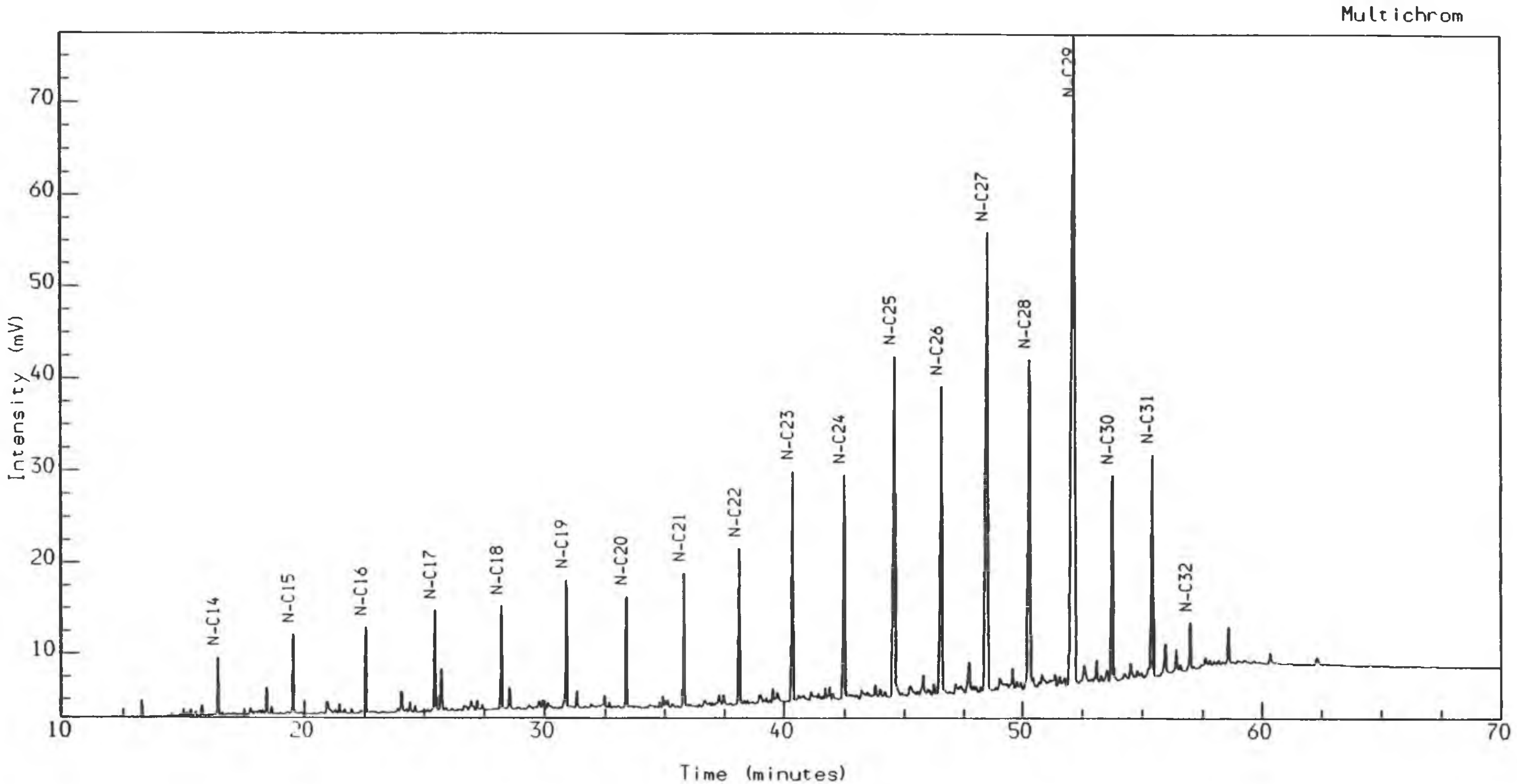


Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 13-FEB-1990 at 07:23
Reported on 13-FEB-1990 at 13:21

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 A300909S.5.1.
30/9-9 2318.5

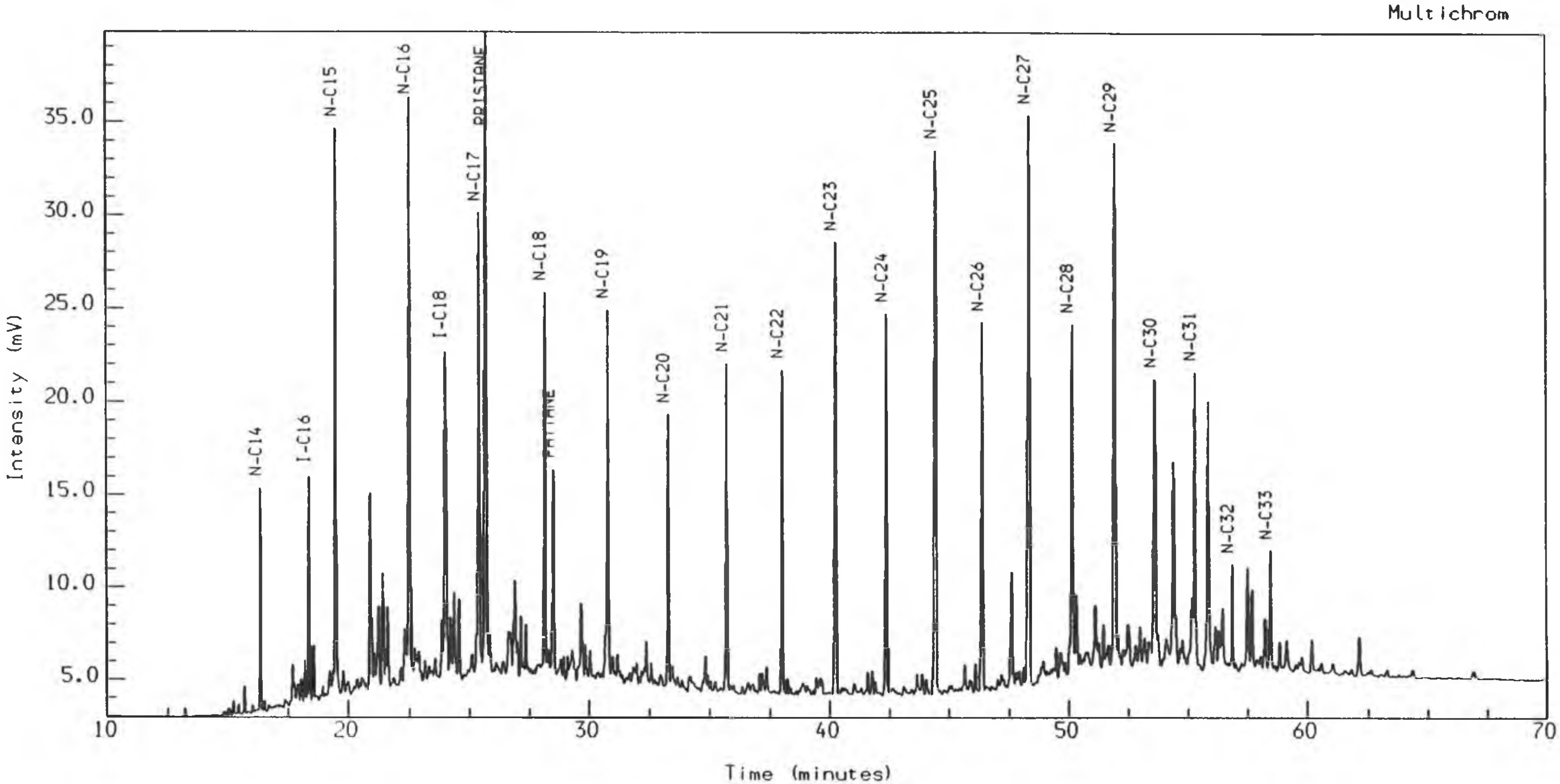


Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 12-FEB-1990 at 20:39
Reported on 5-MAR-1990 at 13:51

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.21.1.
30/9-9 2352.50



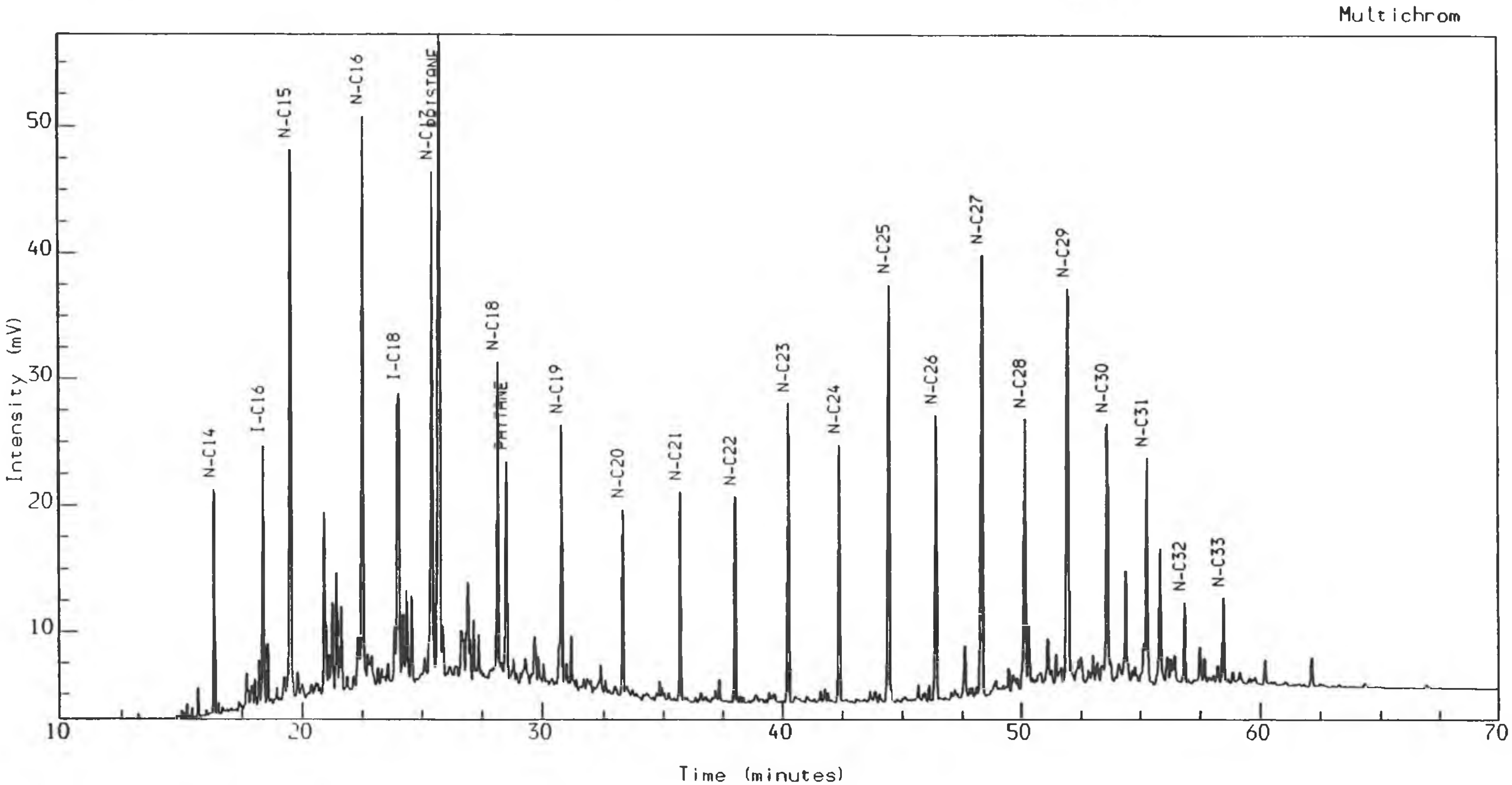
Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 13-FEB-1990 at 21:08
Reported on 13-FEB-1990 at 22:31

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.17.1.

30/9-9 2355.75



Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 13-FEB-1990 at 15:01
Reported on 13-FEB-1990 at 16:24

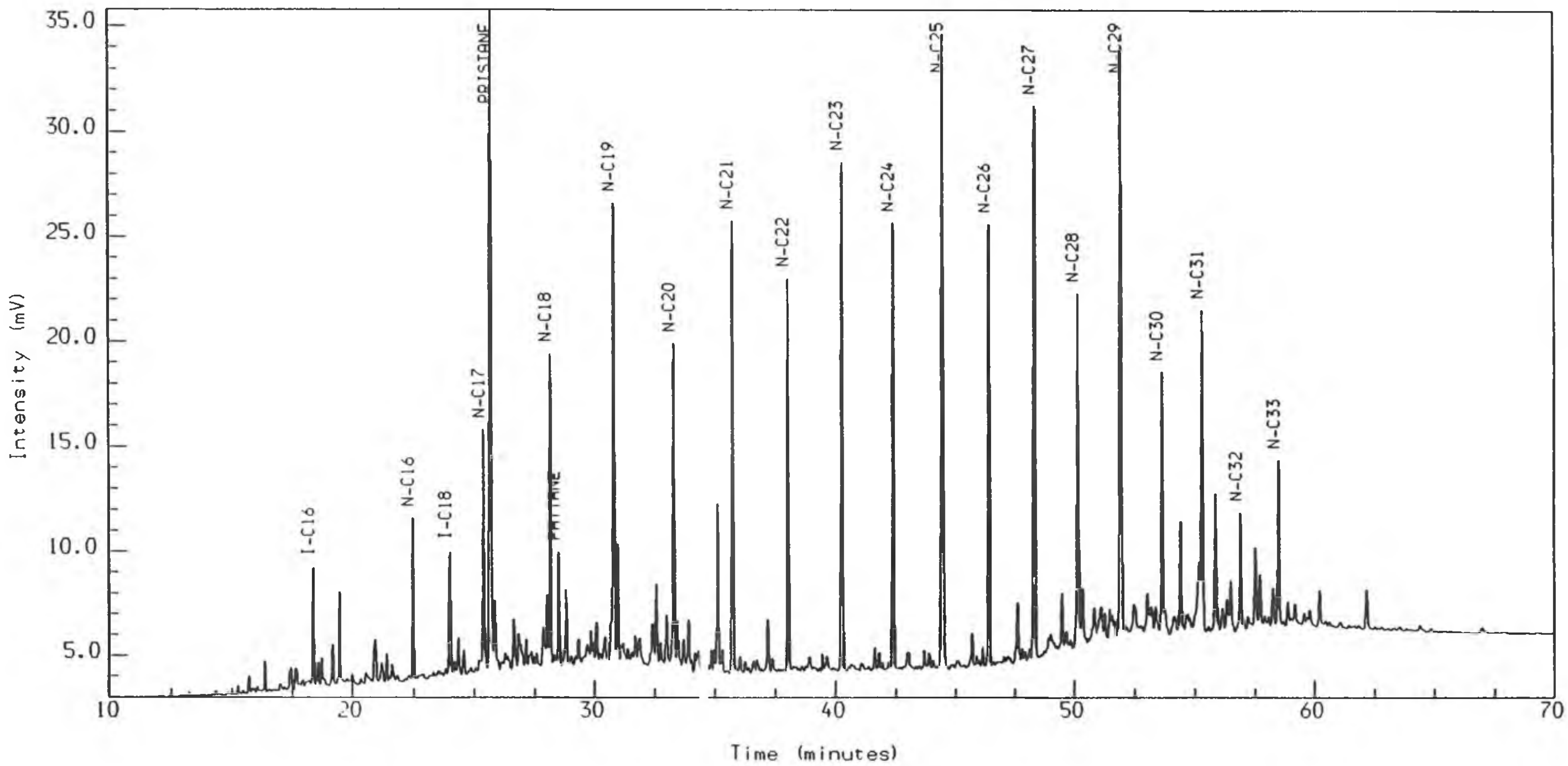
Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.13.1.

30/9-9 2356.5

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 13-FEB-1990 at 08:54

Reported on 13-FEB-1990 at 13:25

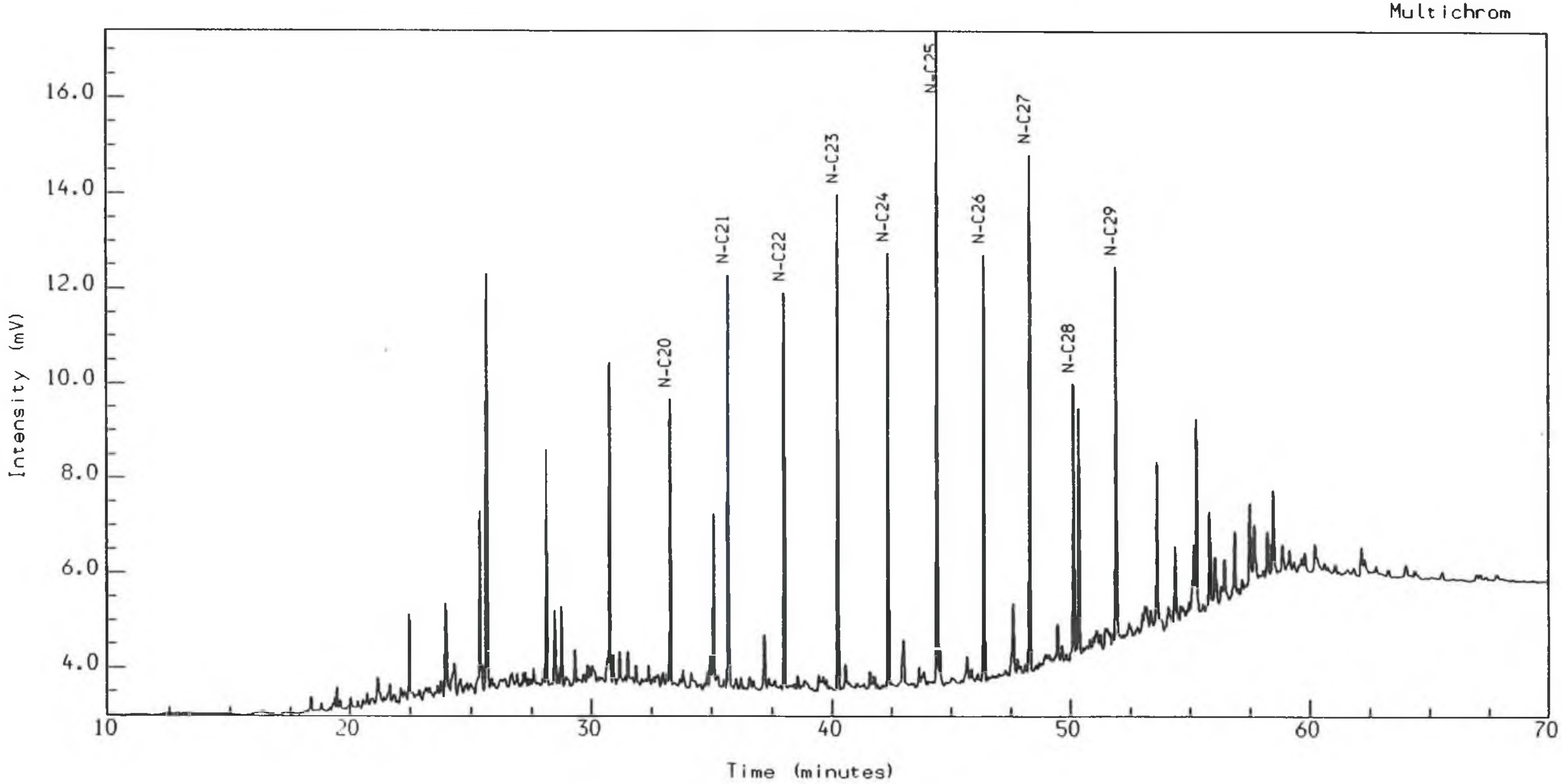
Method : MSDS

Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s,14,1.
30/9-9 2408.5

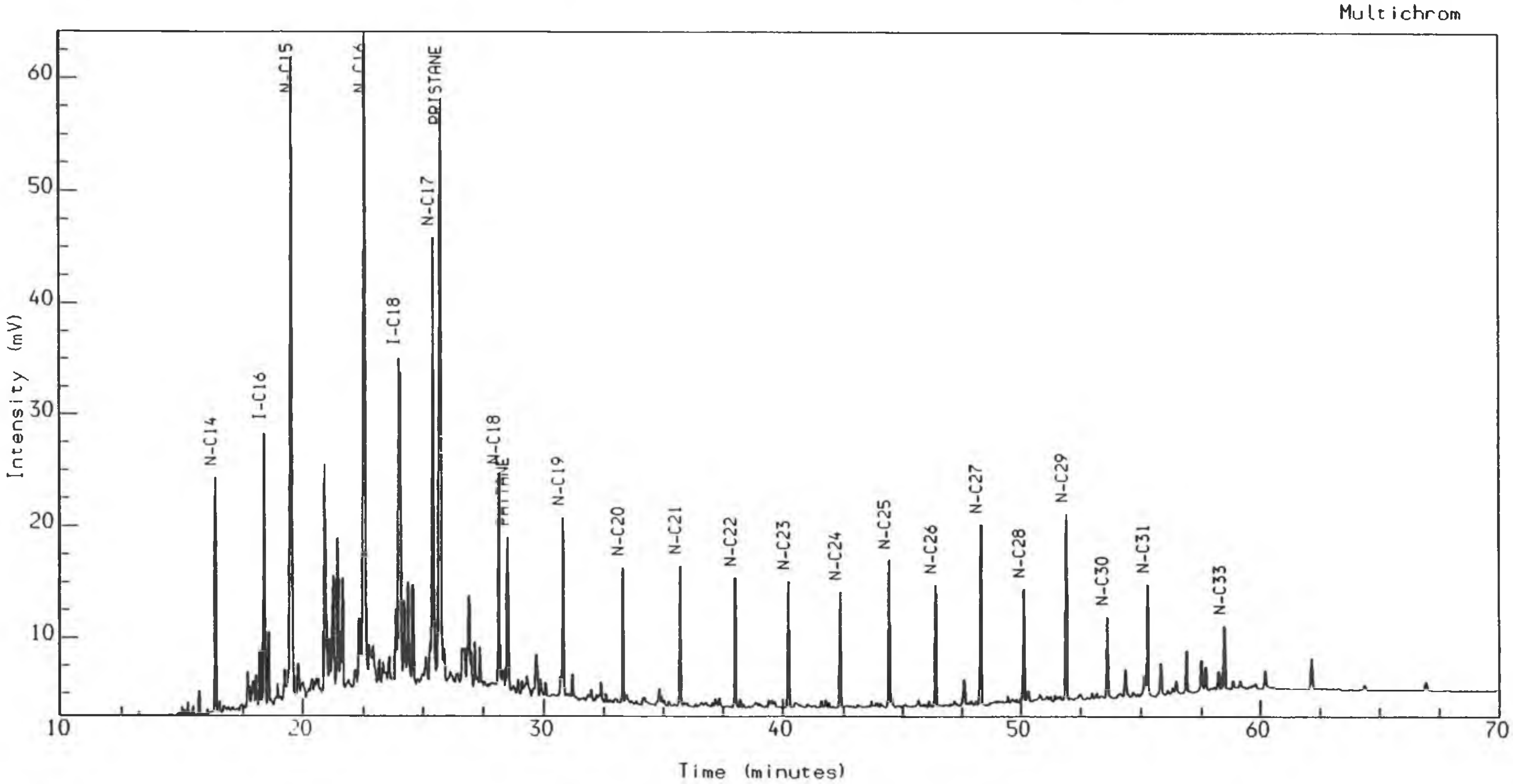


Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 13-FEB-1990 at 10:26
Reported on 13-FEB-1990 at 13:36

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.18.1.
30/9-9 2424.70

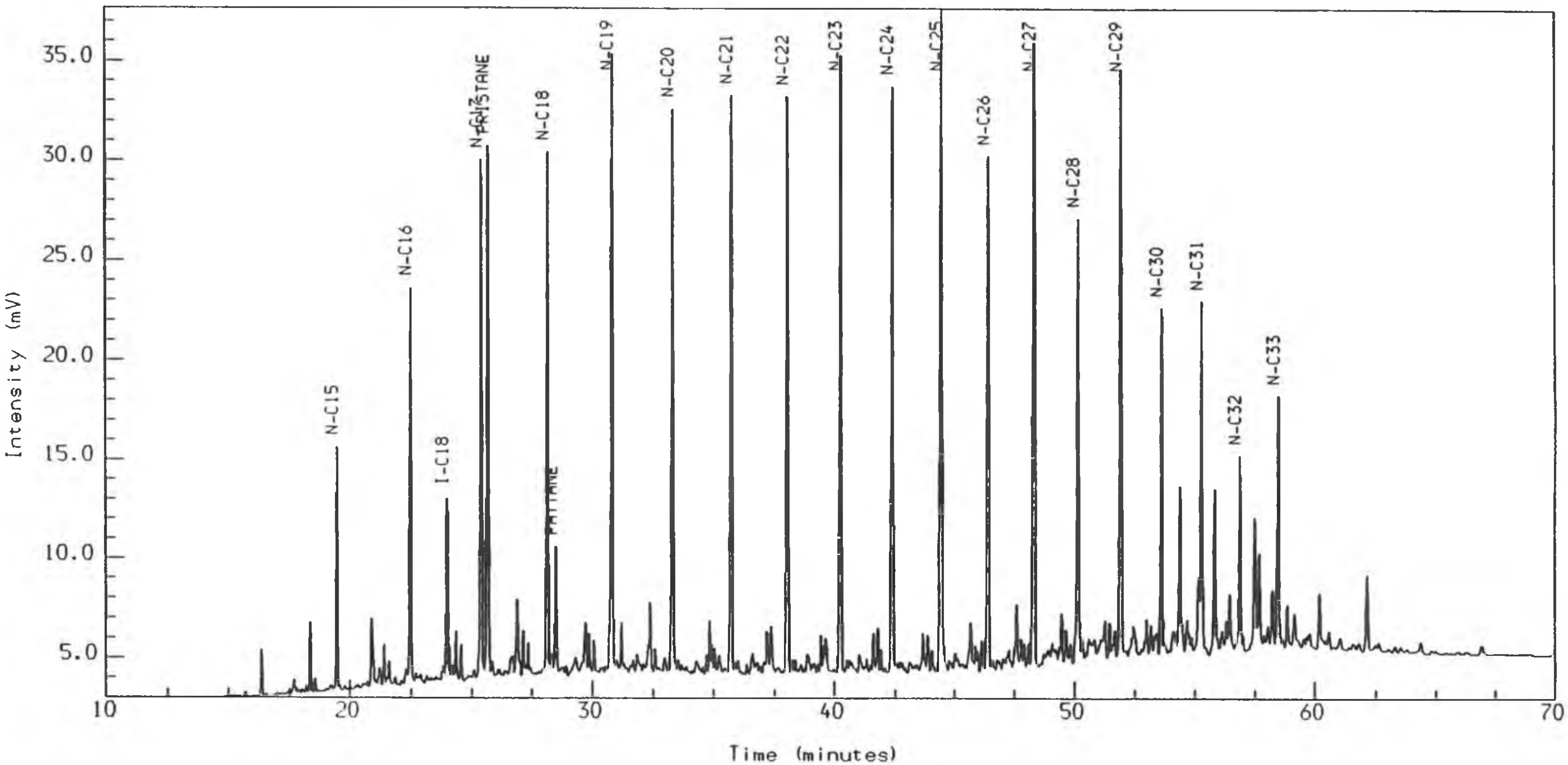


Instrument : HP5890	Method : MSDS
Channel Title : MSD	Calibration : MSDS
Lims ID :	Run Sequence : MSDS
Acquired on 13-FEB-1990 at 16:33	
Reported on 13-FEB-1990 at 17:55	

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.19.1.
30/9-9 2727.0

Multichrom



Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 13-FEB-1990 at 18:05
Reported on 13-FEB-1990 at 19:27

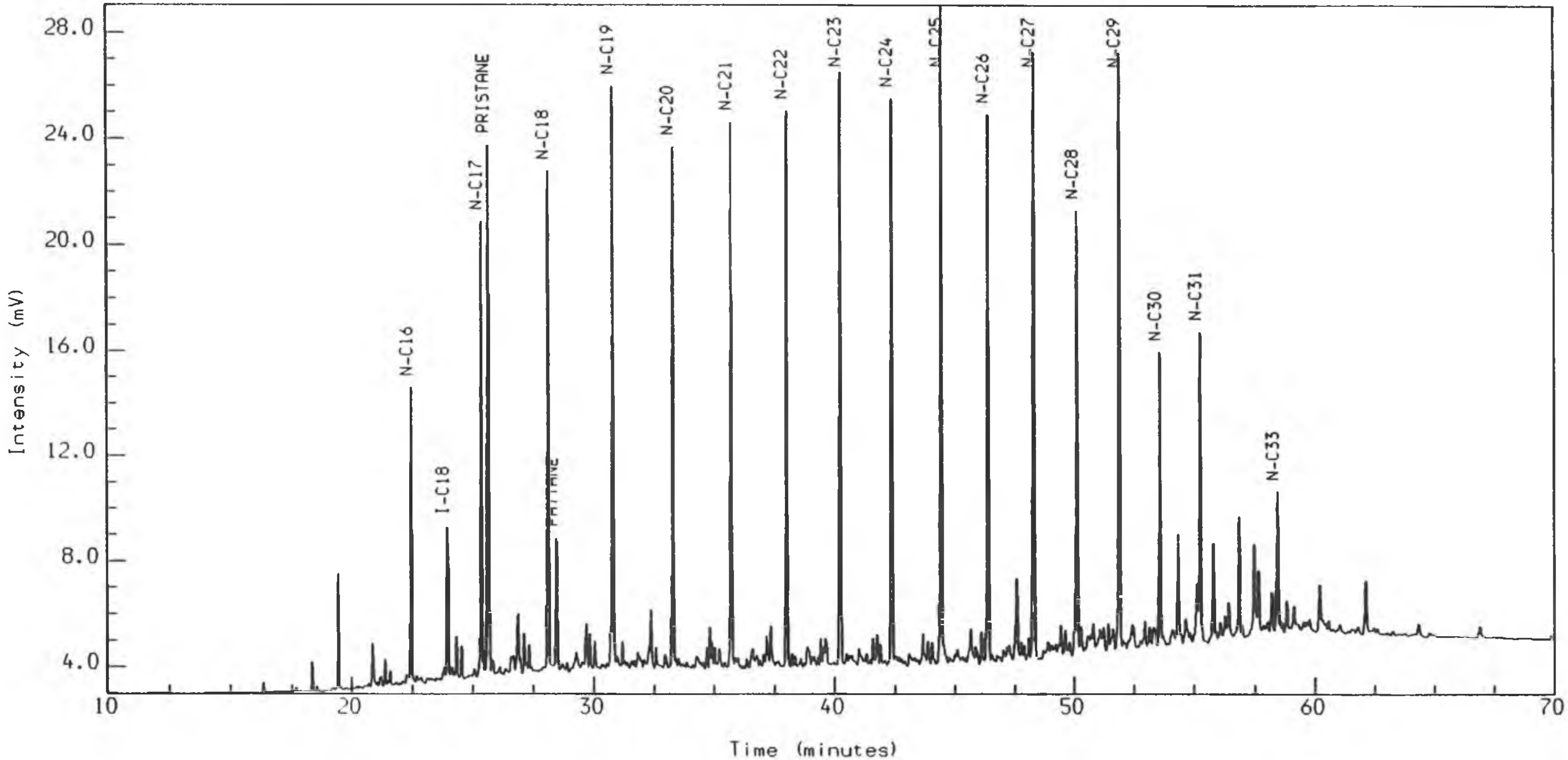
Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 a300909s.20.1.

30/9-9 2778.0

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 13-FEB-1990 at 19:37

Reported on 13-FEB-1990 at 20:59

Method : MSDS

Calibration : MSDS

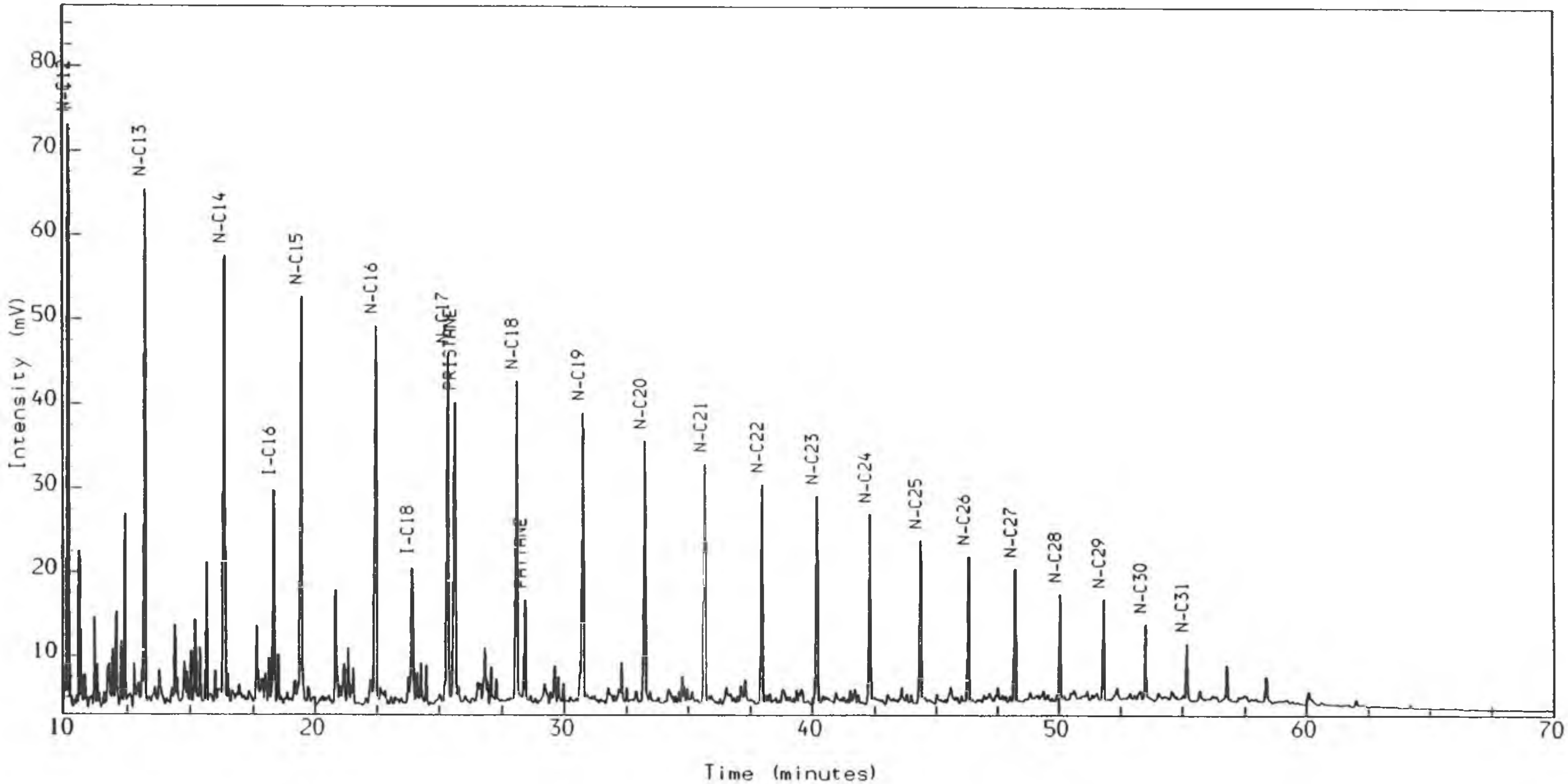
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERG0.3.1.

30/9-9 DST1

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 22-MAR-1990 at 19:33

Reported on 23-MAR-1990 at 09:29

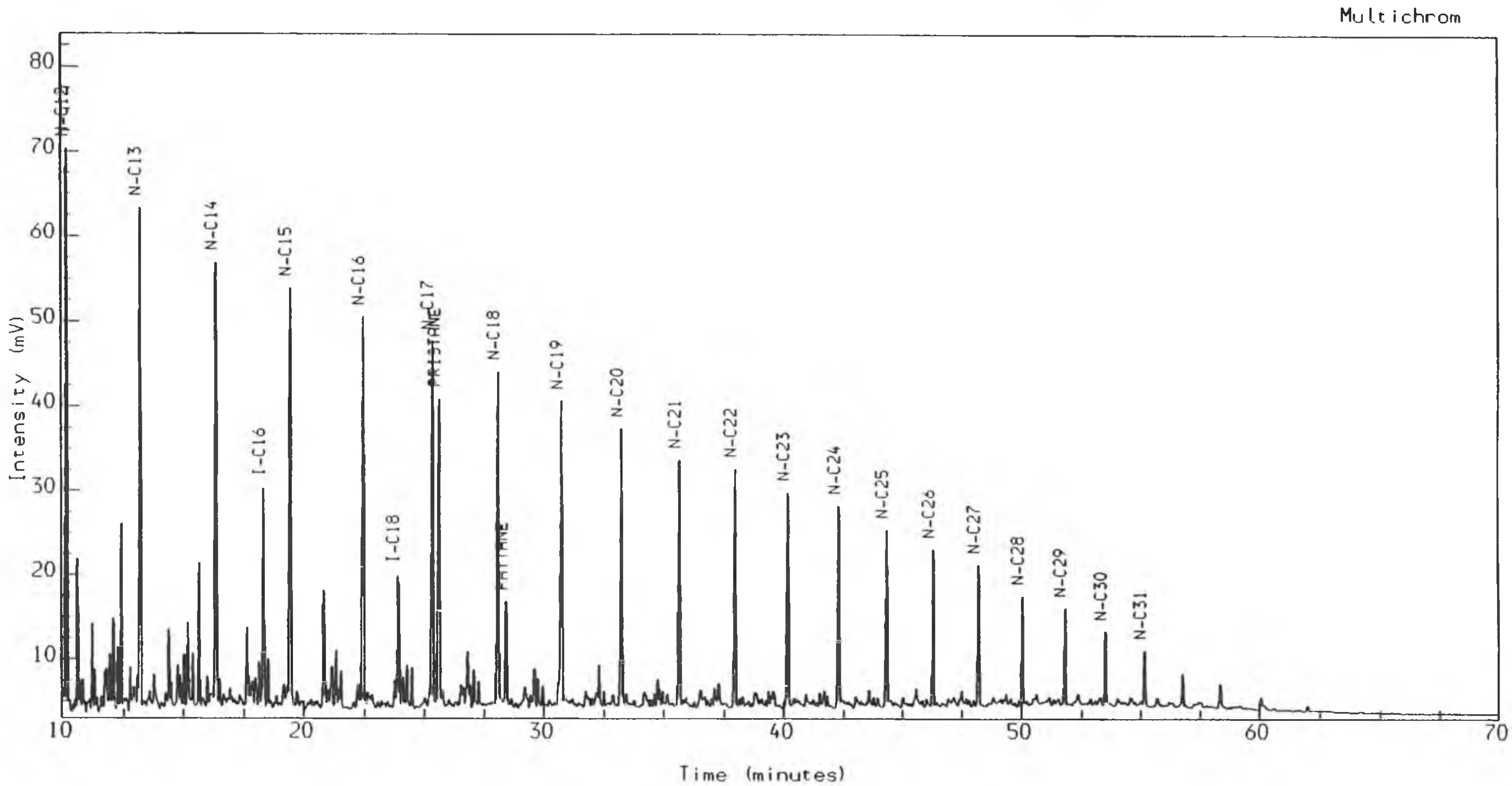
Method : MSDS

Calibration : MSDS

Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO.4.1.
30/9-9 DST 2



Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 22-MAR-1990 at 21:05
Reported on 23-MAR-1990 at 09:31

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

APPENDIX III

Gas Chromatograms of Aromatic Hydrocarbons.

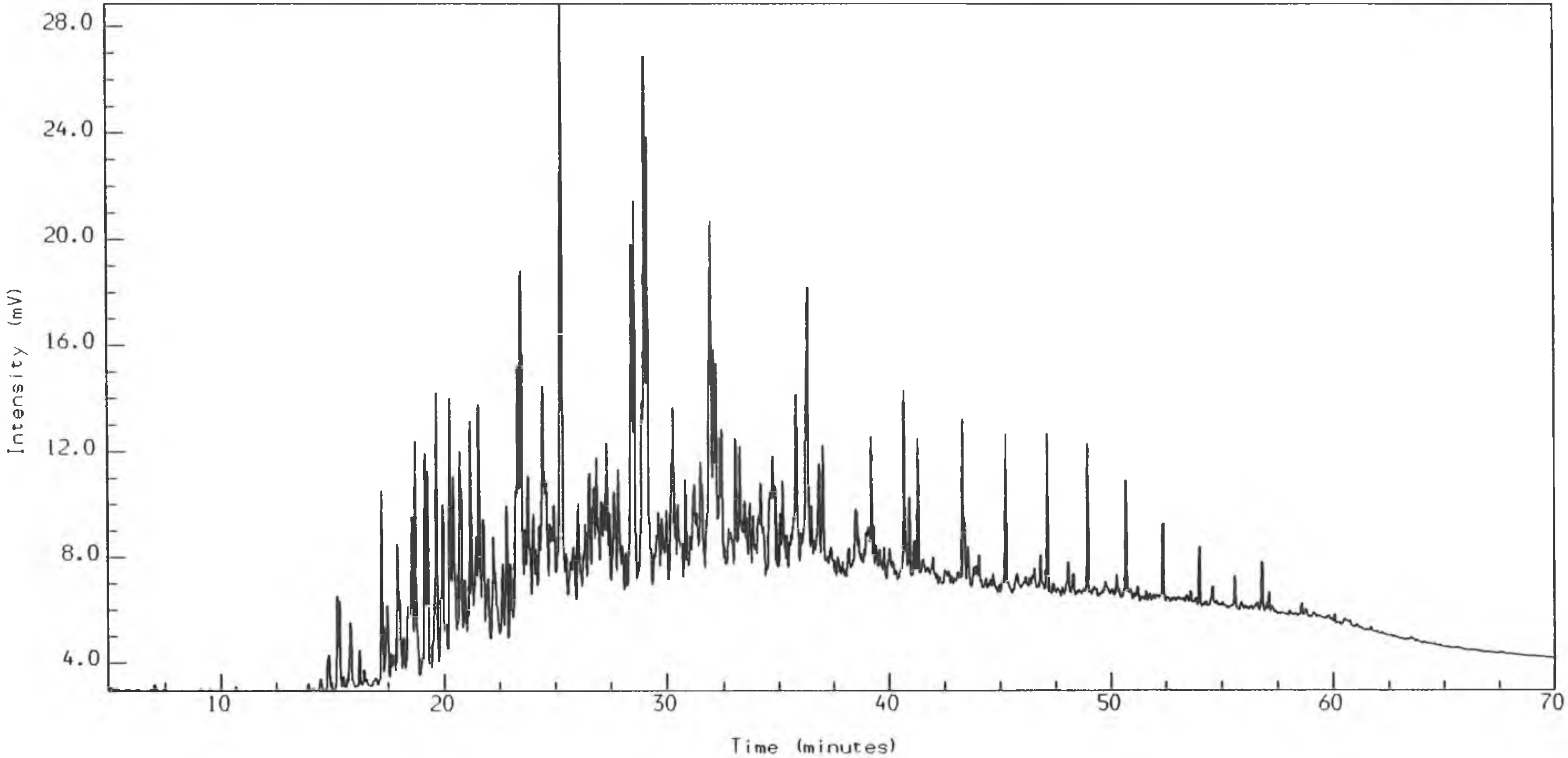
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.2.1.

30/9-9 2292.5 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 22-MAR-1990 at 18:08

Reported on 22-MAR-1990 at 19:30

Method : ARO

Calibration : ARO

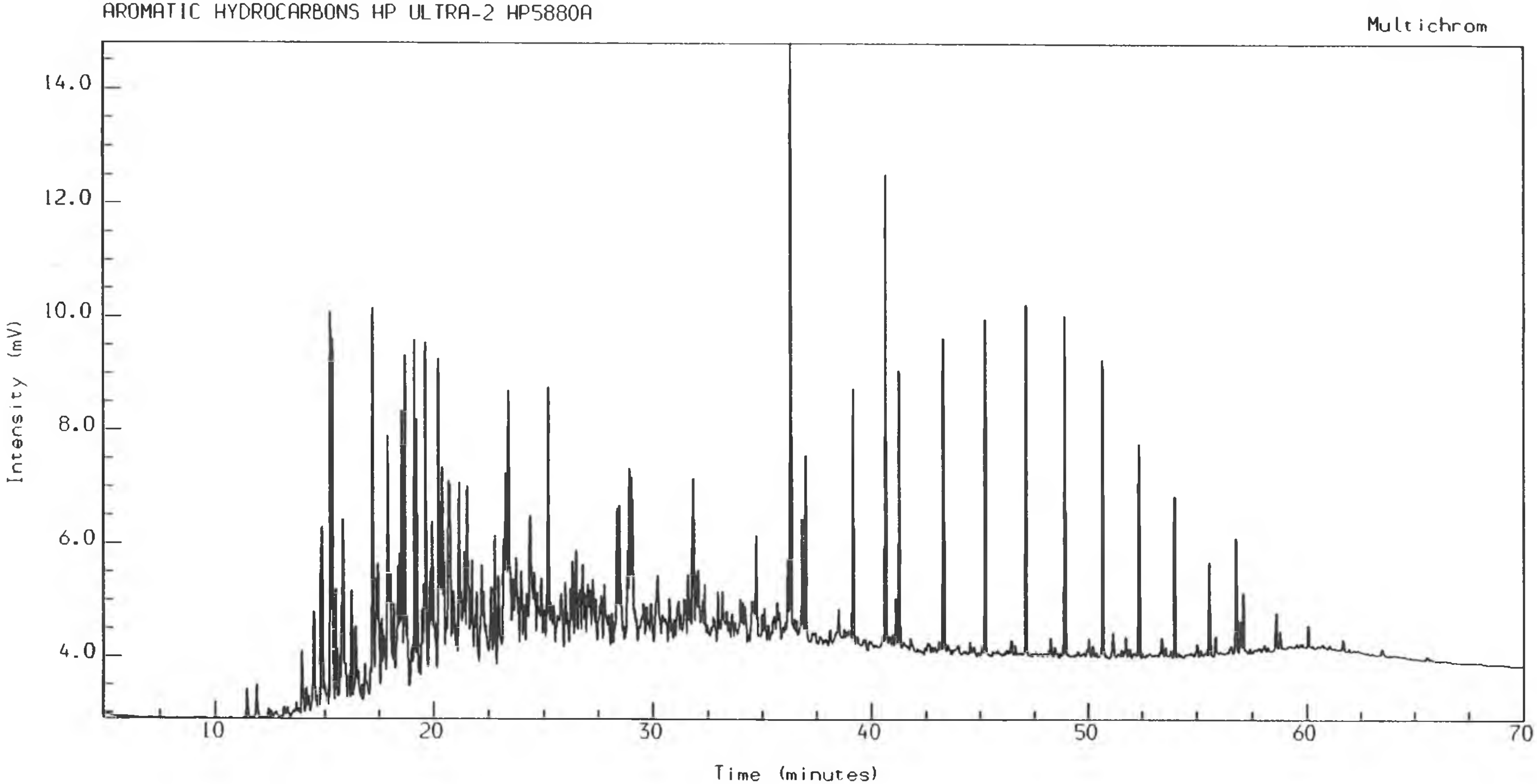
Run Sequence : ARO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.3.1.

30/9-9 2293.0 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 22-MAR-1990 at 19:49
Reported on 22-MAR-1990 at 21:11

Method : ARO
Calibration : ARO
Run Sequence : ARO

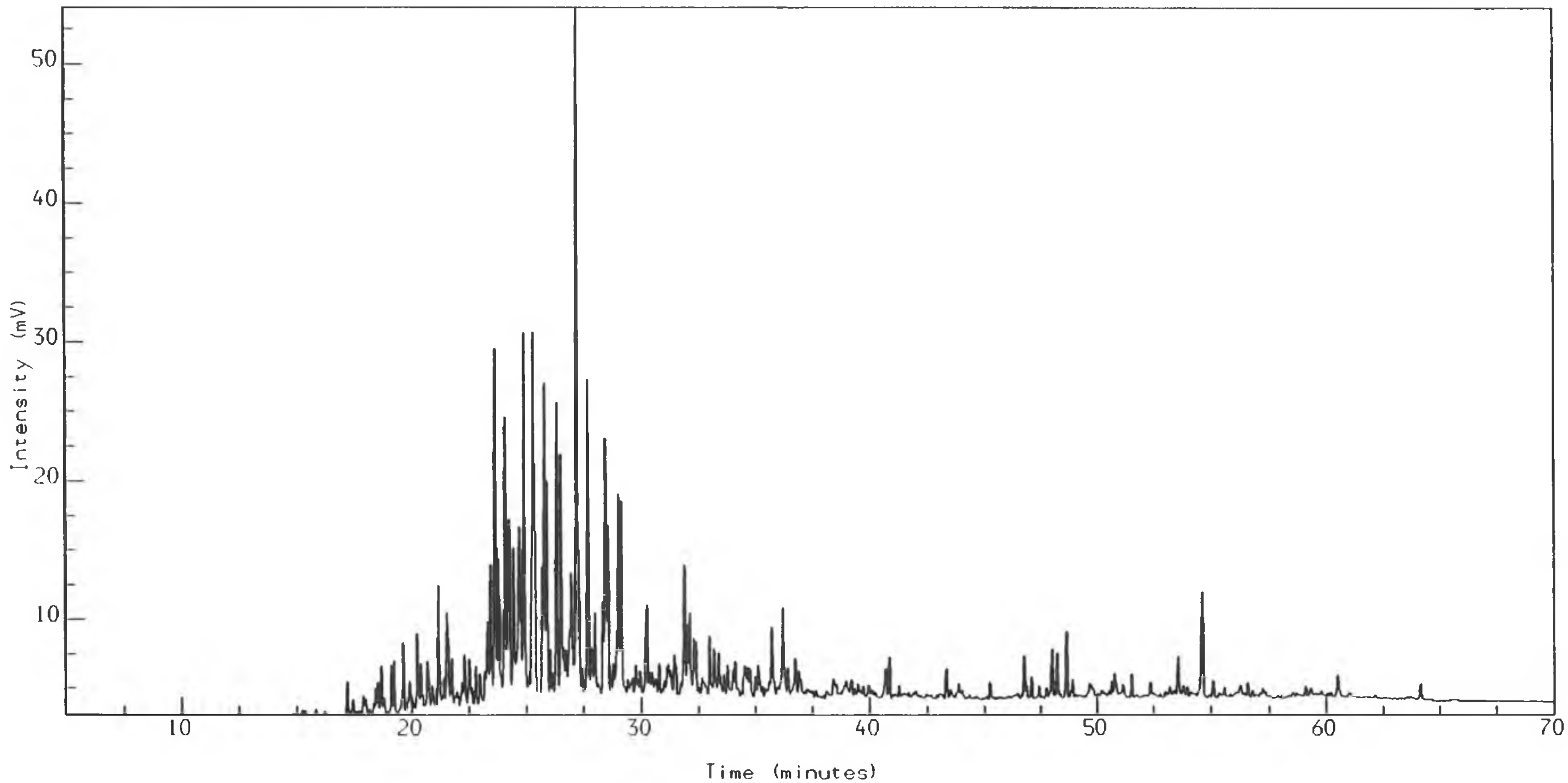
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.4.1.

30/9-9 2318.5   Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 22-MAR-1990 at 21:30
Reported on 22-MAR-1990 at 22:52

Method : ARO
Calibration : ARO
Run Sequence : ARO

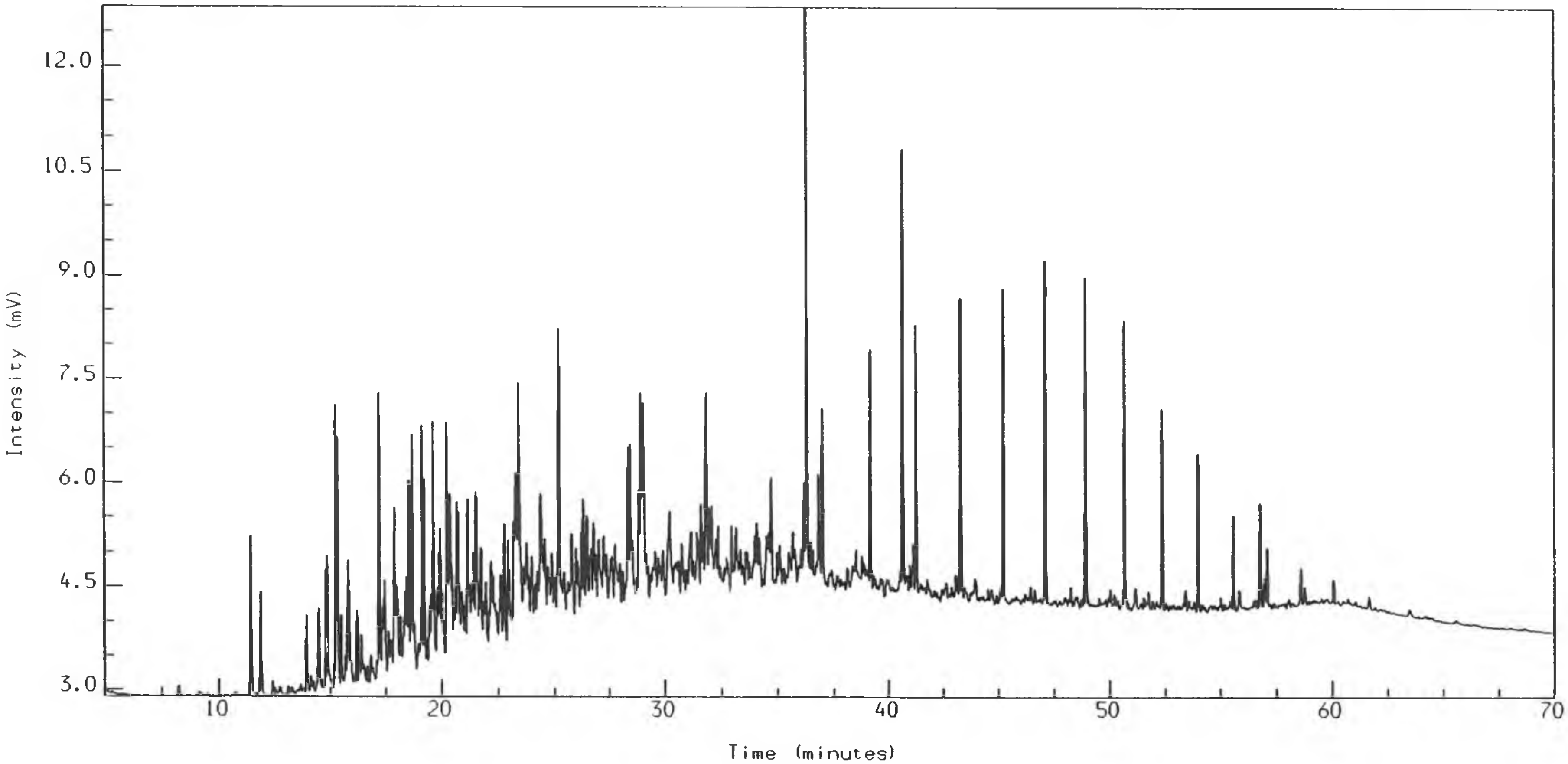
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.5.1.

30/9-9 2291.1 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 22-MAR-1990 at 23:10

Reported on 23-MAR-1990 at 00:33

Method : ARO

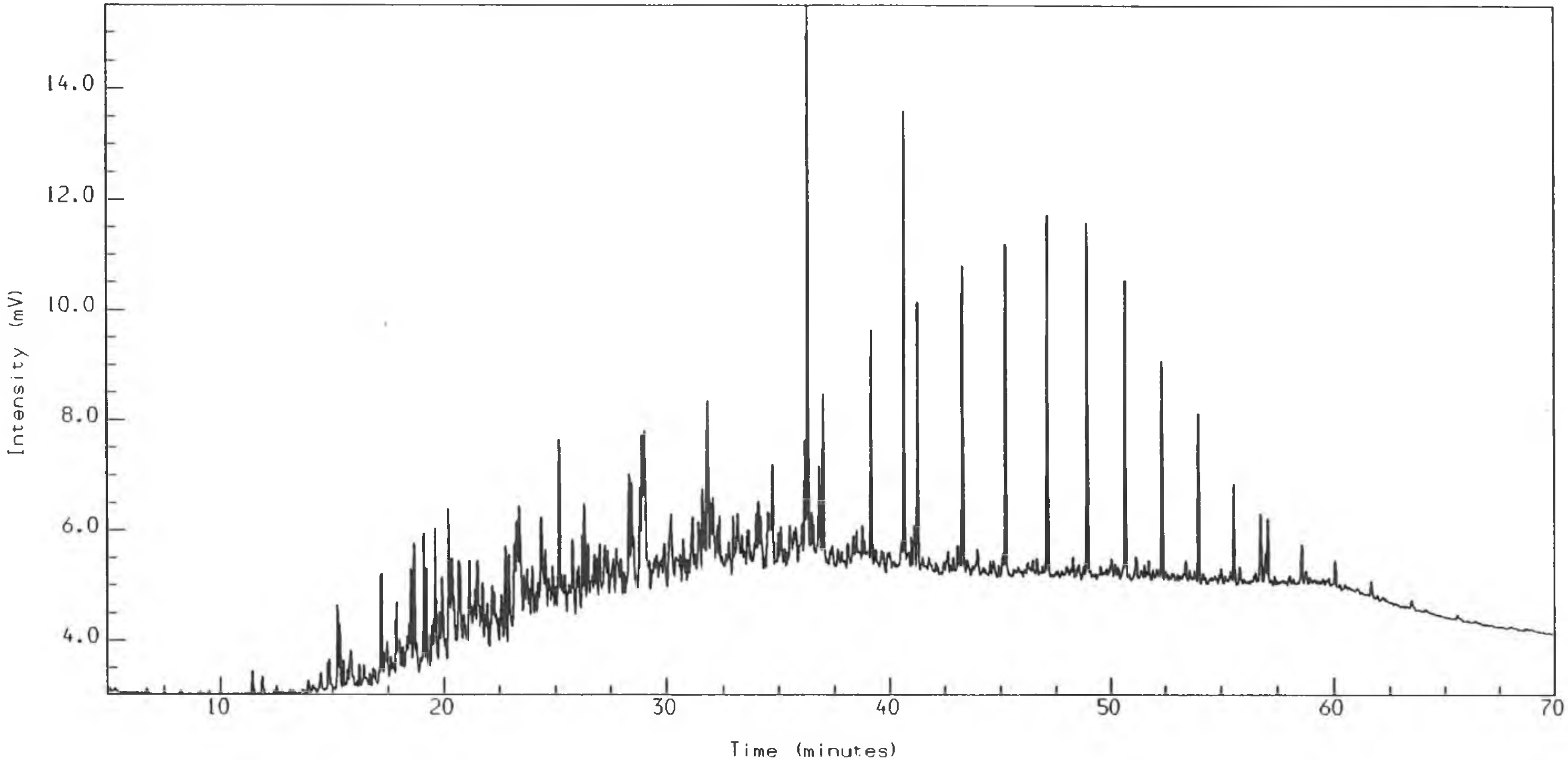
Calibration : ARO

Run Sequence : ARO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.6.1.
30/9-9 2393.02 Amount : 1.000
AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 23-MAR-1990 at 00:51
Reported on 23-MAR-1990 at 02:14

Method : ARO
Calibration : ARO
Run Sequence : ARO

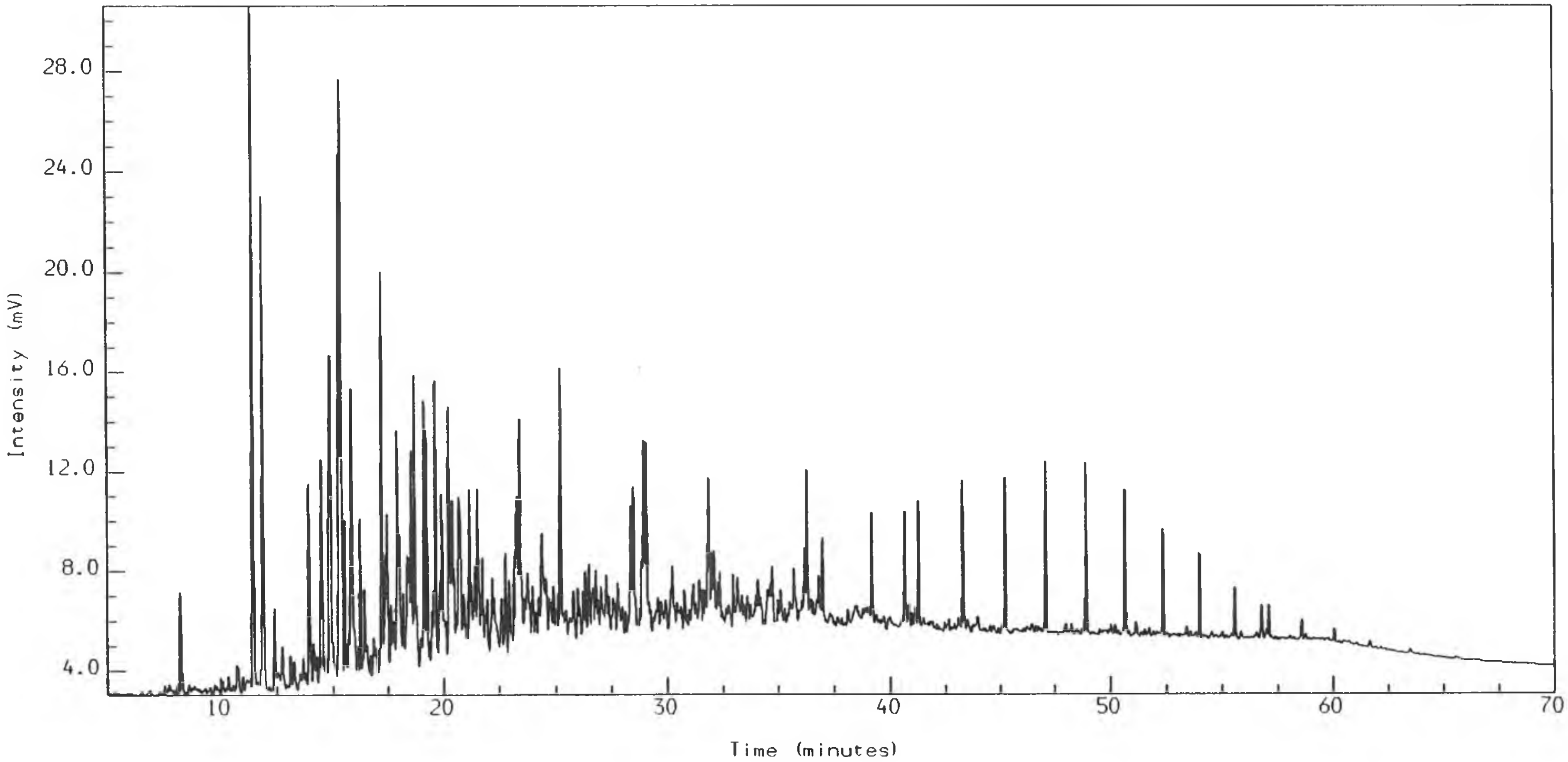
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.7.1.

30/9-9 2293.70 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 23-MAR-1990 at 02:32
Reported on 23-MAR-1990 at 03:55

Method : ARO
Calibration : ARO
Run Sequence : ARO

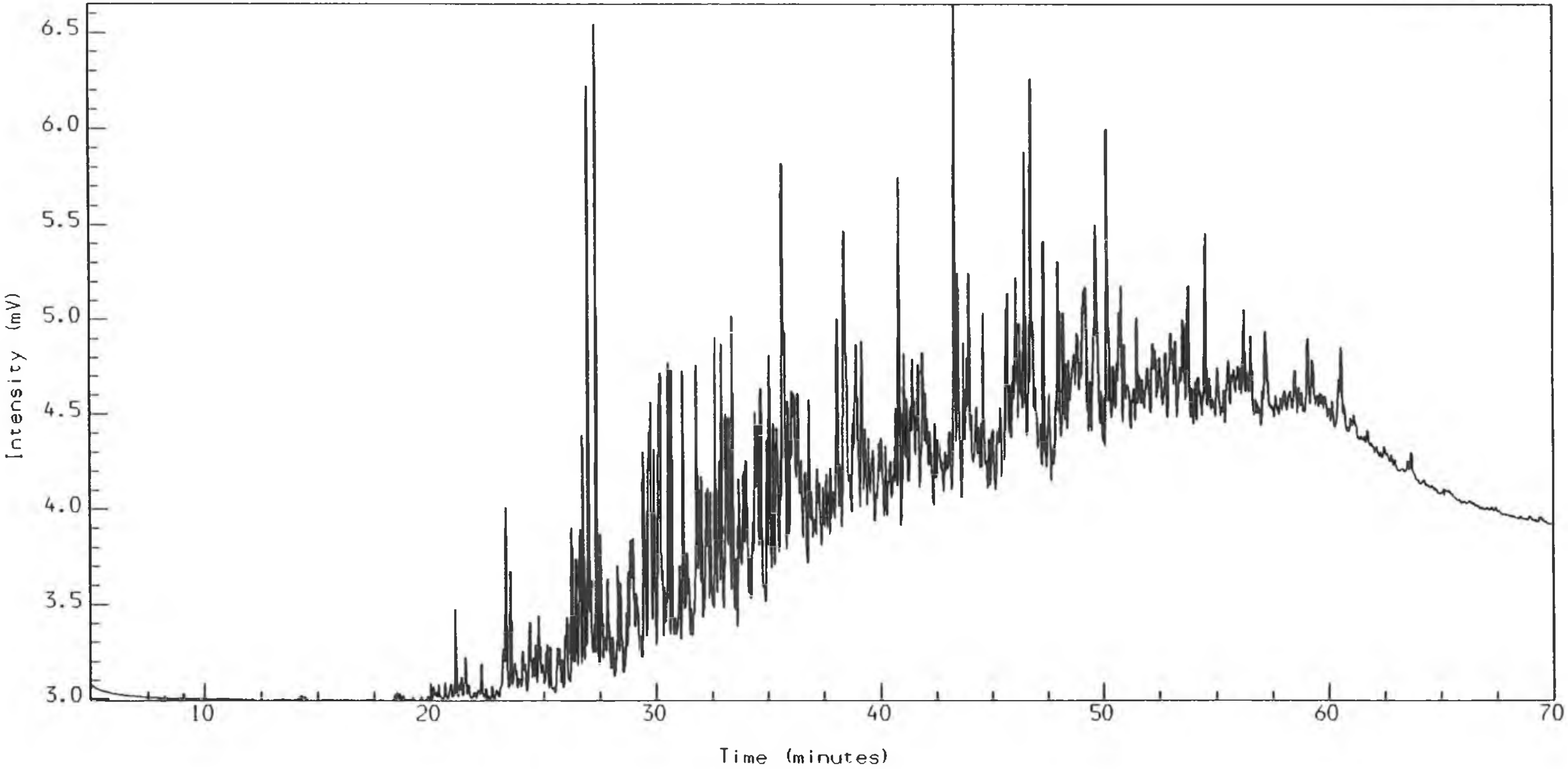
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.8.1.

30/9-9 2291.75 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 04:13

Reported on 23-MAR-1990 at 05:35

Method : ARO

Calibration : ARO

Run Sequence : ARO

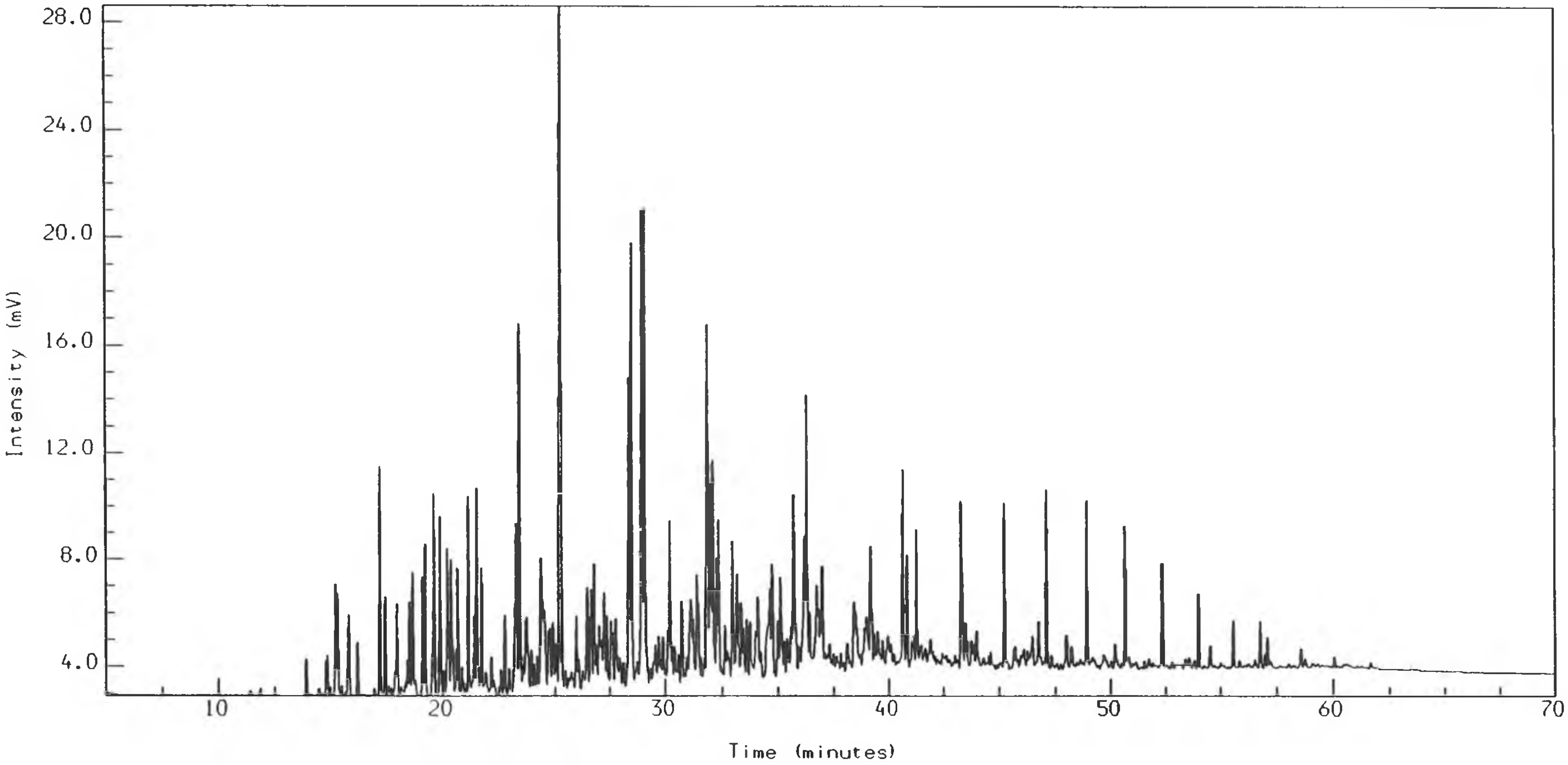
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.9.1.

30/9-9 2295.75 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 05:54

Reported on 23-MAR-1990 at 07:16

Method : ARO

Calibration : ARO

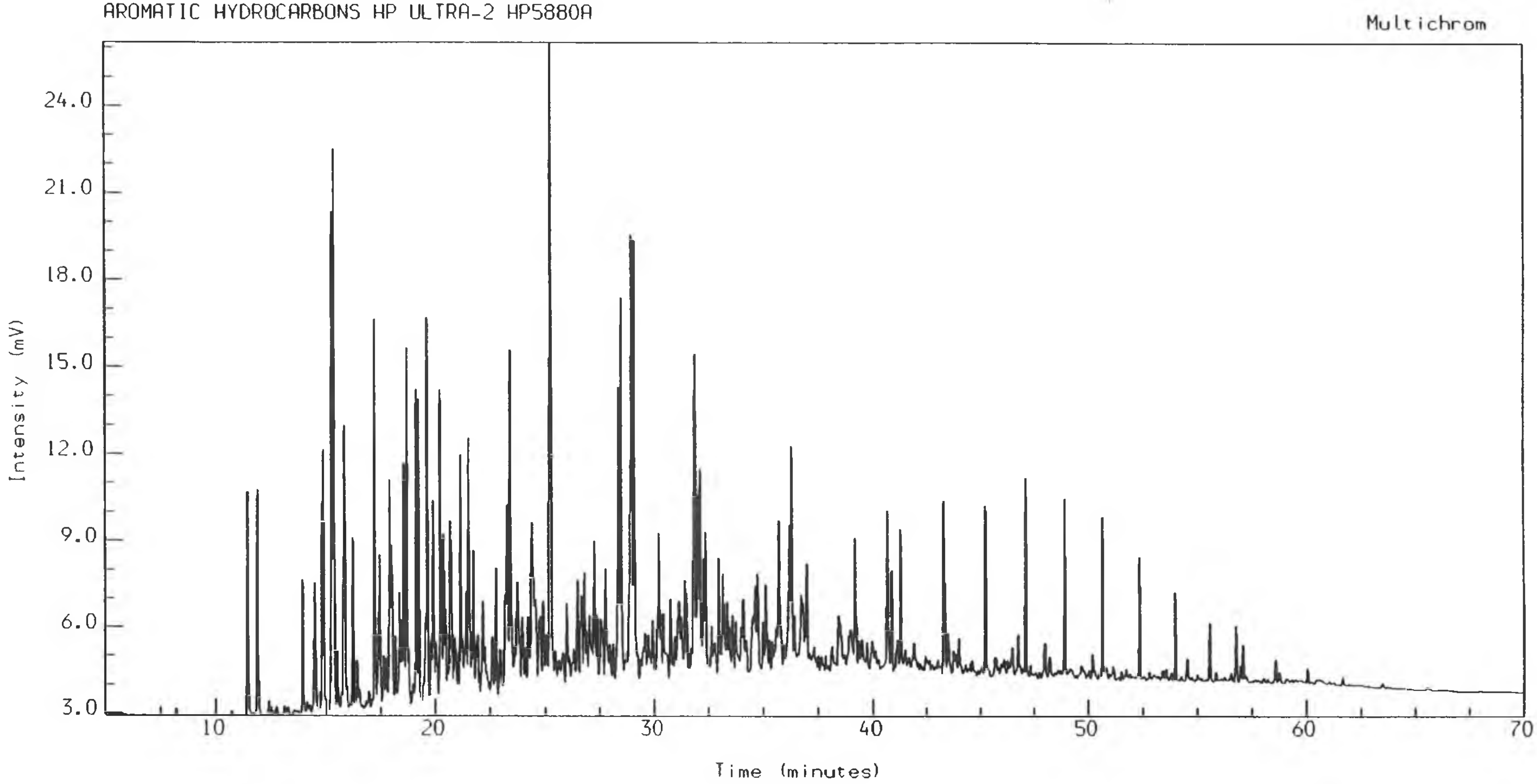
Run Sequence : ARO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.10.1.

30/9-9 2297.40   Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 23-MAR-1990 at 07:35
Reported on 23-MAR-1990 at 08:57

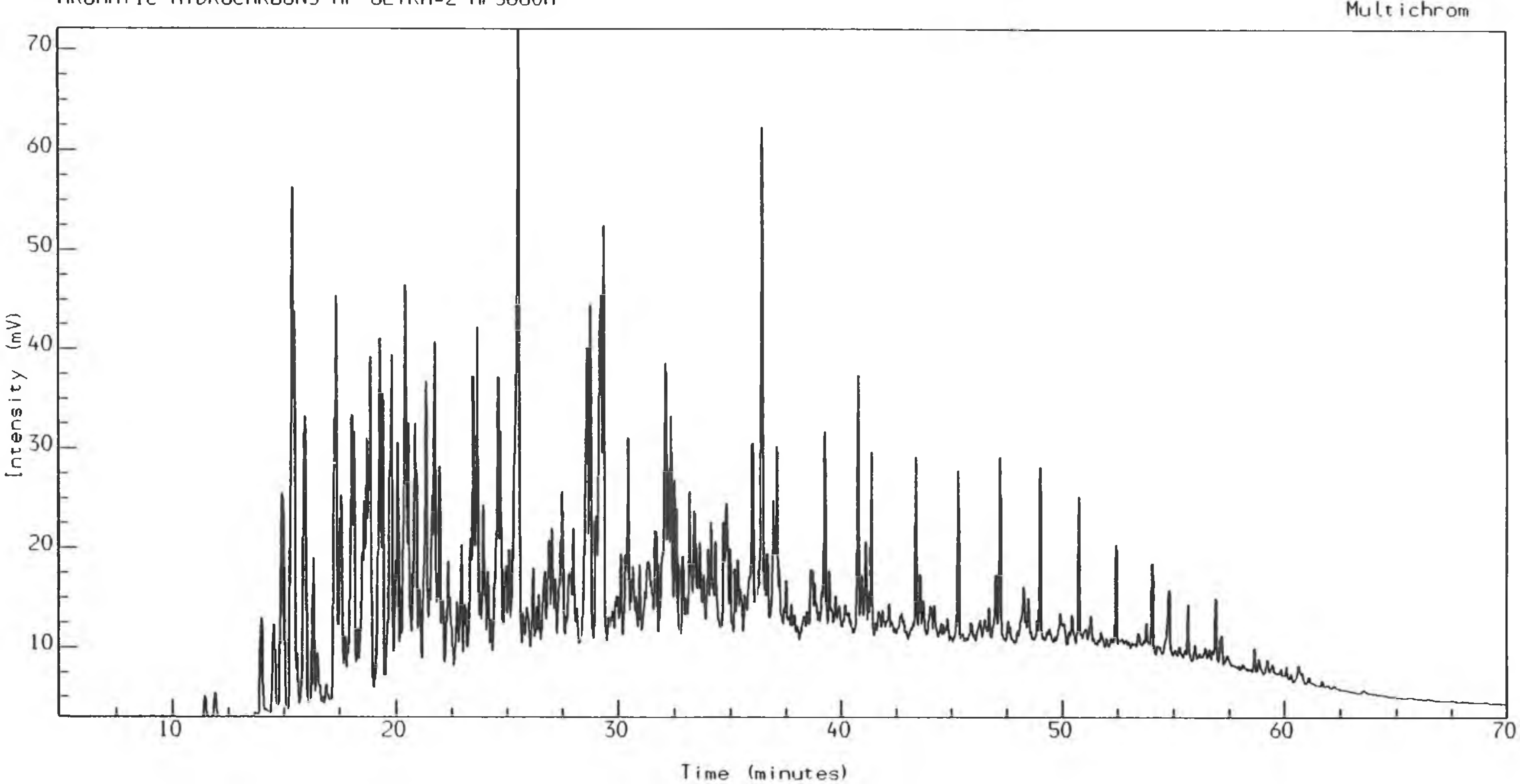
Method : ARO
Calibration : ARO
Run Sequence : ARO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.11.1.

30/9-9 2313.5 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 09:15

Reported on 23-MAR-1990 at 10:39

Method : ARO

Calibration : ARO

Run Sequence : ARO

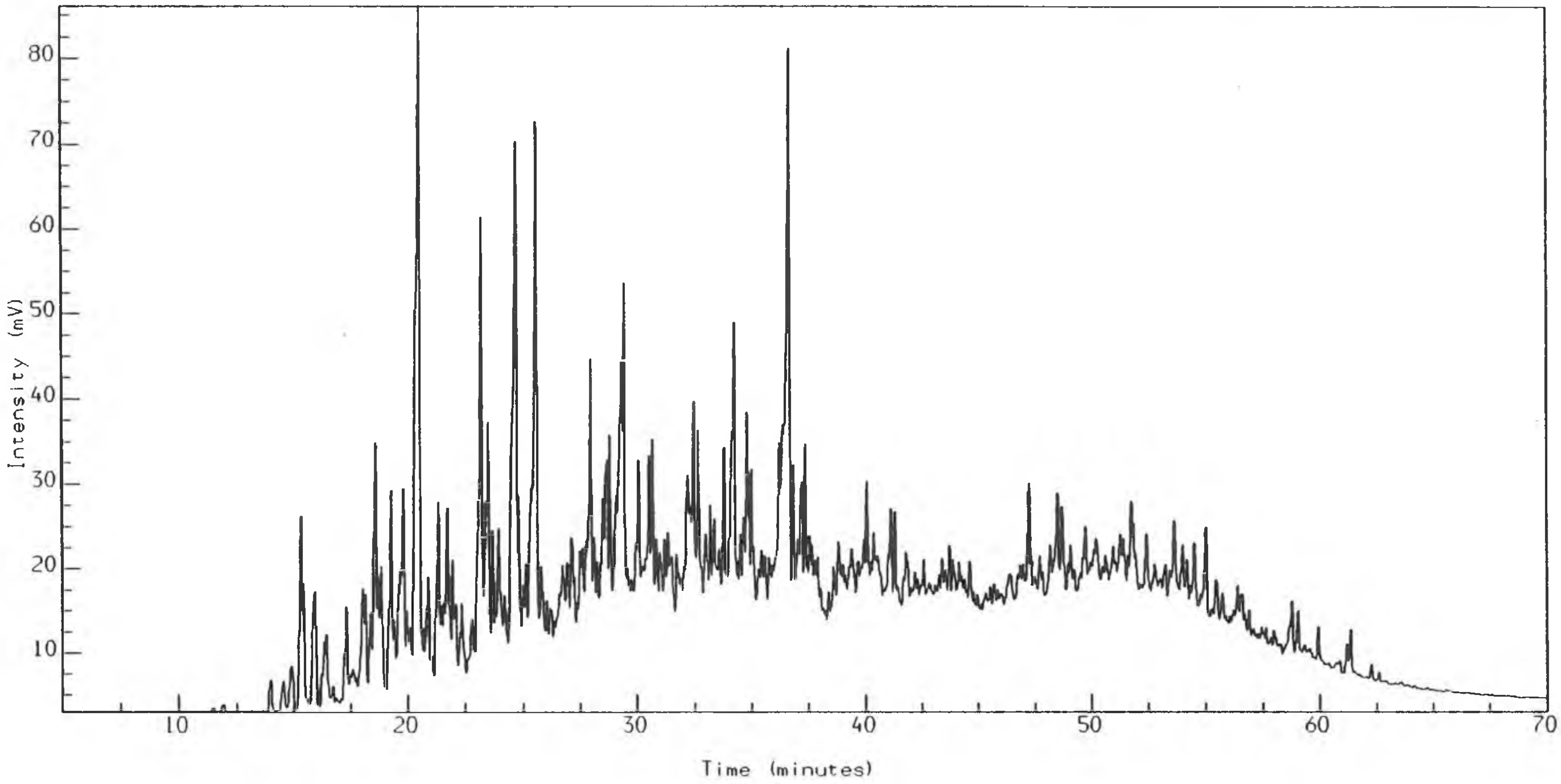
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.12.1.

30/9-9 2356.5 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 23-MAR-1990 at 10:56
Reported on 23-MAR-1990 at 12:29

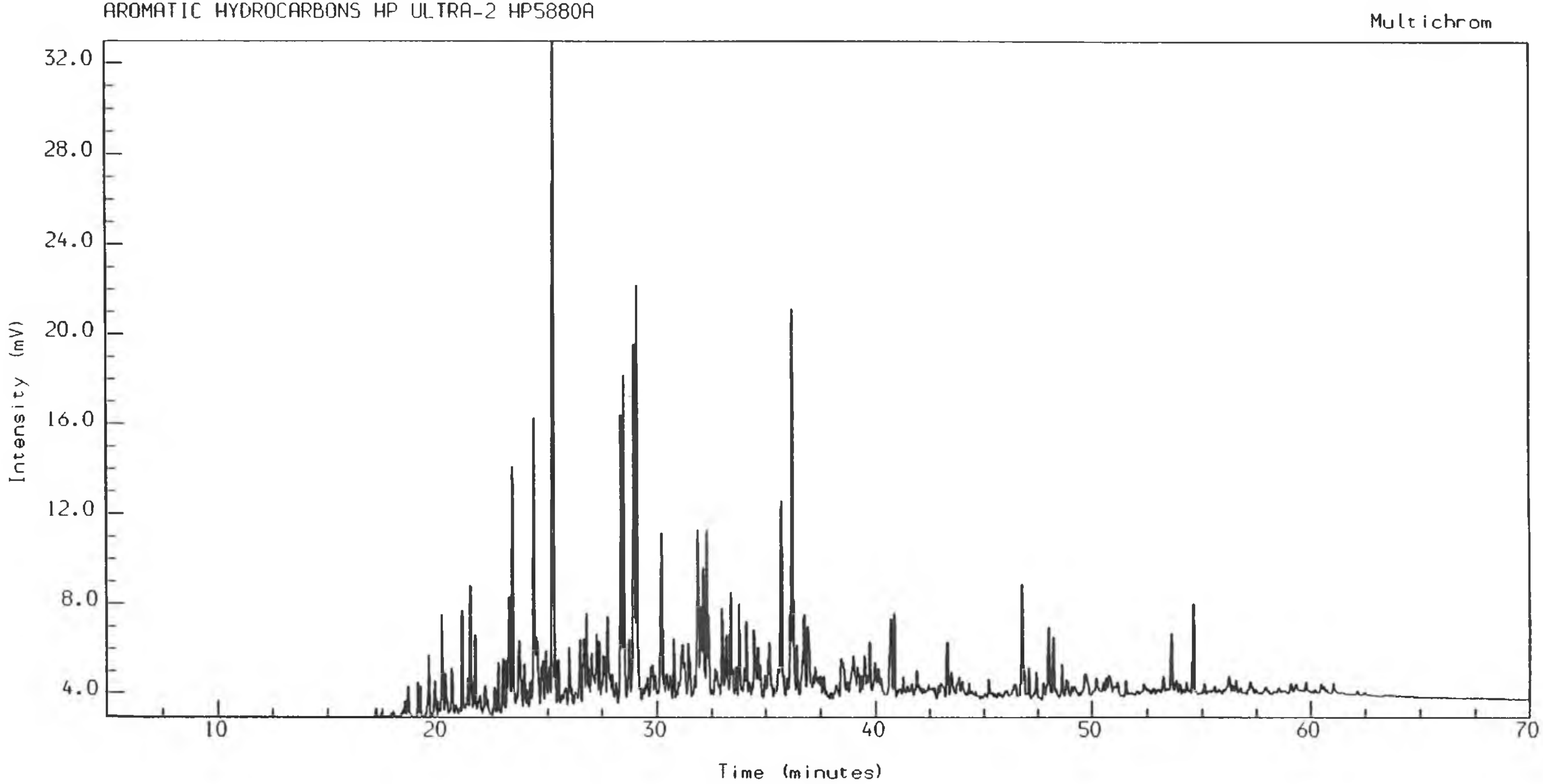
Method : ARO
Calibration : ARO
Run Sequence : ARO

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.13.1.

30/9-9 2408.5 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 23-MAR-1990 at 12:37
Reported on 23-MAR-1990 at 14:01

Method : ARO
Calibration : ARO
Run Sequence : ARO

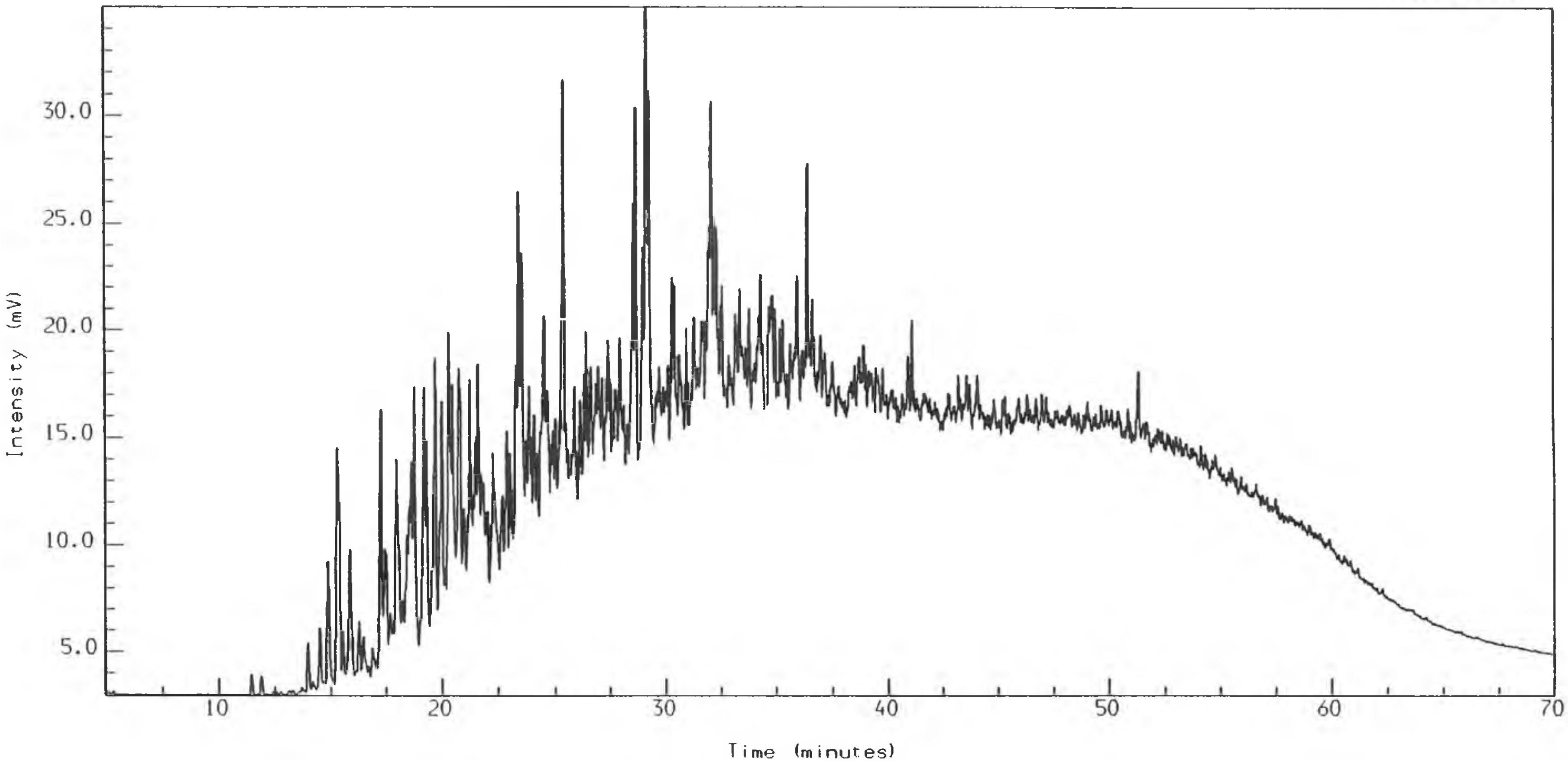
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.14.1.

30/9-9 2299.02 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 14:18

Reported on 23-MAR-1990 at 15:41

Method : ARO

Calibration : ARO

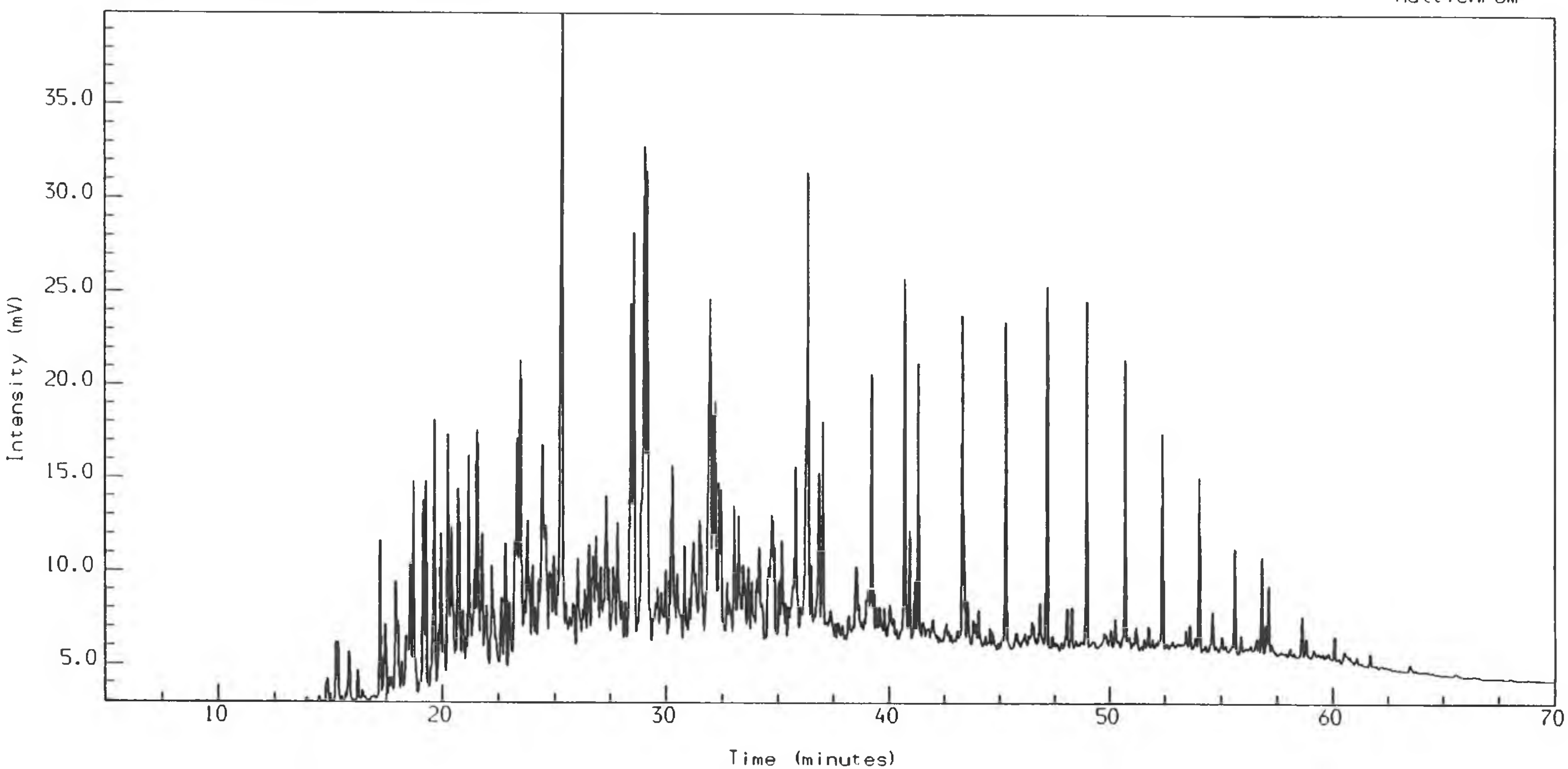
Run Sequence : ARO

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.15.1.

30/9-9 2308.6 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A



Instrument : HP5880
Channel Title : HP5880A GC
Lims ID :
Acquired on 23-MAR-1990 at 15:59
Reported on 23-MAR-1990 at 17:21

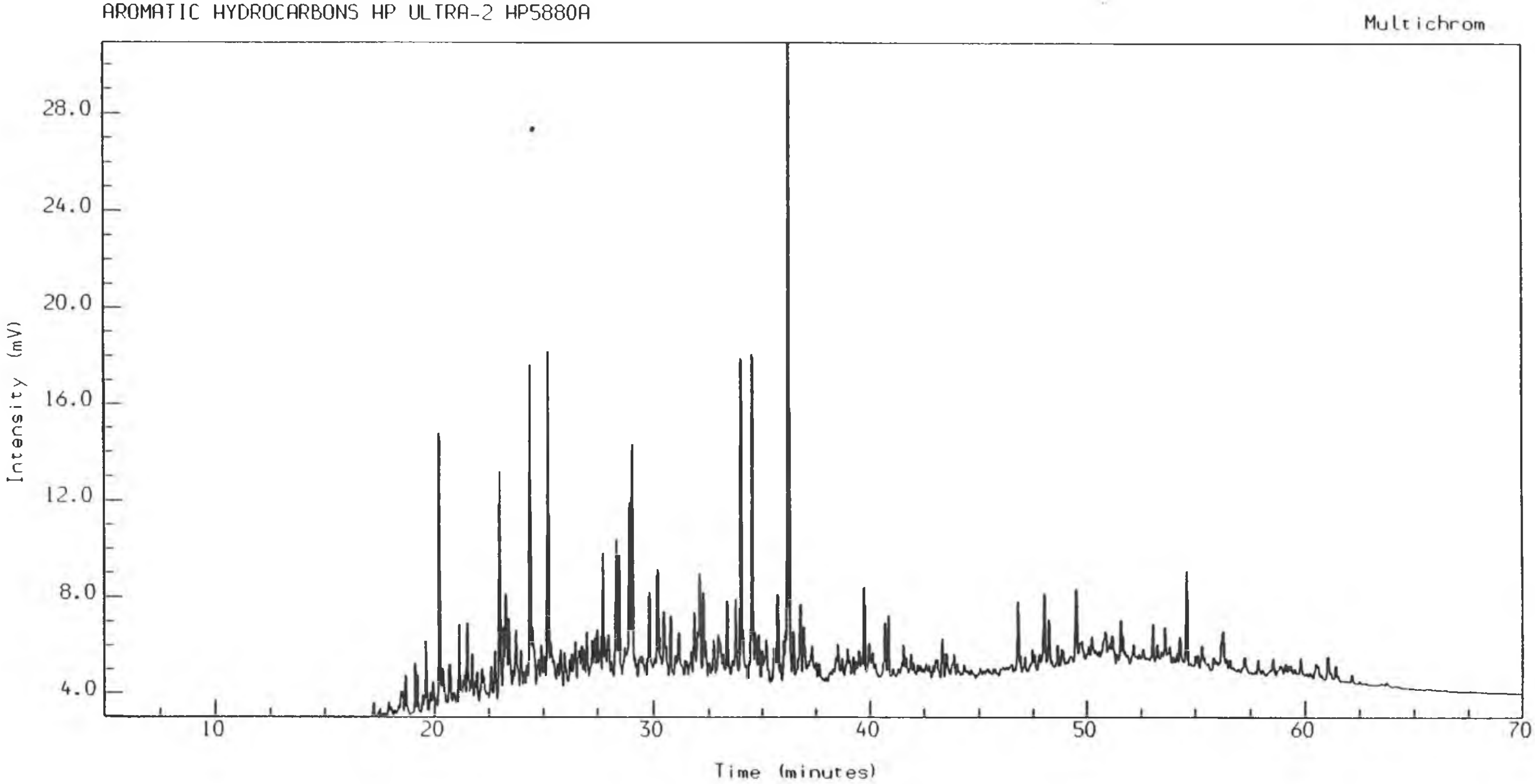
Method : ARO
Calibration : ARO
Run Sequence : ARO

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.16.1.

30/9-9 2355.75 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 17:40

Reported on 23-MAR-1990 at 19:02

Method : ARO

Calibration : ARO

Run Sequence : ARO

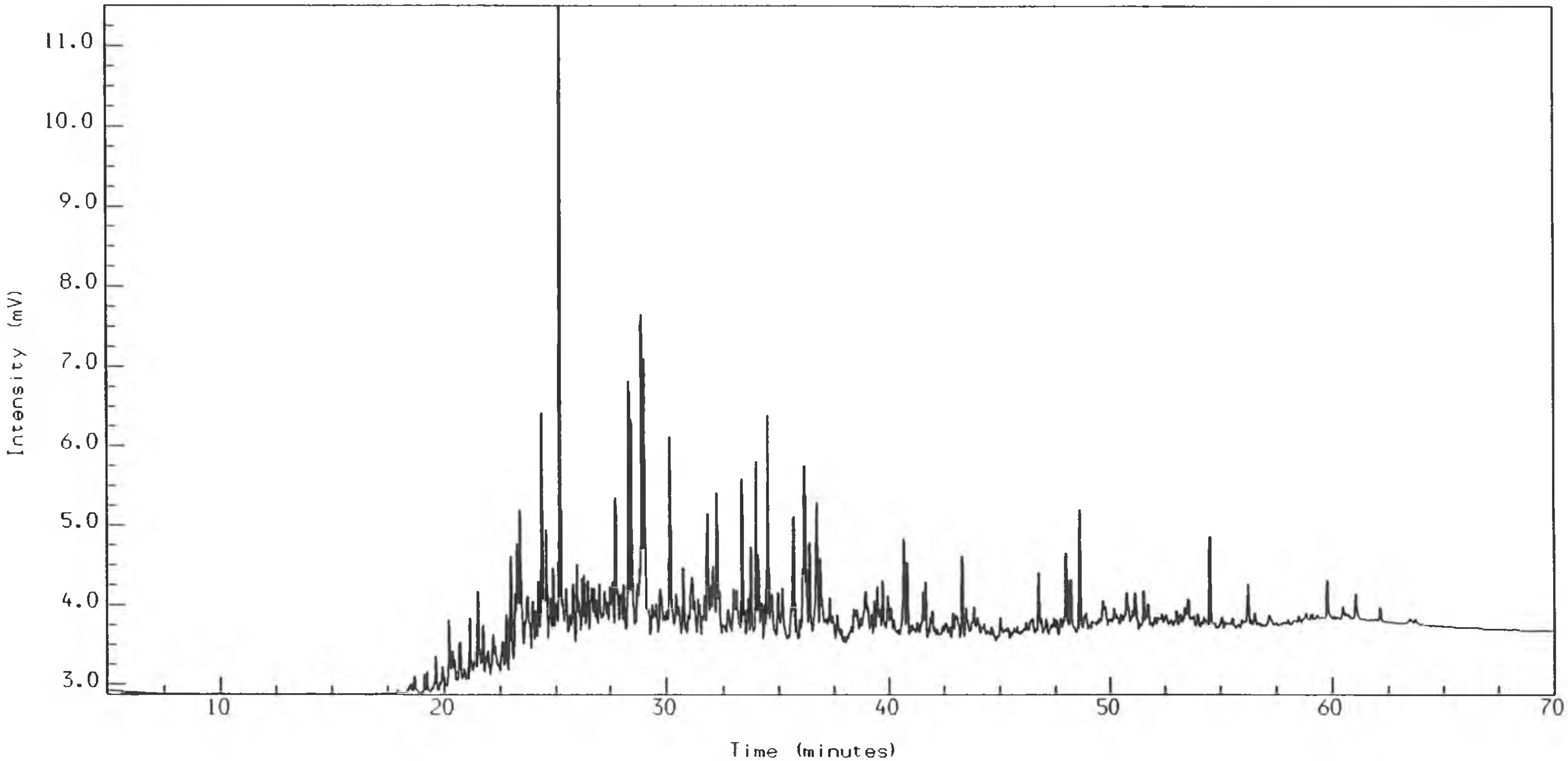
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.17.1.

30/9-9 2424.7 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 19:21

Reported on 23-MAR-1990 at 20:43

Method : ARO

Calibration : ARO

Run Sequence : ARO

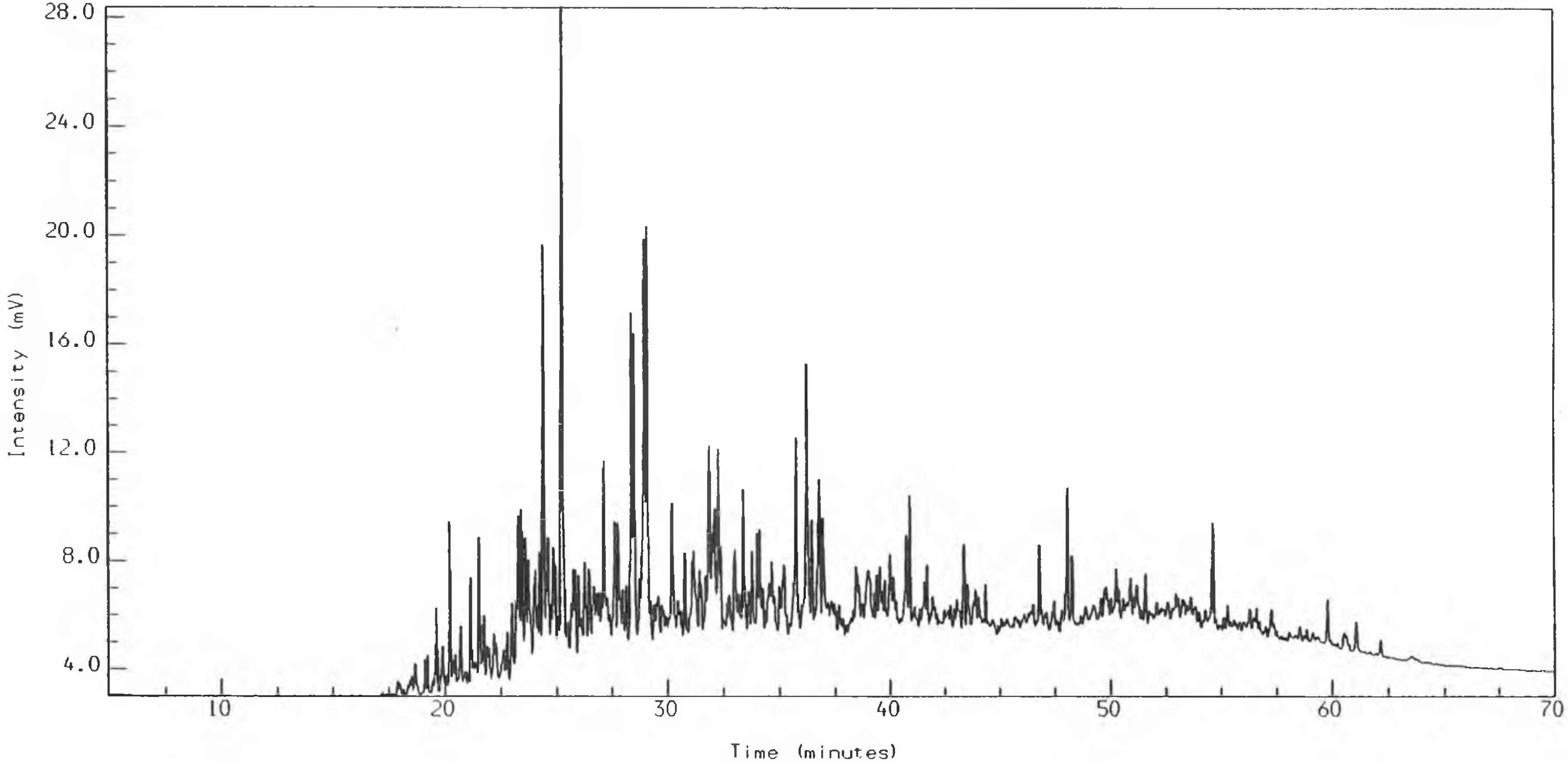
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.18.1.

30/9-9 2727.0 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 21:03

Reported on 23-MAR-1990 at 22:25

Method : ARO

Calibration : ARO

Run Sequence : ARO

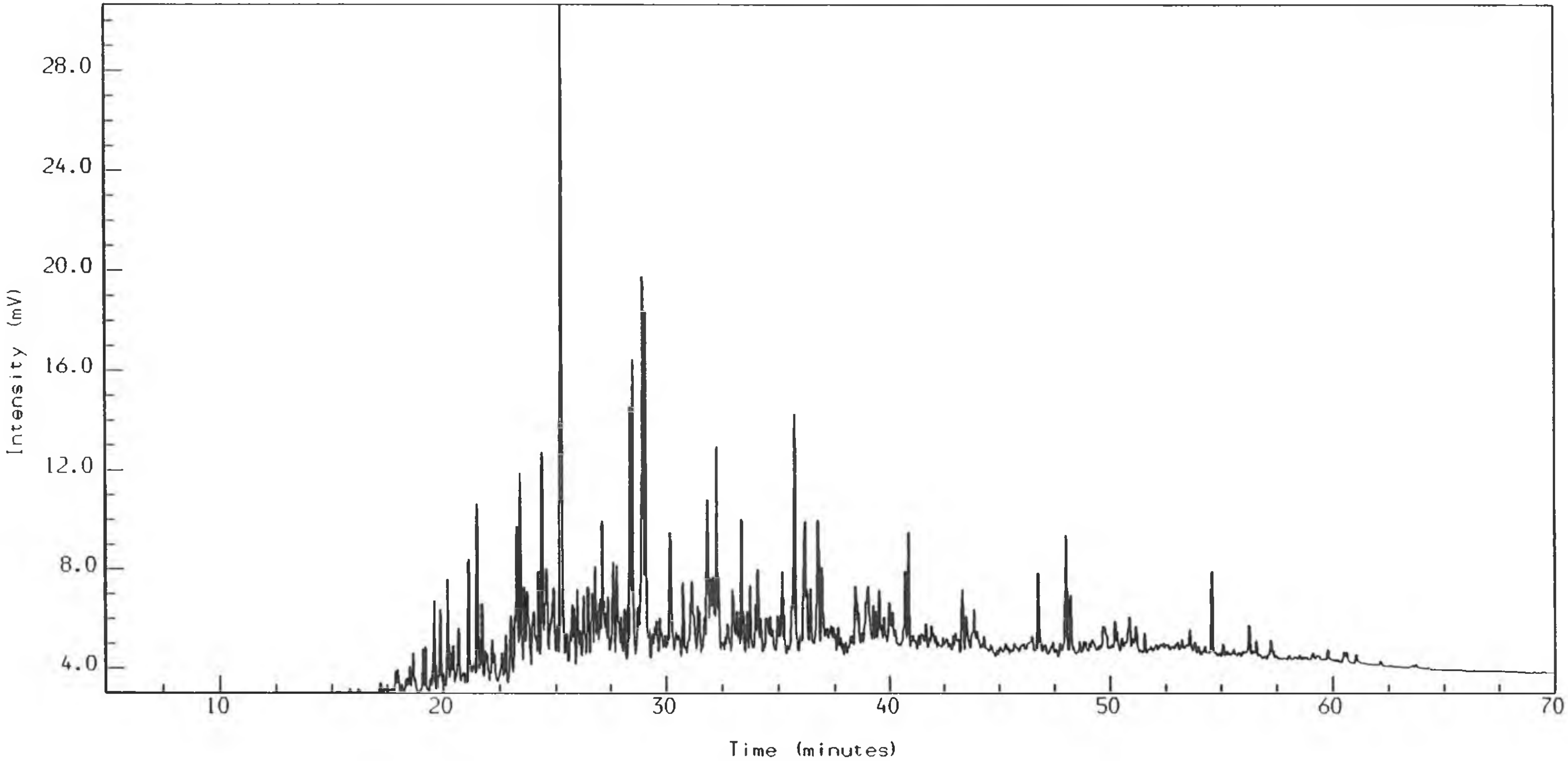
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.19.1.

30/9-9 2778.0 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 23-MAR-1990 at 22:44

Reported on 24-MAR-1990 at 00:06

Method : ARO

Calibration : ARO

Run Sequence : ARO

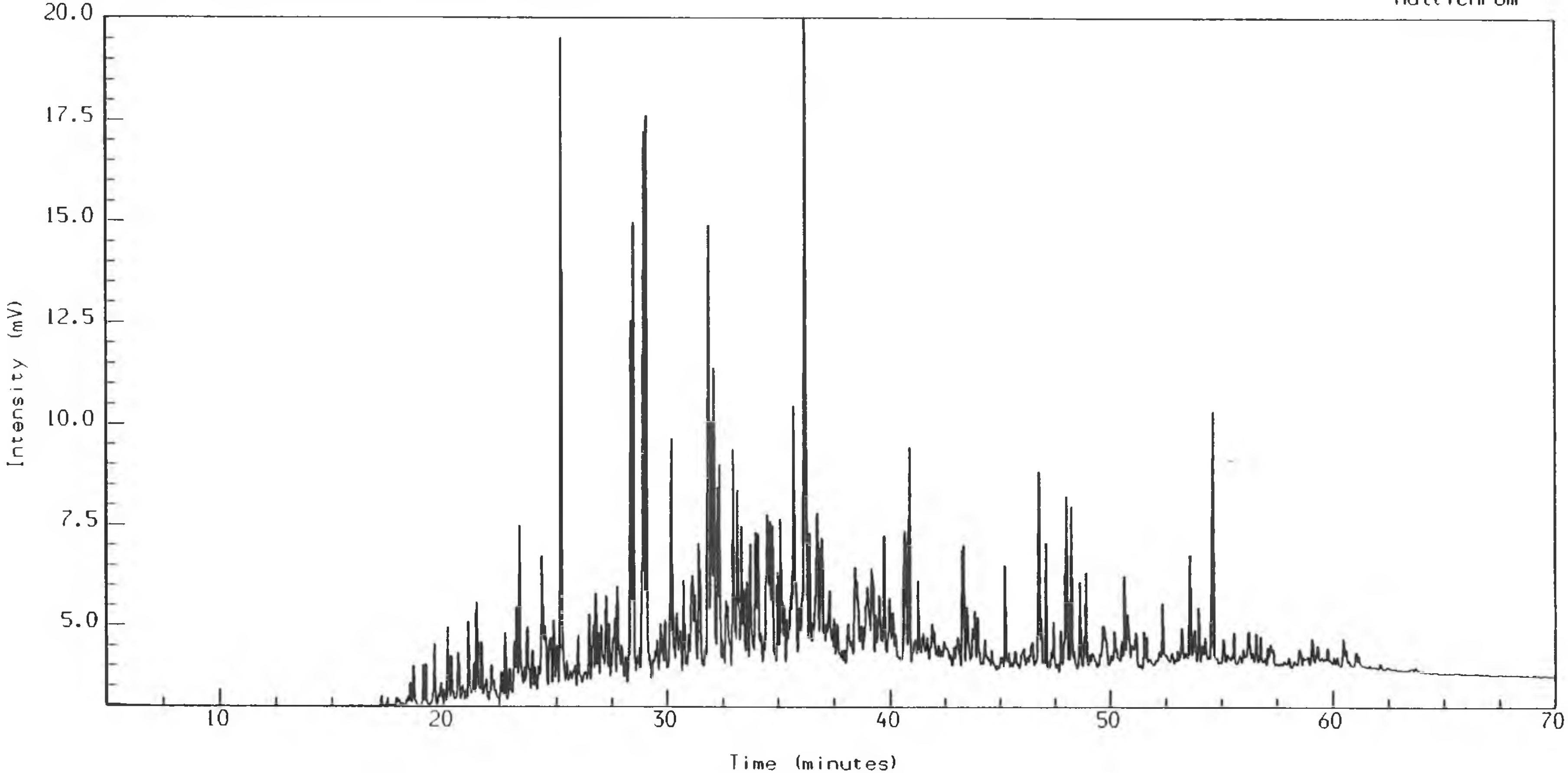
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.21.1.

30/9-9 2312.3 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 24-MAR-1990 at 02:07

Reported on 24-MAR-1990 at 03:29

Method : ARO

Calibration : ARO

Run Sequence : ARO

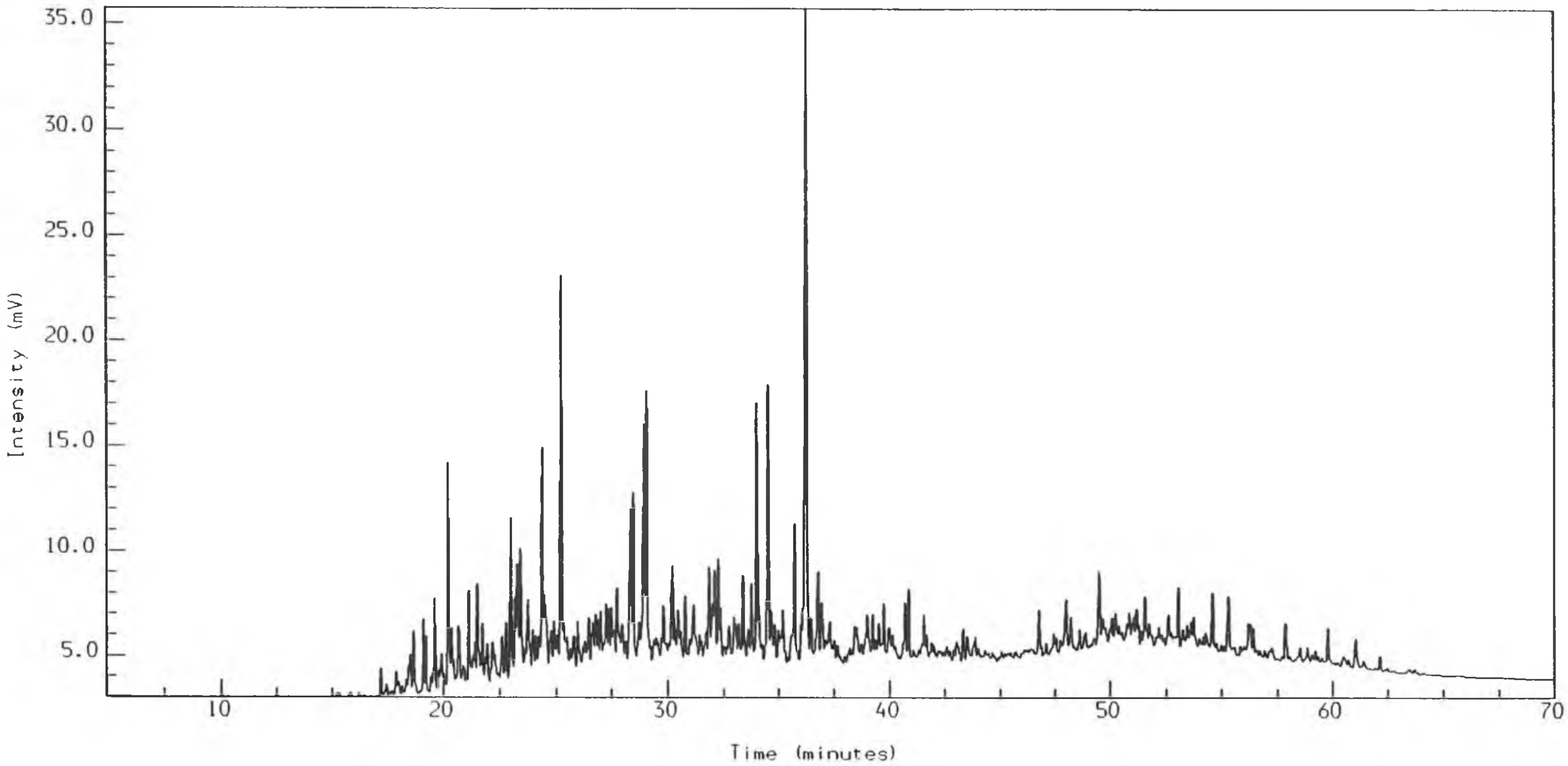
NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 1 A300909A.20.1.

30/9-9 2352.5 Amount : 1.000

AROMATIC HYDROCARBONS HP ULTRA-2 HP5880A

Multichrom



Instrument : HP5880

Channel Title : HP5880A GC

Lims ID :

Acquired on 24-MAR-1990 at 00:25

Reported on 24-MAR-1990 at 01:48

Method : ARO

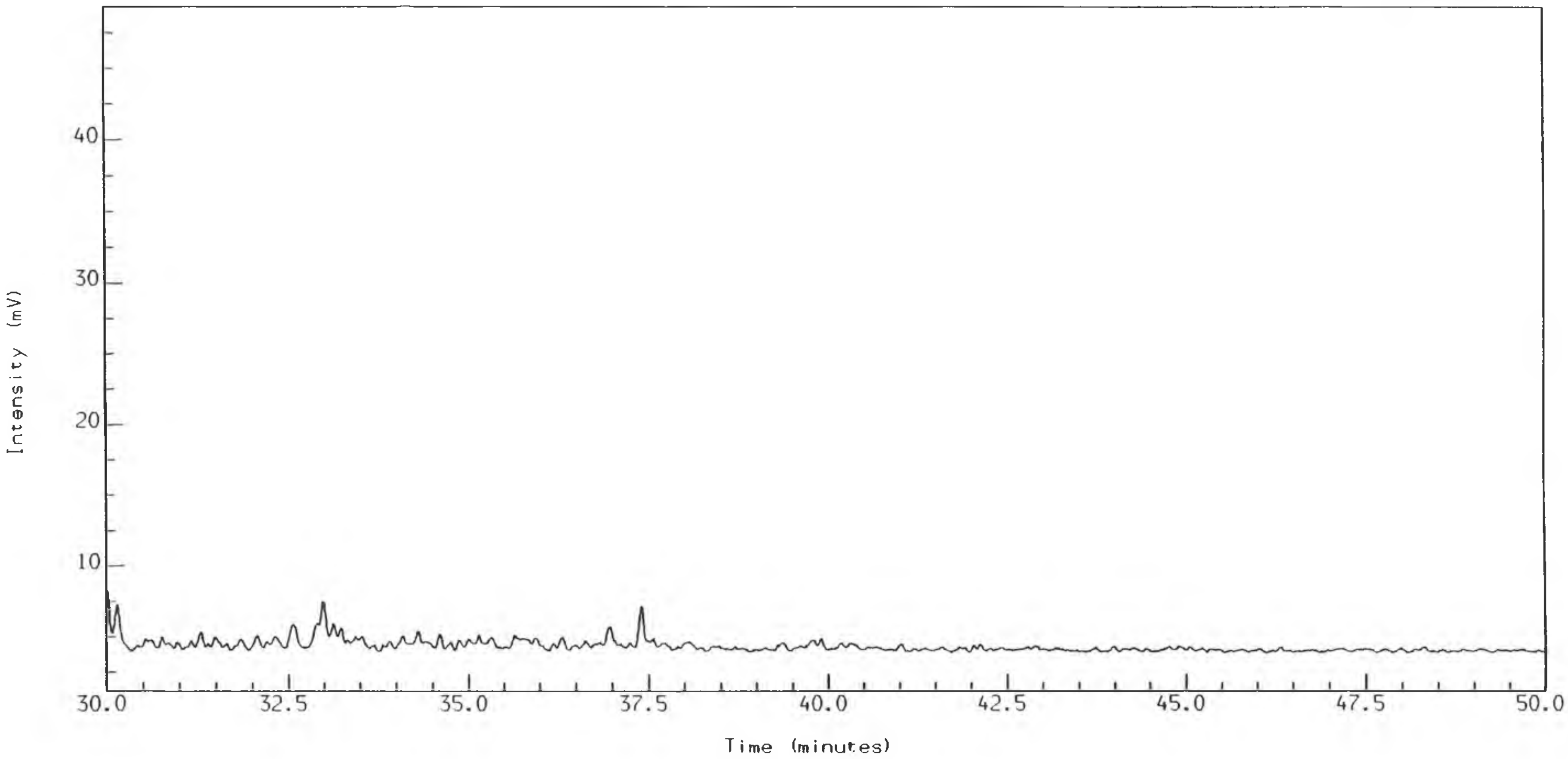
Calibration : ARO

Run Sequence : ARO

NORSK HYDRO F-BERGEN, PETRULEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO.11.1.
30/9-9 DST1 ARO

Multichrom



Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 23-MAR-1990 at 07:48
Reported on 23-MAR-1990 at 09:11

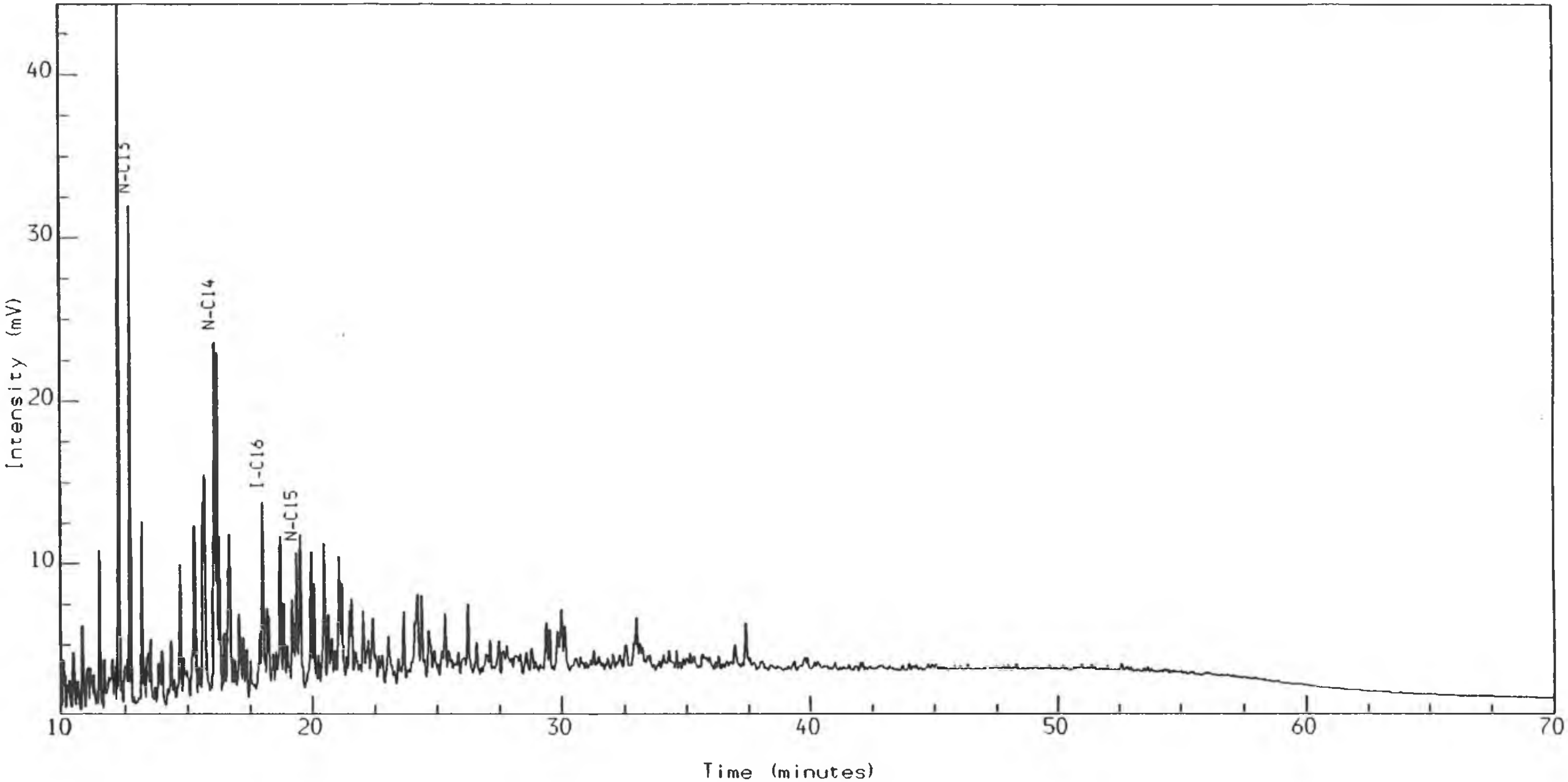
Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO.12.1.

30/9-9 DST2 ARO

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 23-MAR-1990 at 09:20

Reported on 23-MAR-1990 at 10:45

Method : MSDS

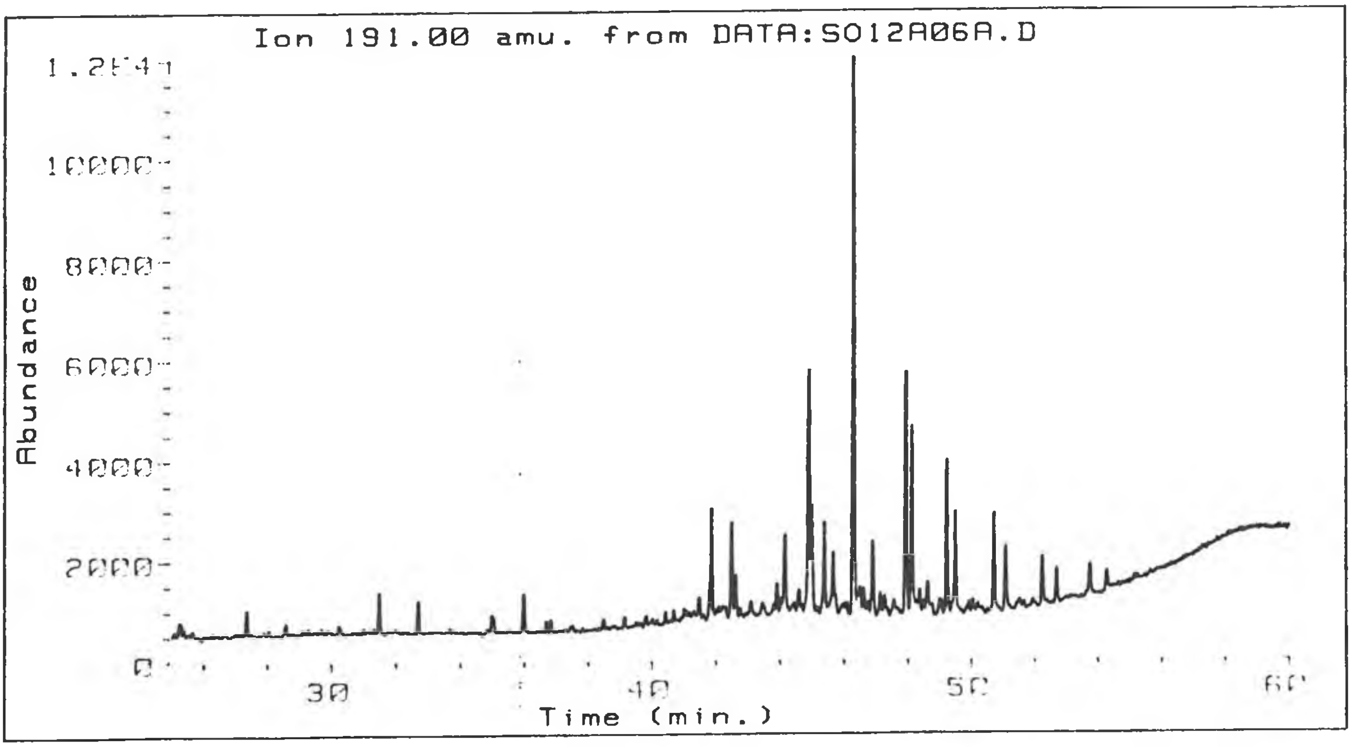
Calibration : MSDS

Run Sequence : MSDS

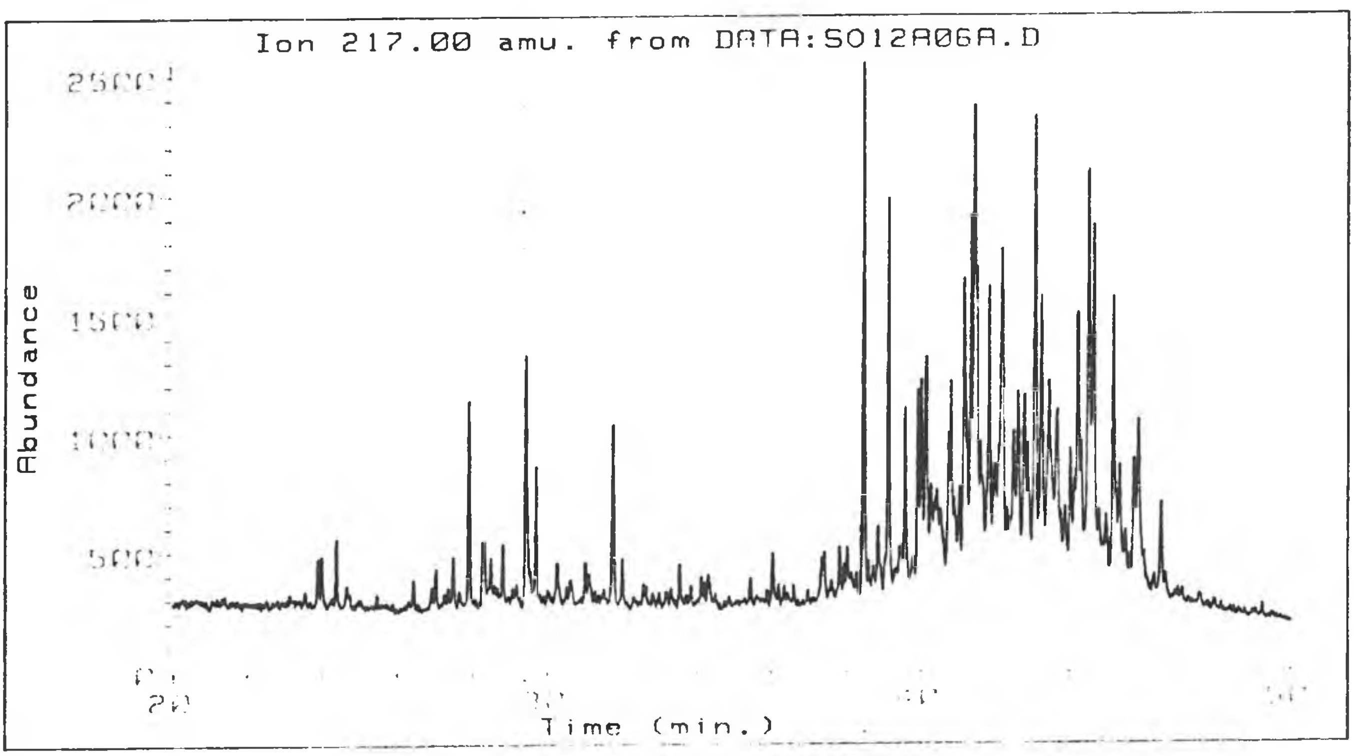
APPENDIX IV

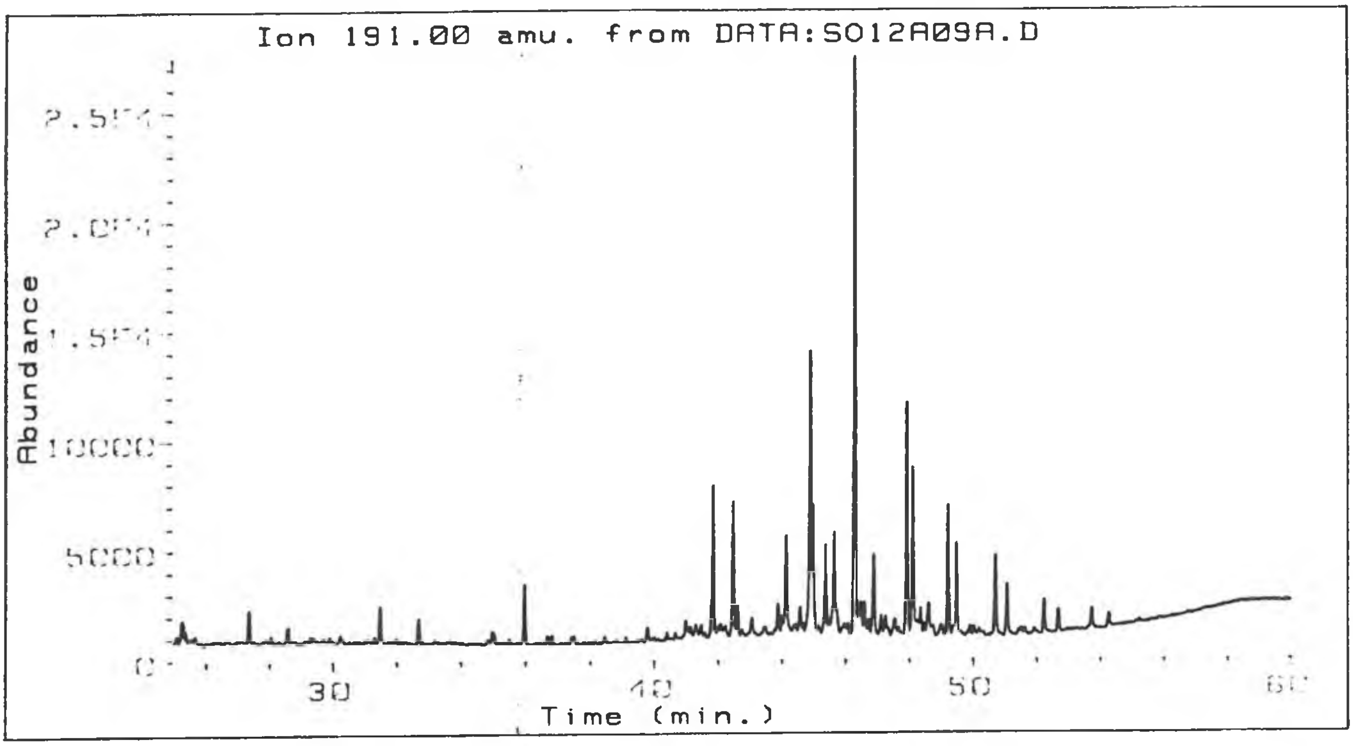
Fragmentograms of Terpanes, (Ion 191 m/z).

Fragmentograms of Steranes, (Ion 217 m/z).

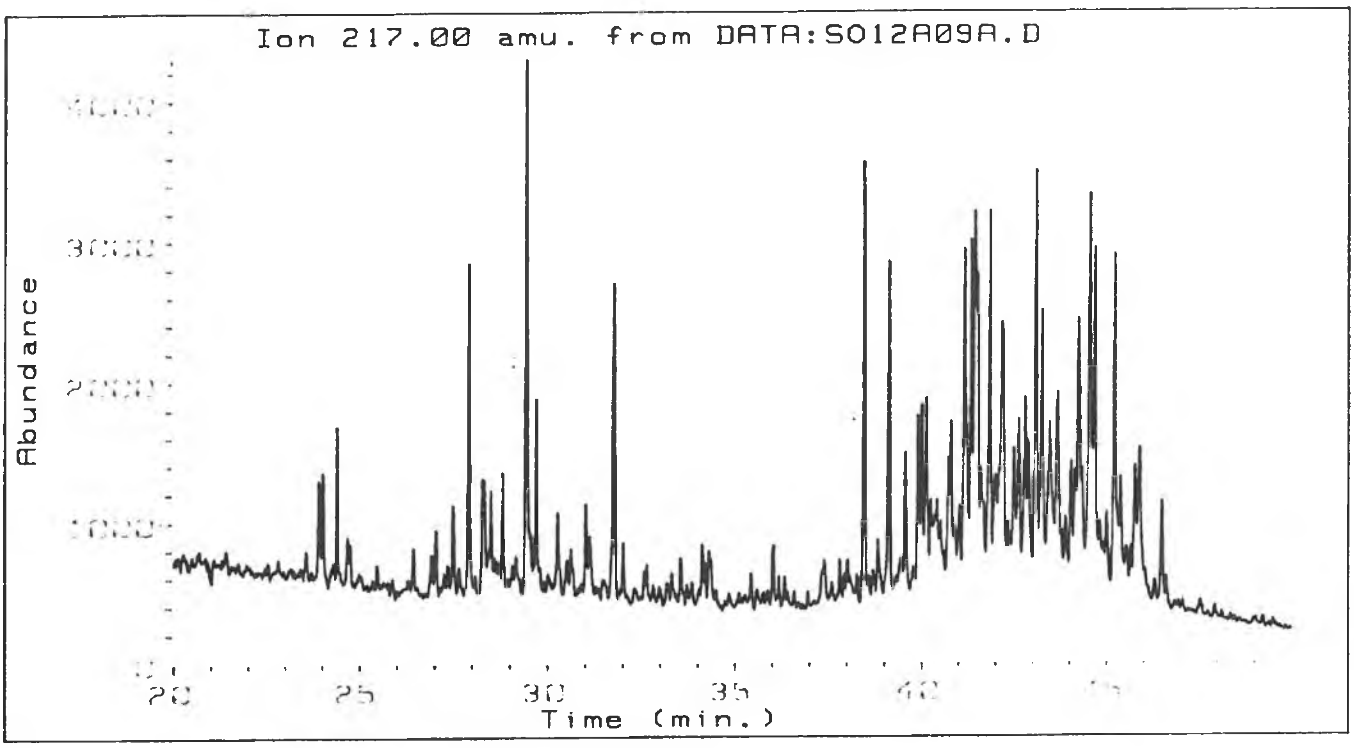


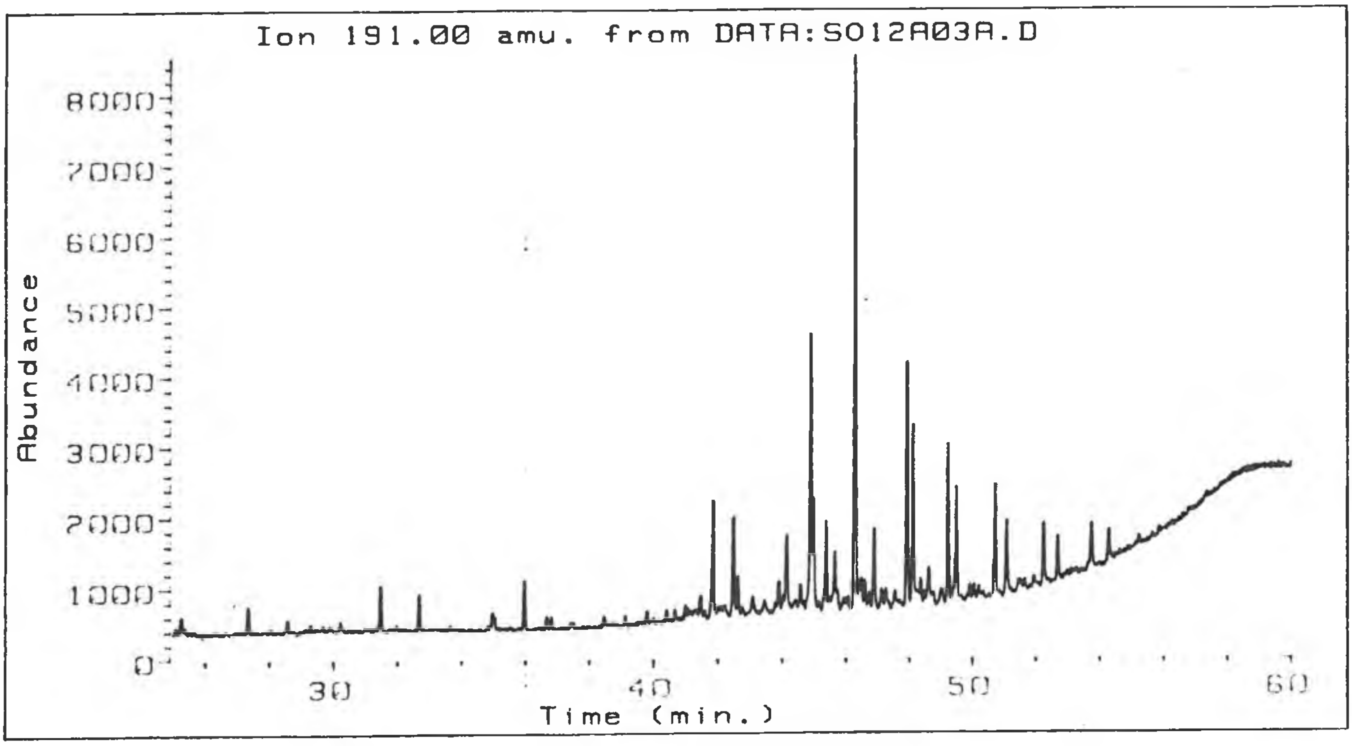
30/9-9 2291.10 m



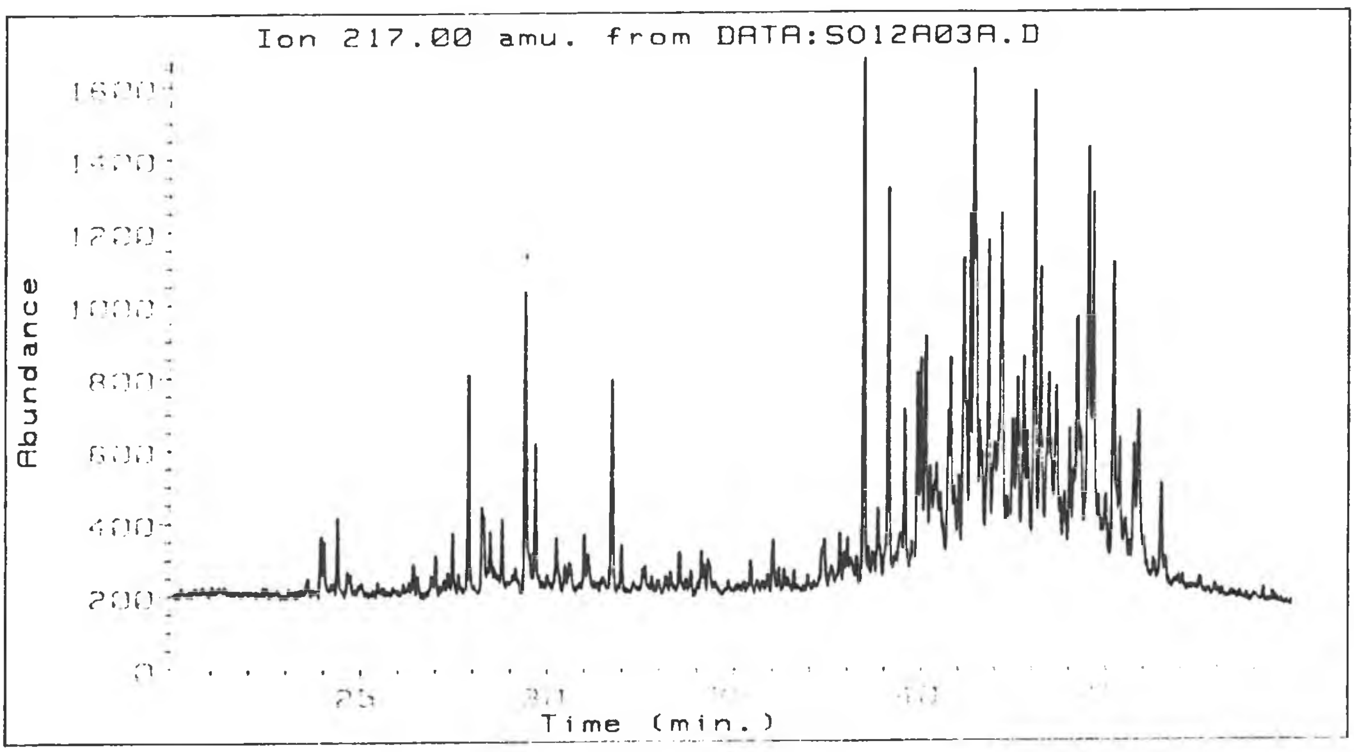


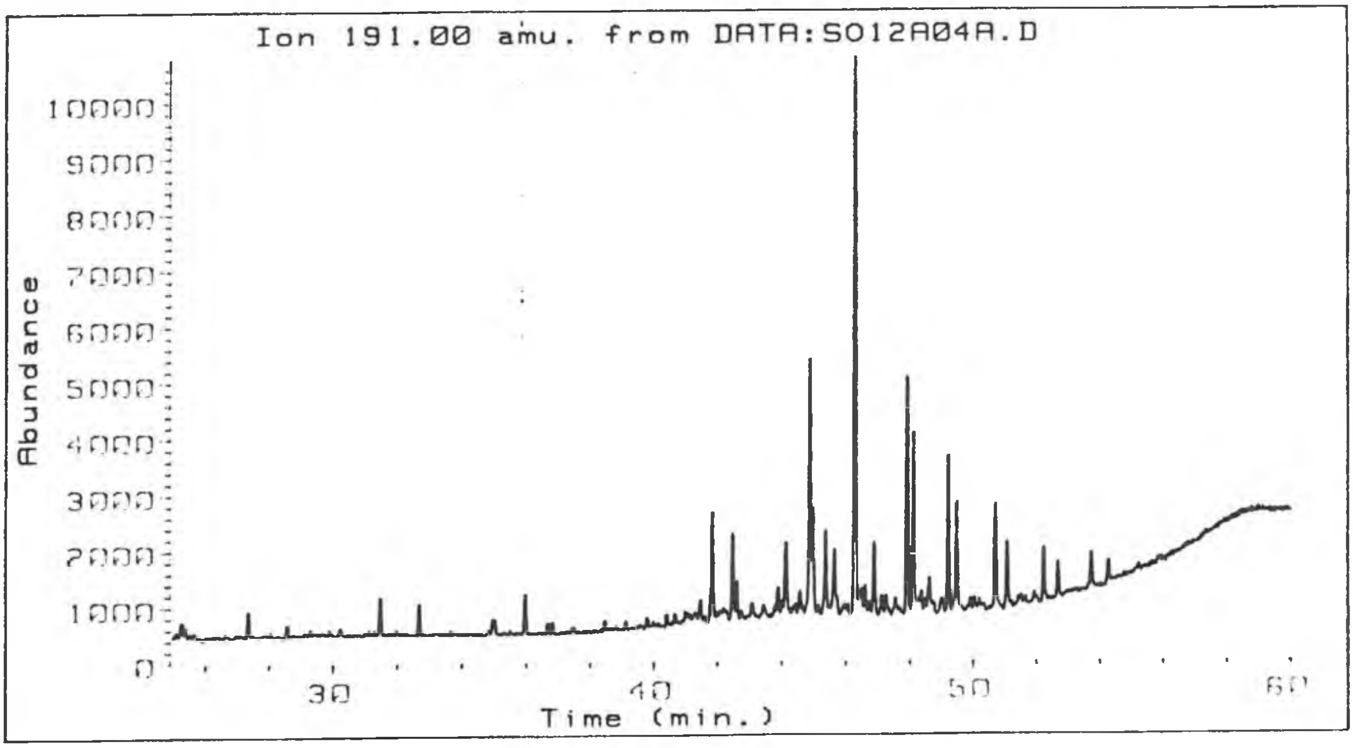
30/9-9 2291.75 m



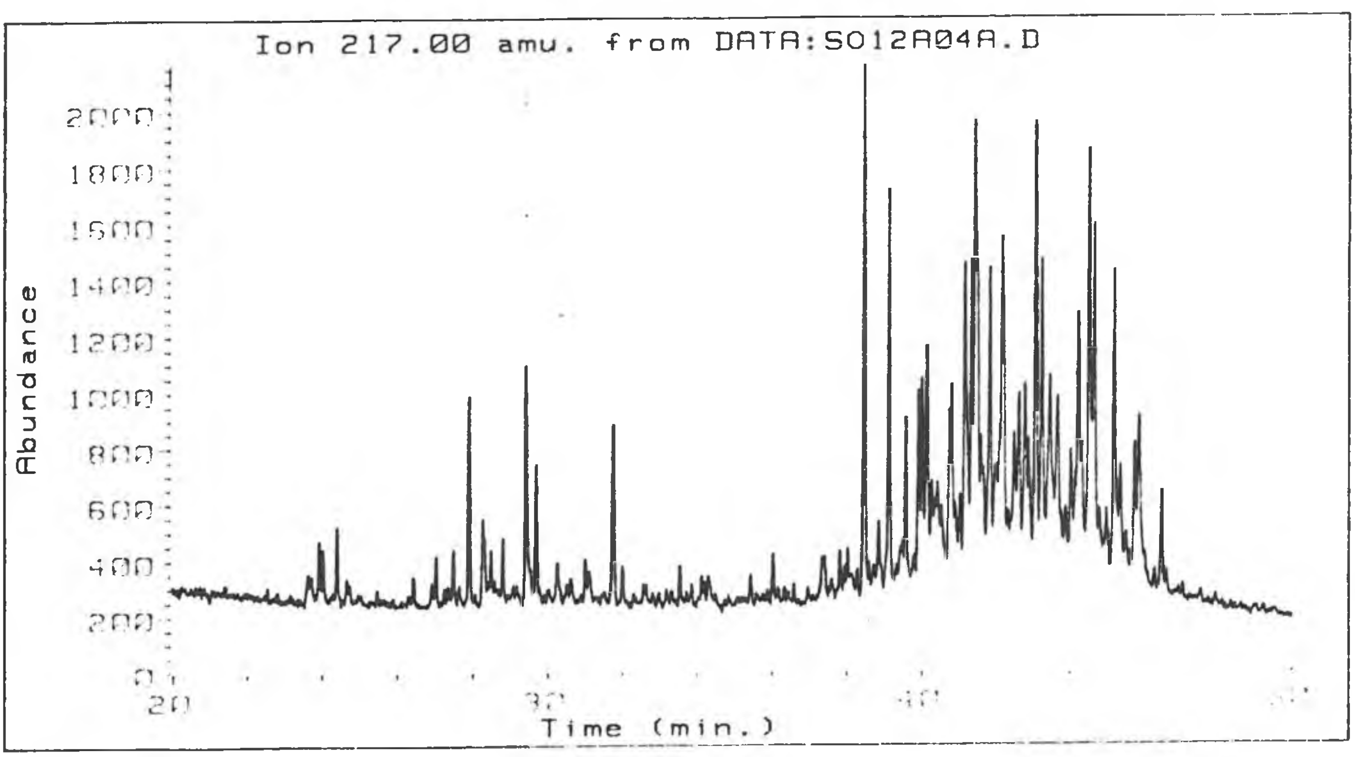


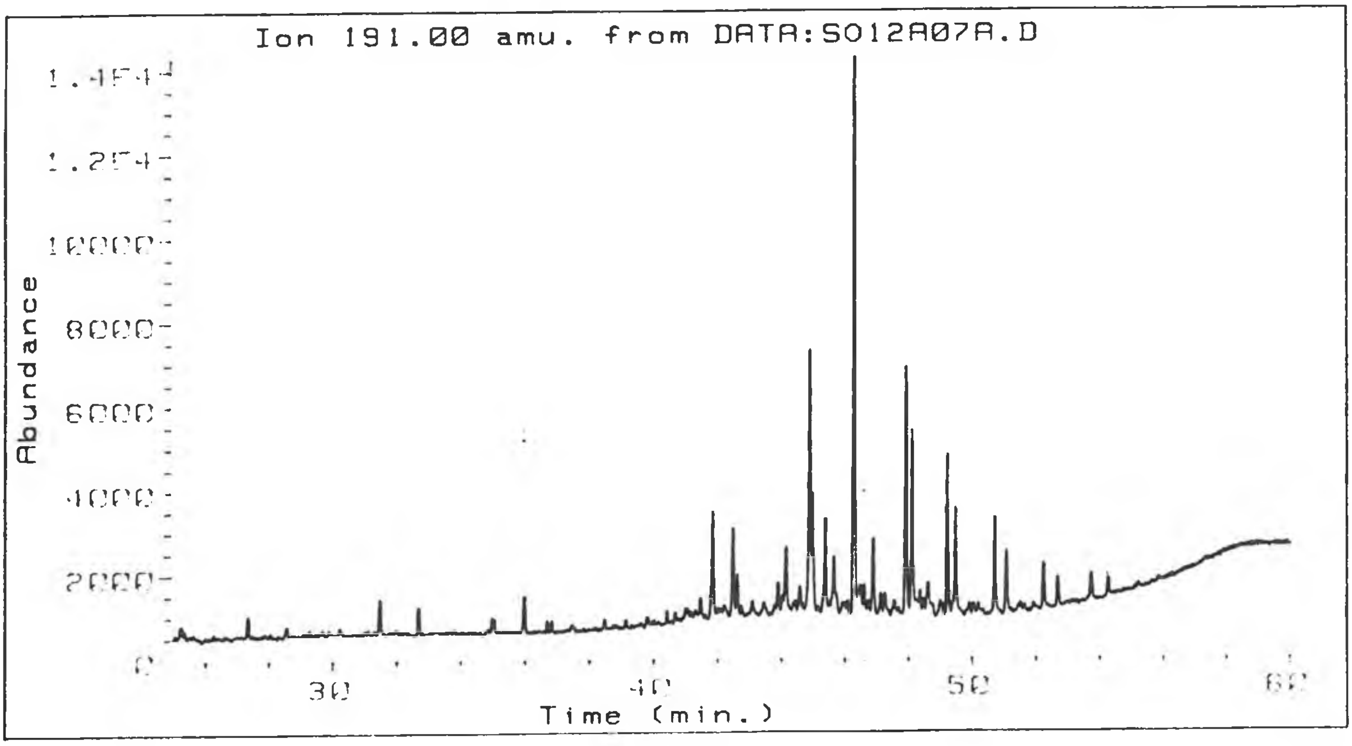
30/9-9 2292.50 m



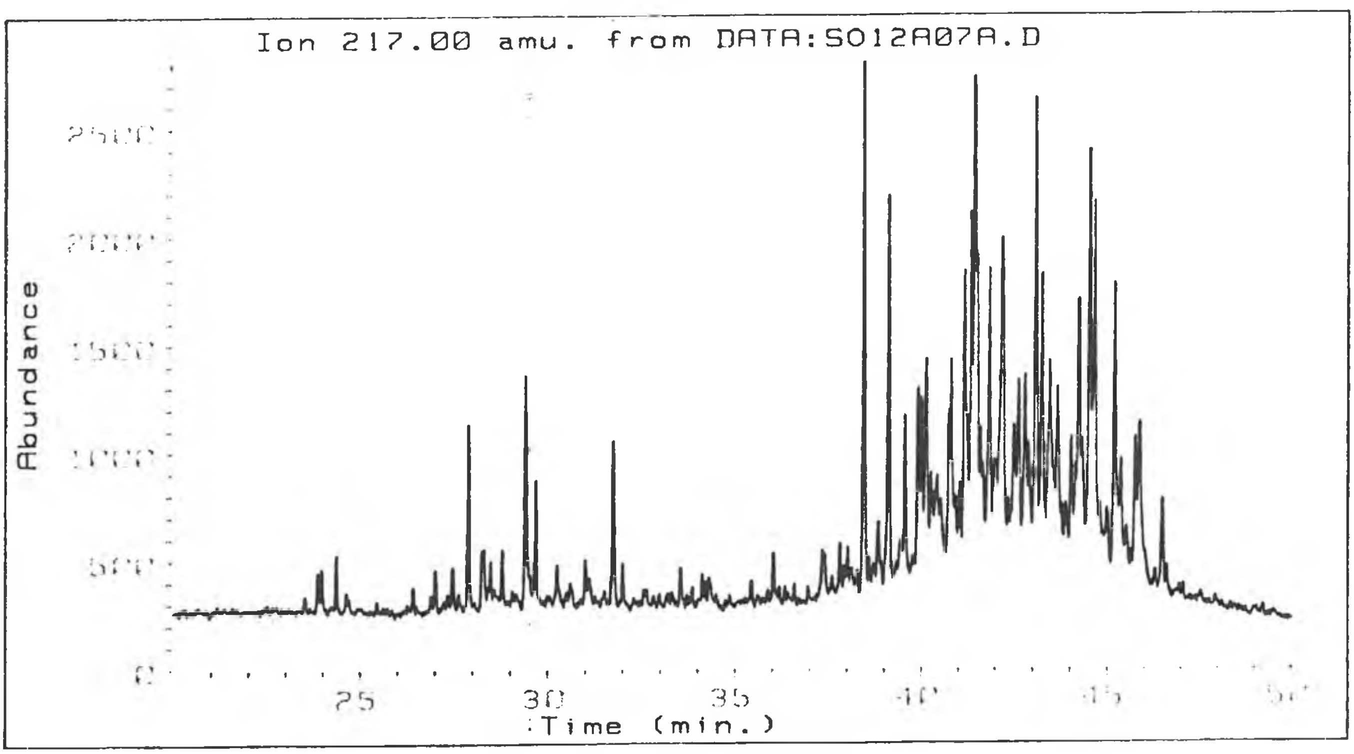

Ion 191.00 amu. from DATA:SO12A04A.D
Abundance
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
30
40
50
60
Time (min.)

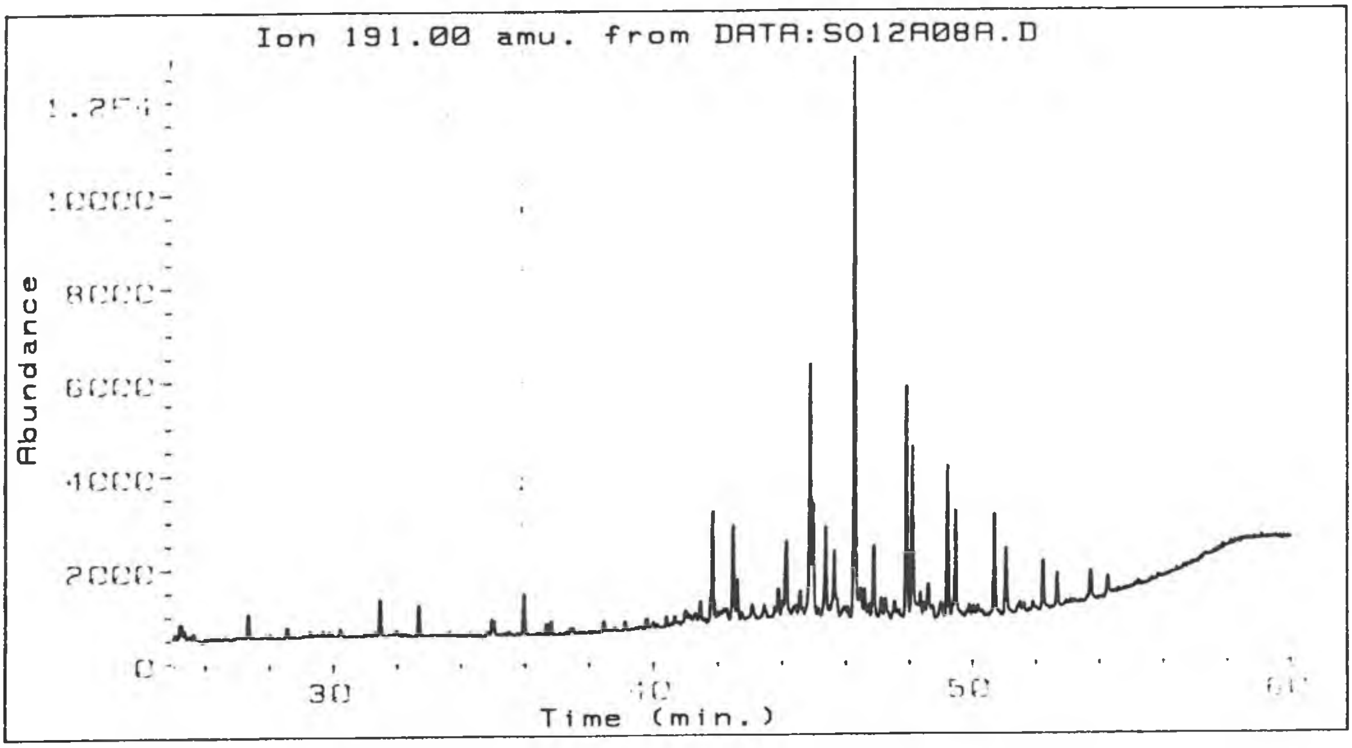
30/9-9 2293.0 m


Ion 217.00 amu. from DATA:SO12A04A.D
Abundance
2000
1800
1600
1400
1200
1000
800
600
400
200
0
20
30
40
Time (min.)

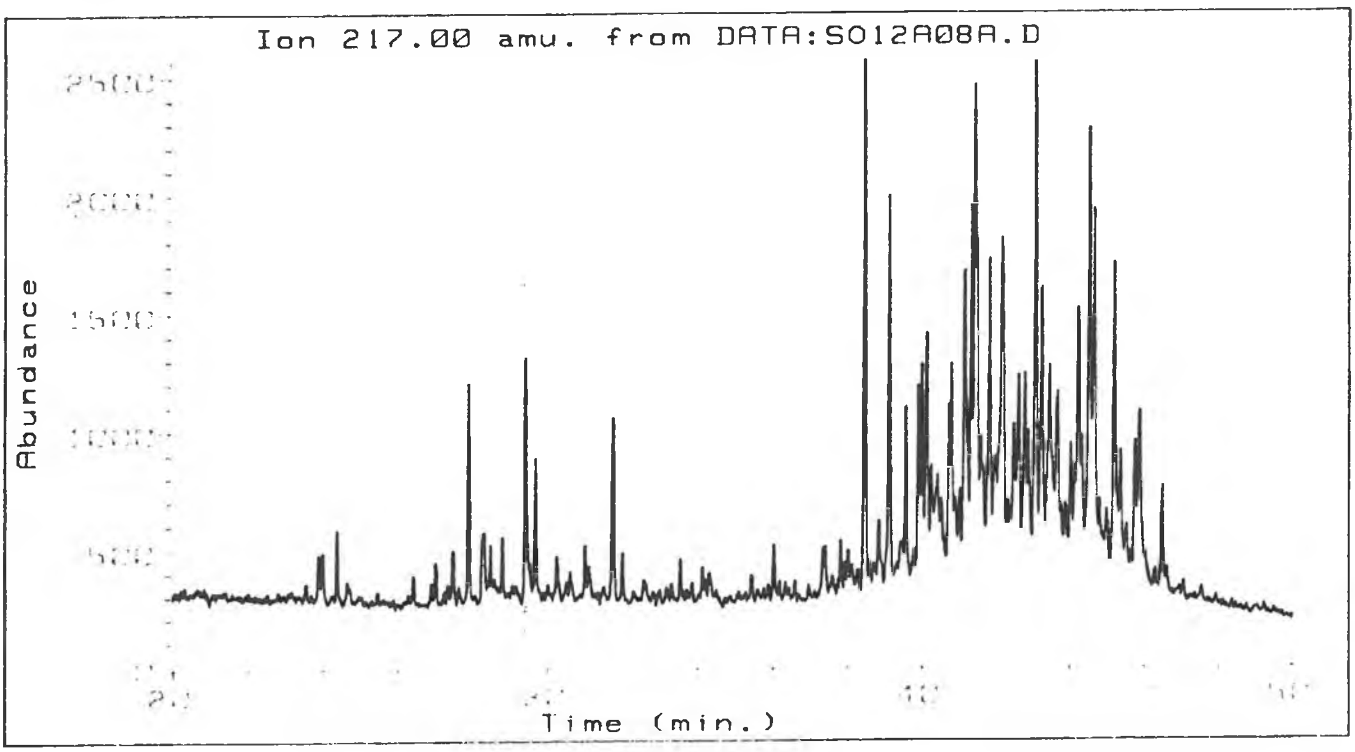


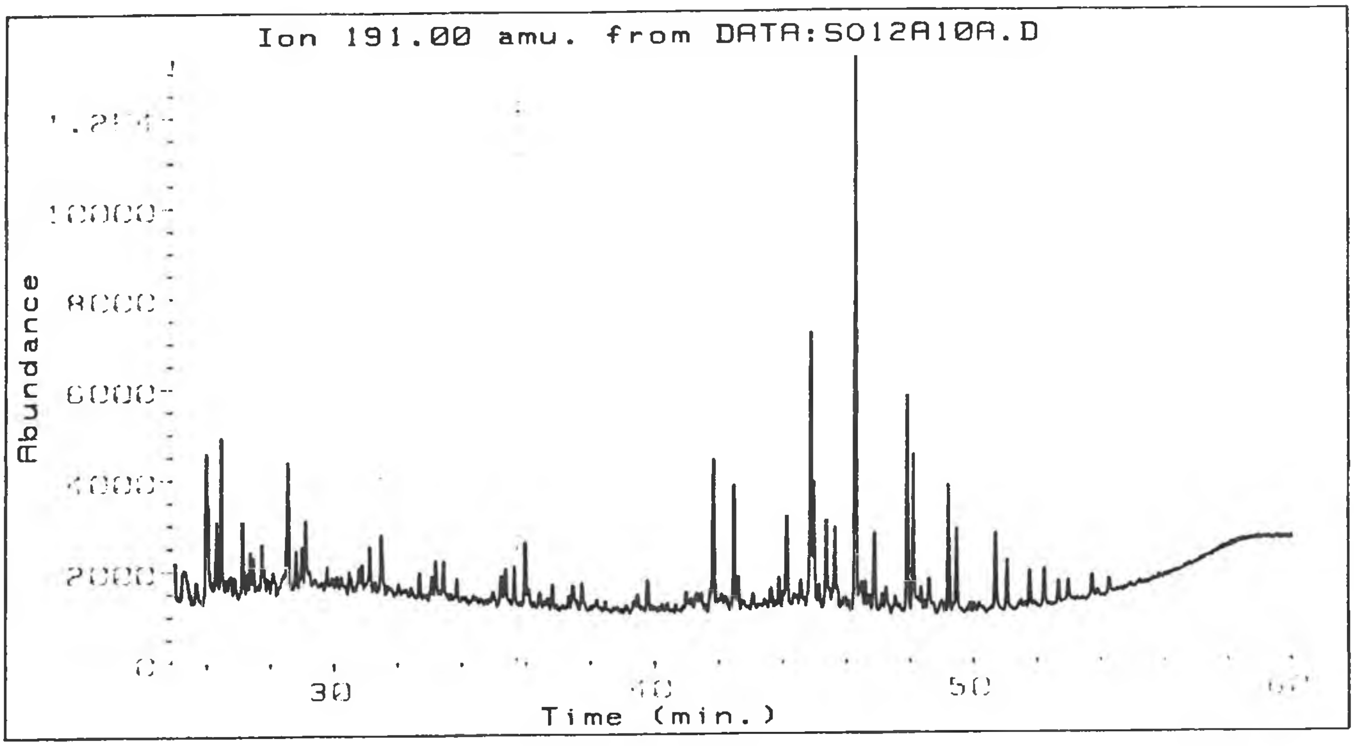
30/9-9 2393.02 m



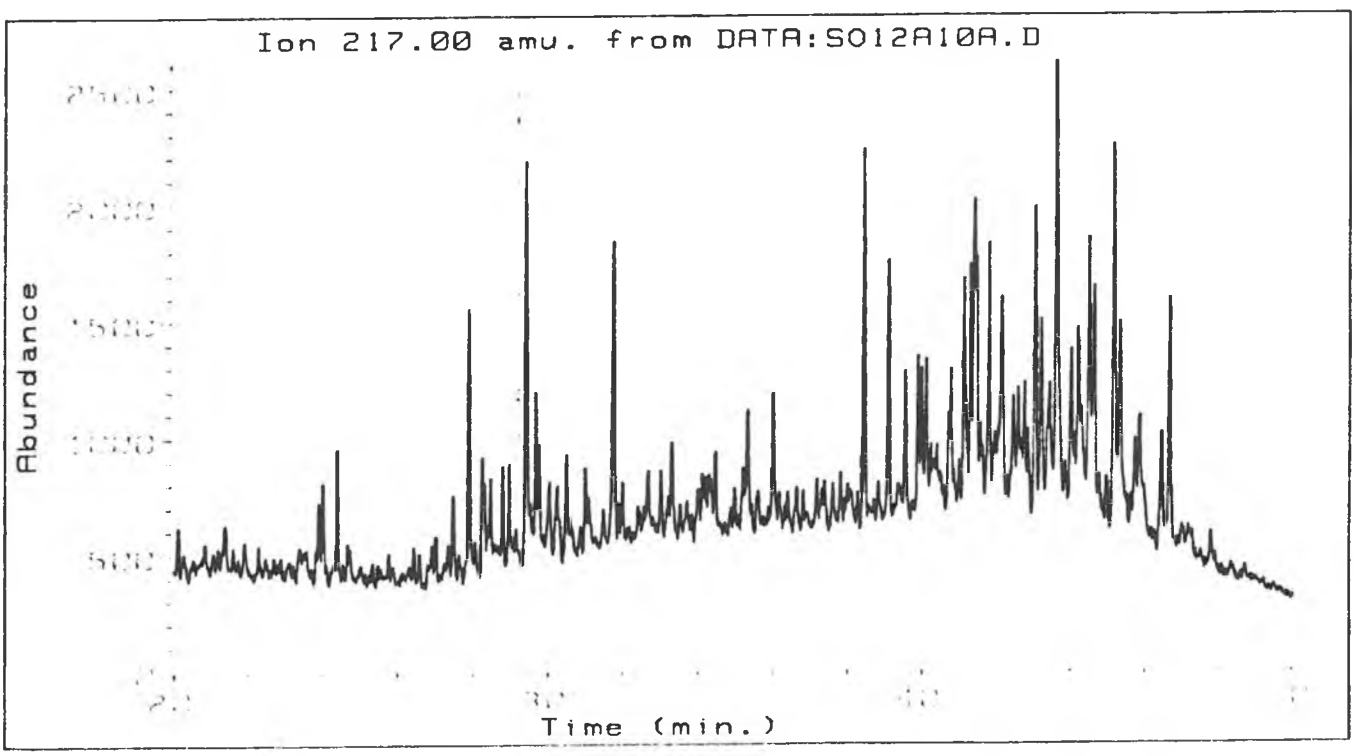


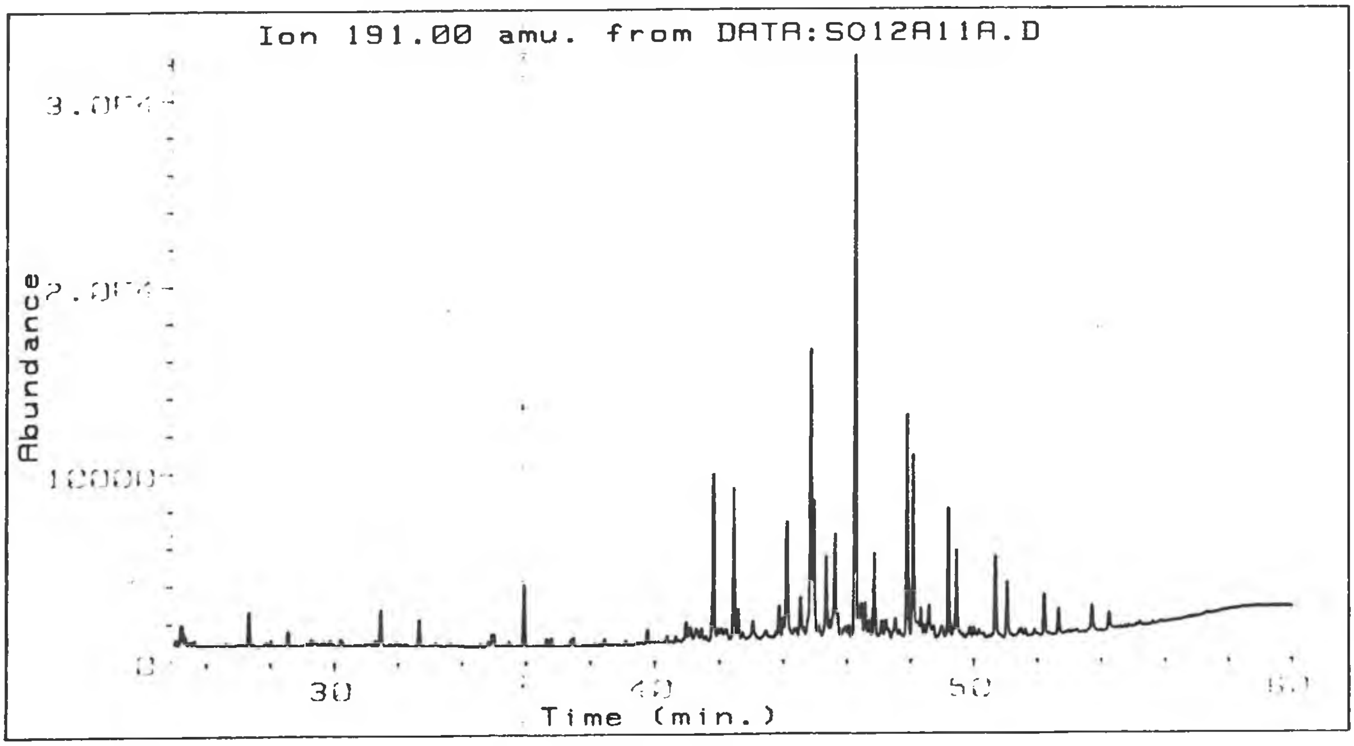
30/9-9 2293.70 m



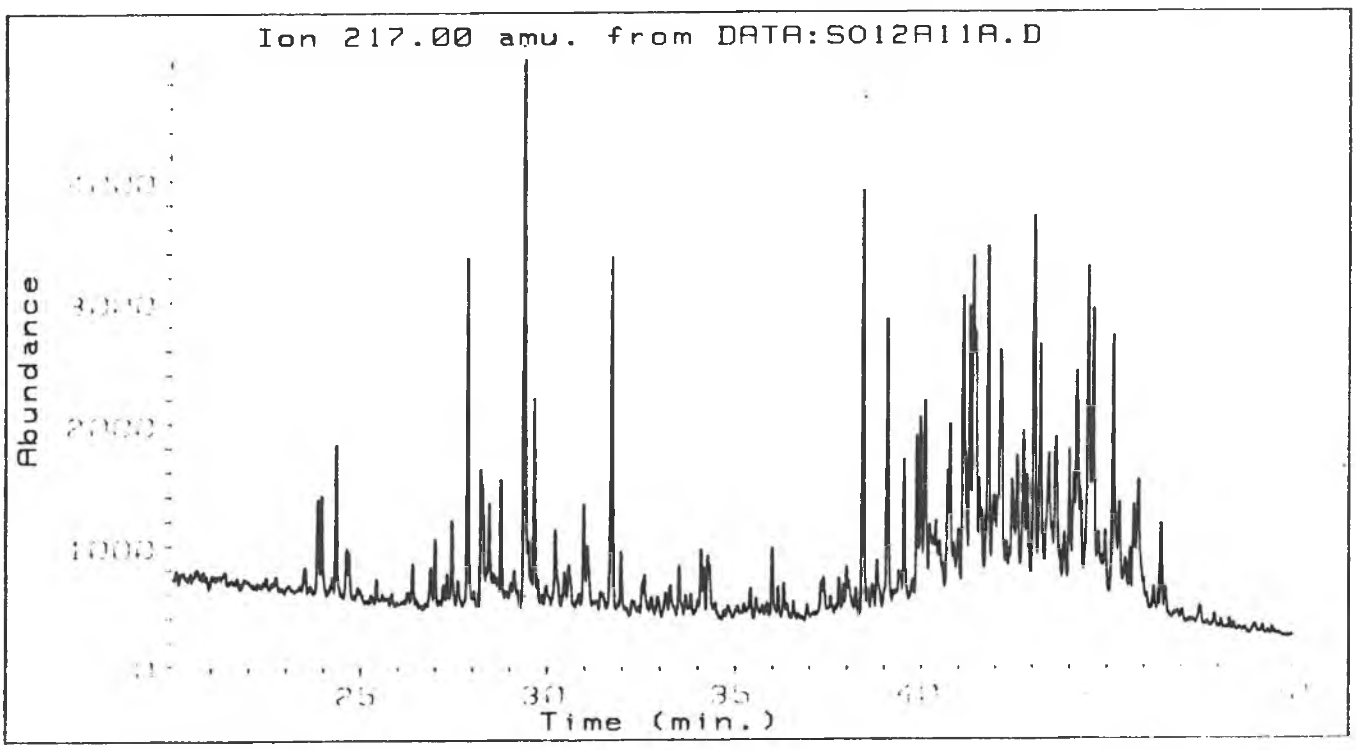


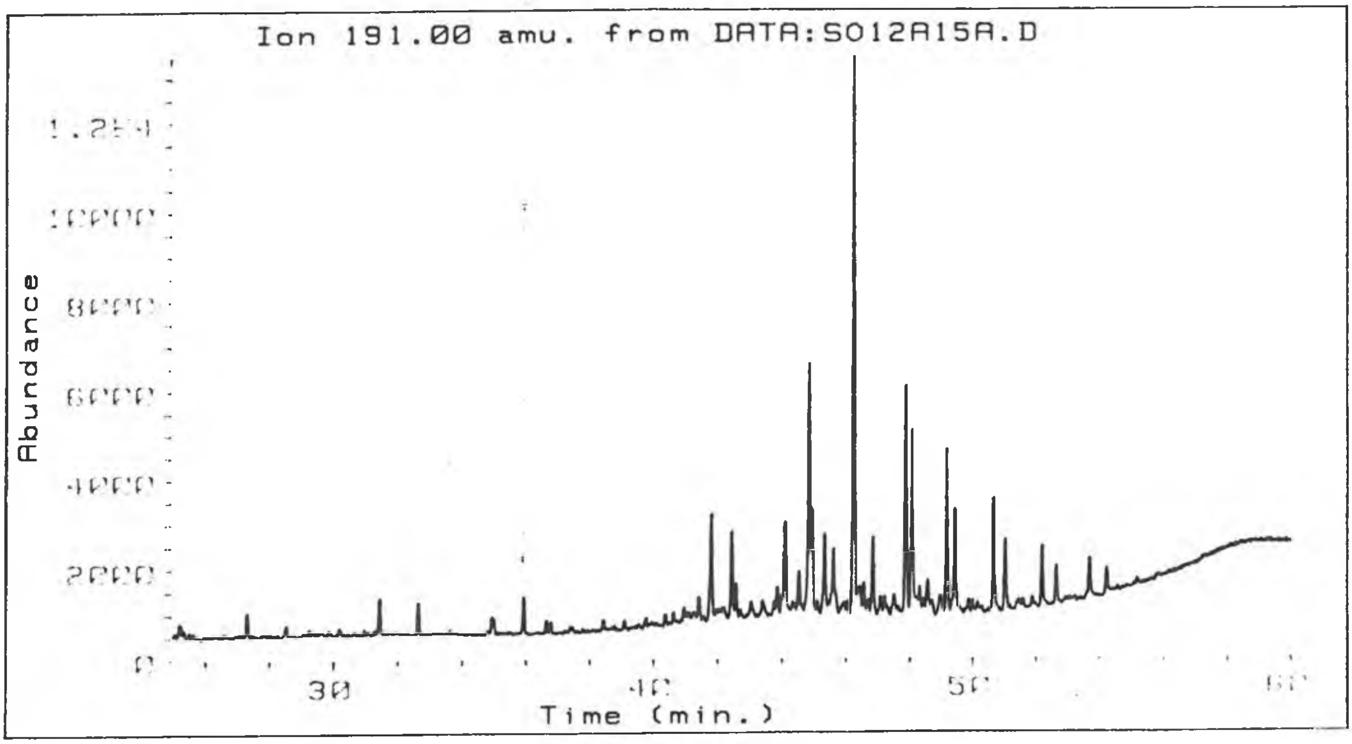
30/9-9 2295.75 m



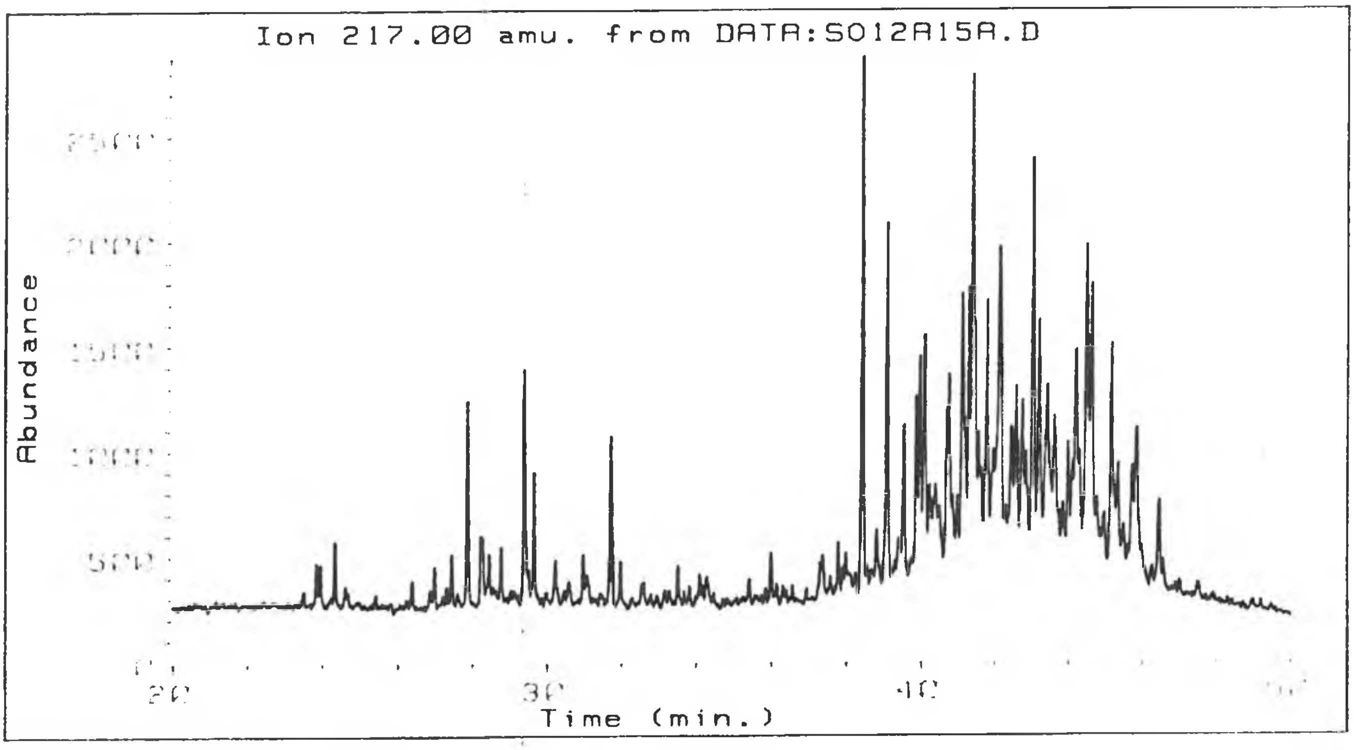


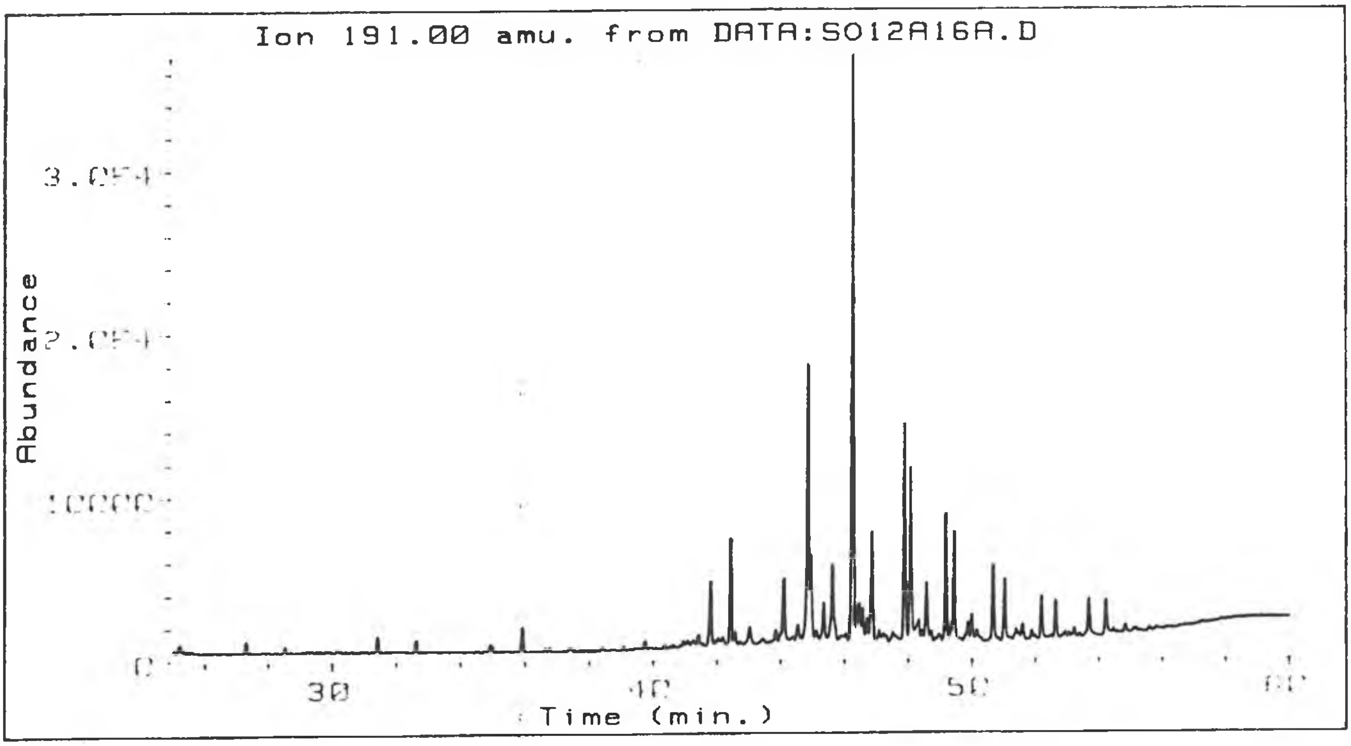
30/9-9 2297.40 m



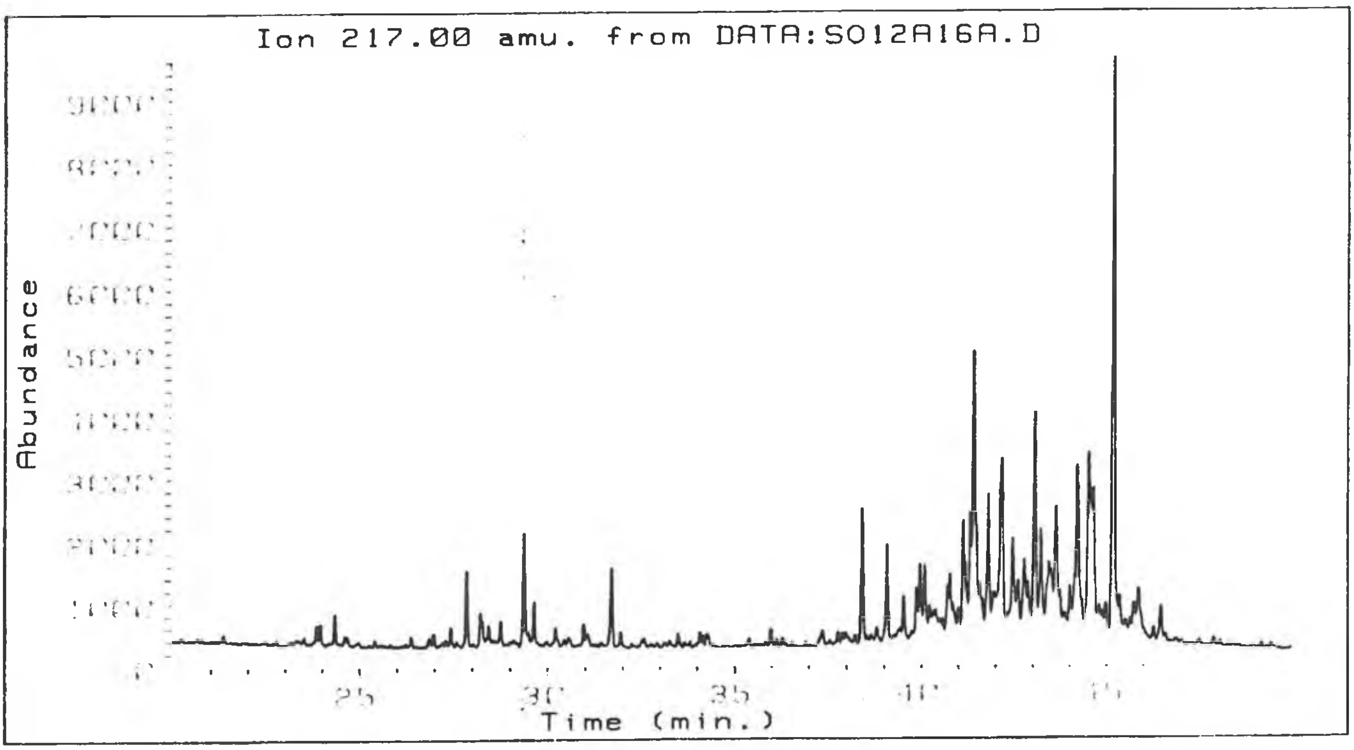


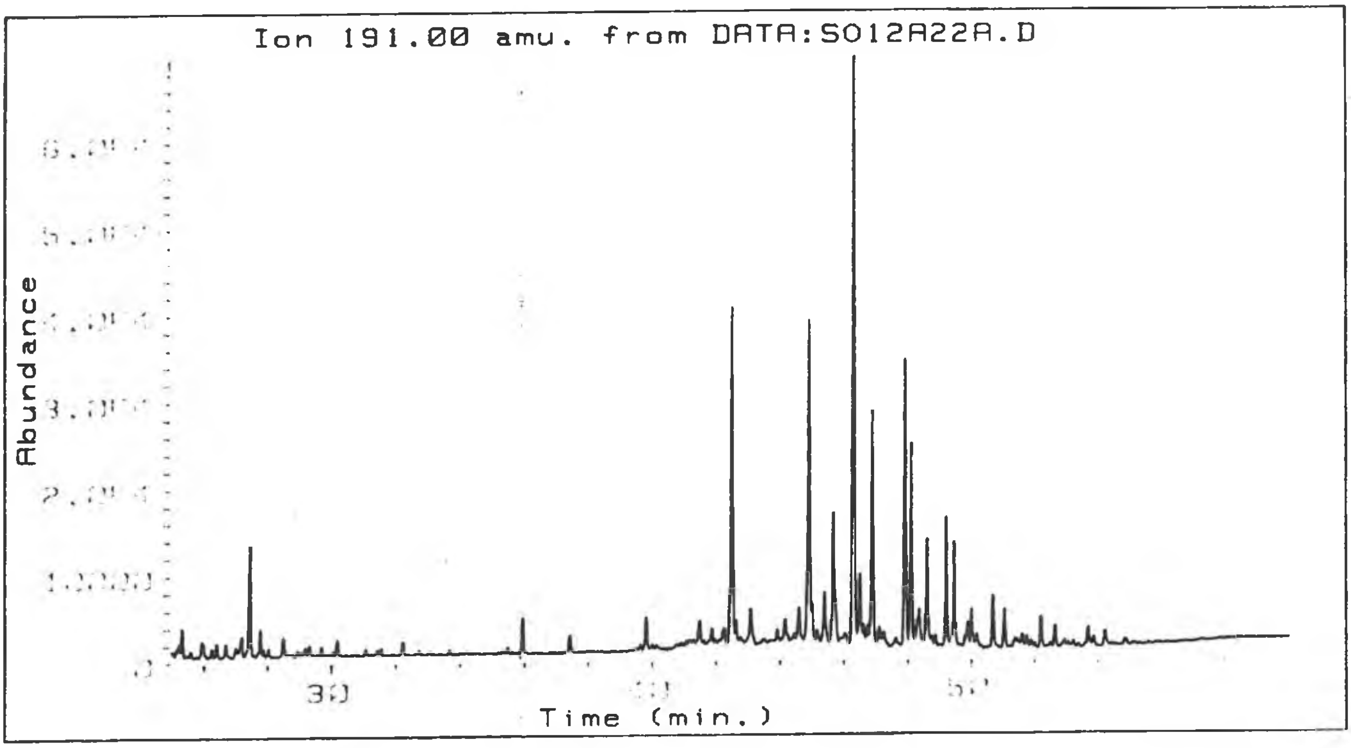
30/9-9 2299.02 m





30/9-9 2308.60 m





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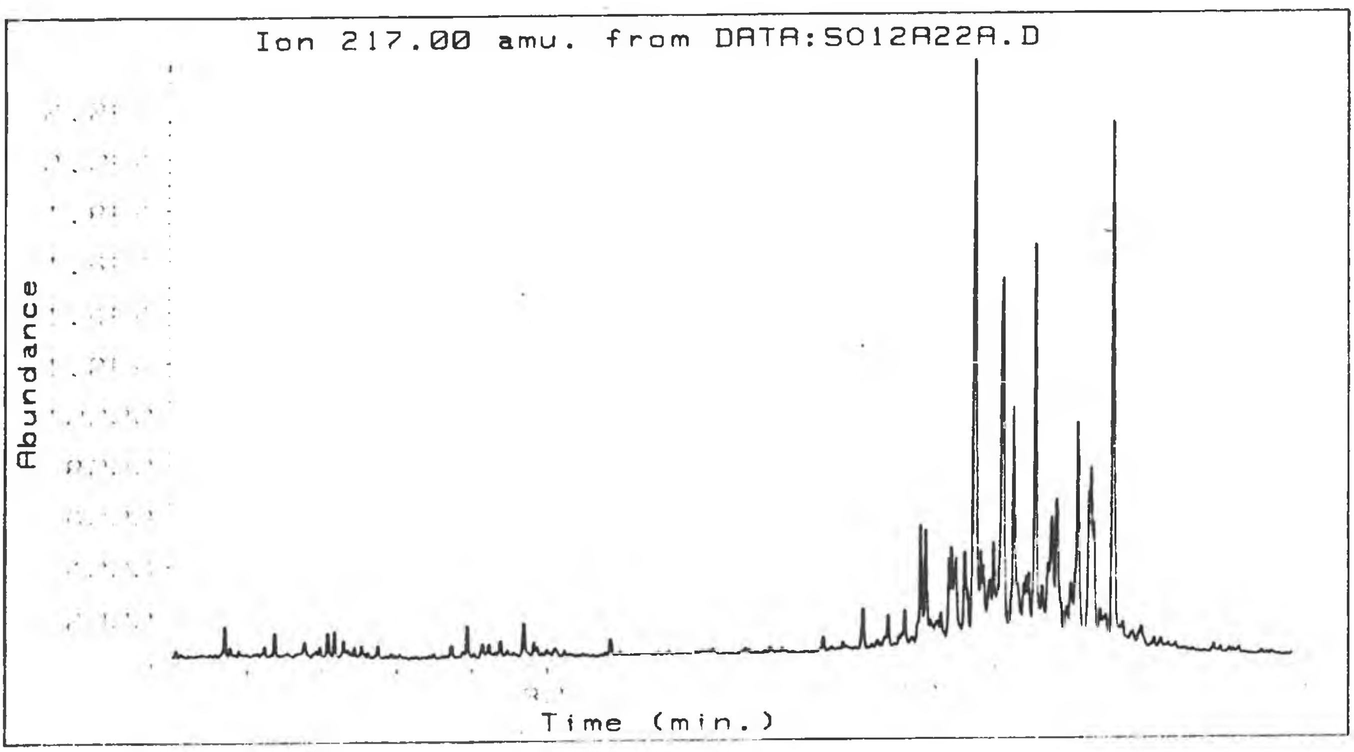
Abundance
Time (min.)

30/9-9 2312.3 m



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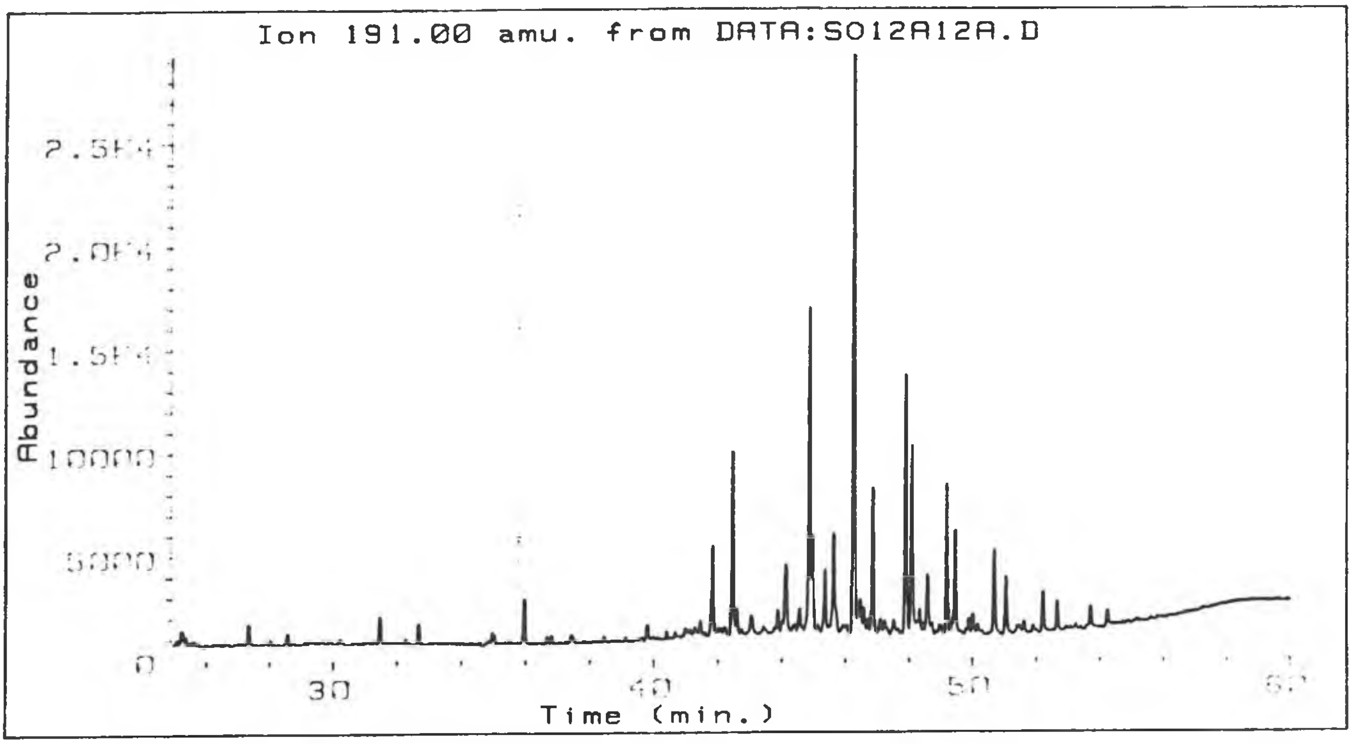
Abundance
Time (min.)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Abundance
Time (min.)
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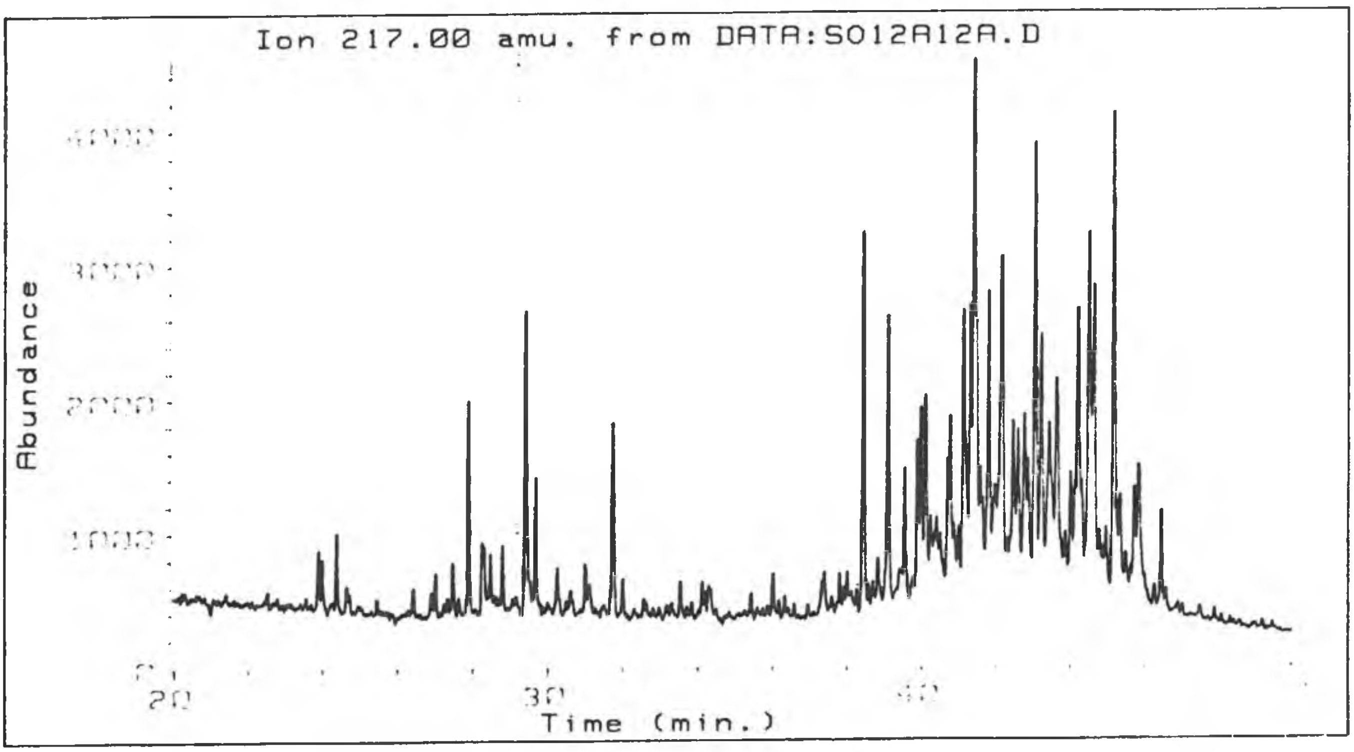
40
50
60
0
5000
10000
1.5E4
2.0E4
2.5E4

30/9-9 2313.5 m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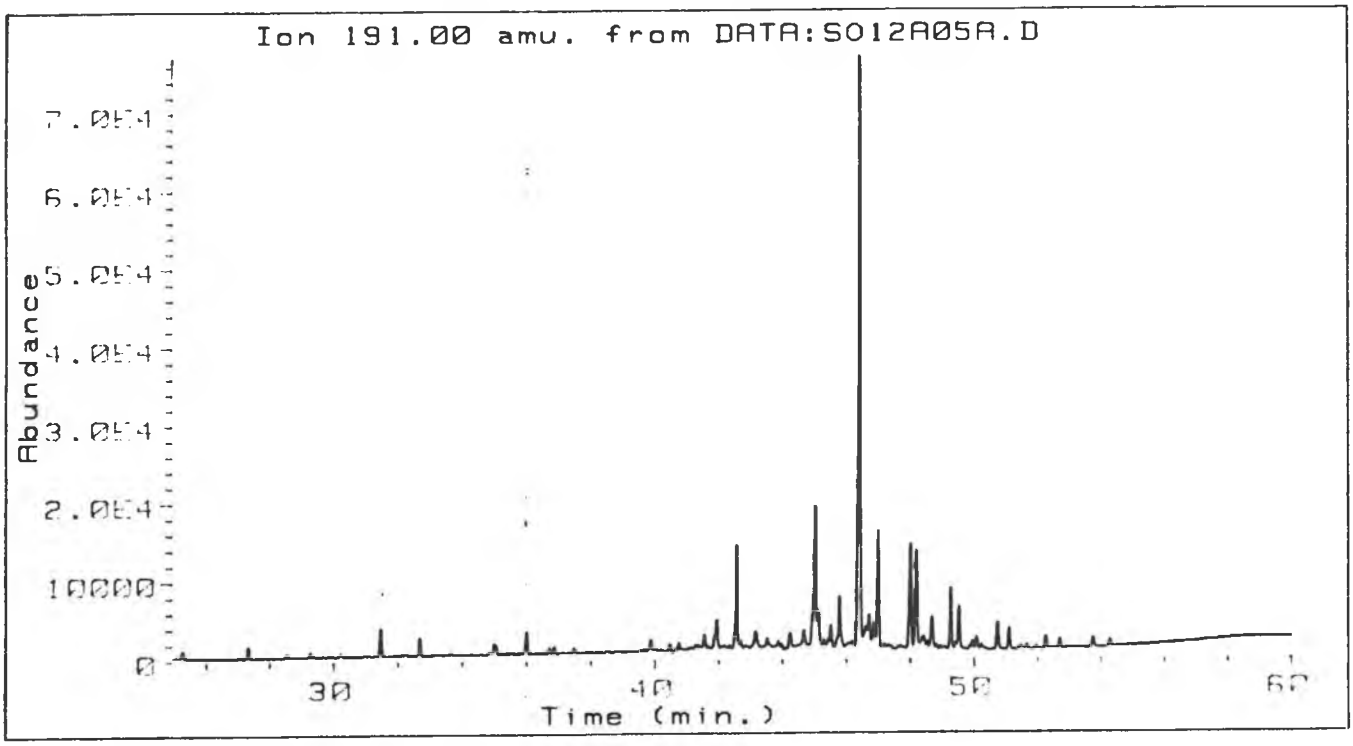
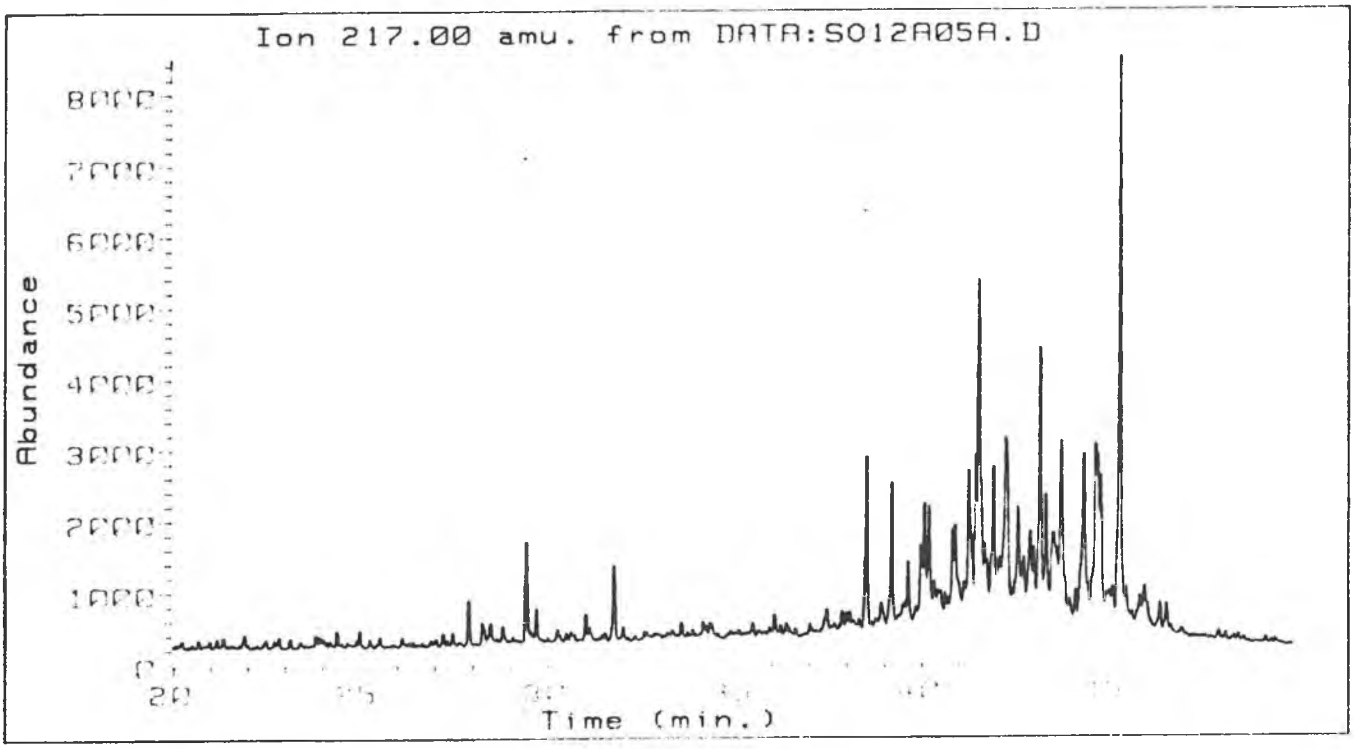
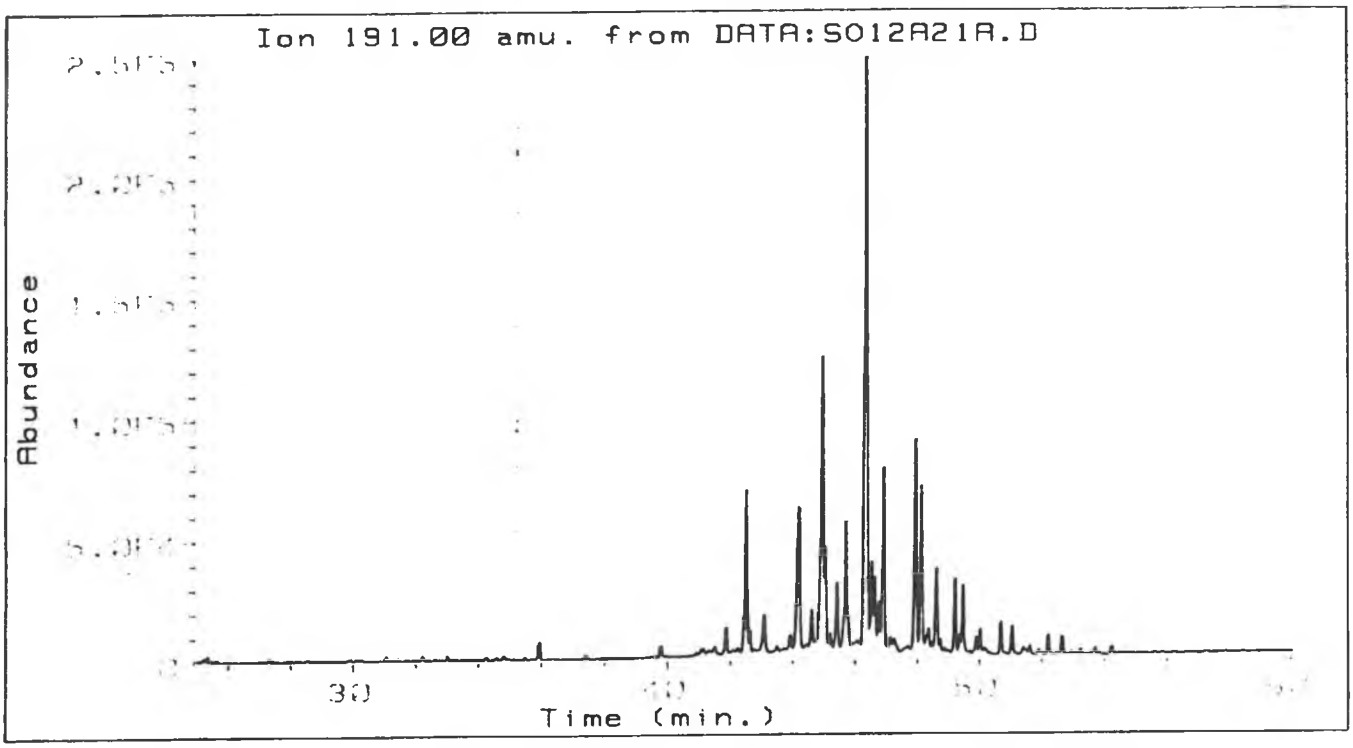
Abundance
Time (min.)
20
30
40
1000
2000
3000
4000



30/9-9 2318.50 m

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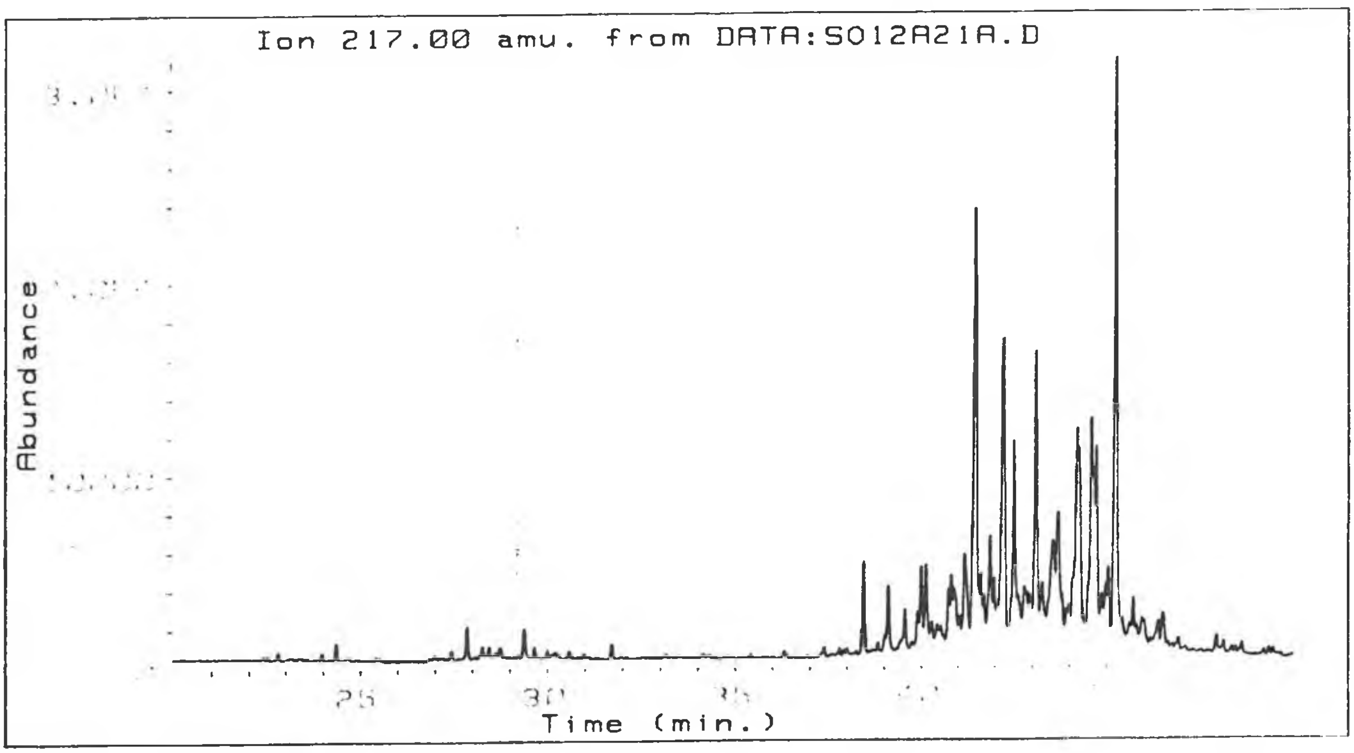
Abundance
Time (min.)
30

30/9-9 2352.5 m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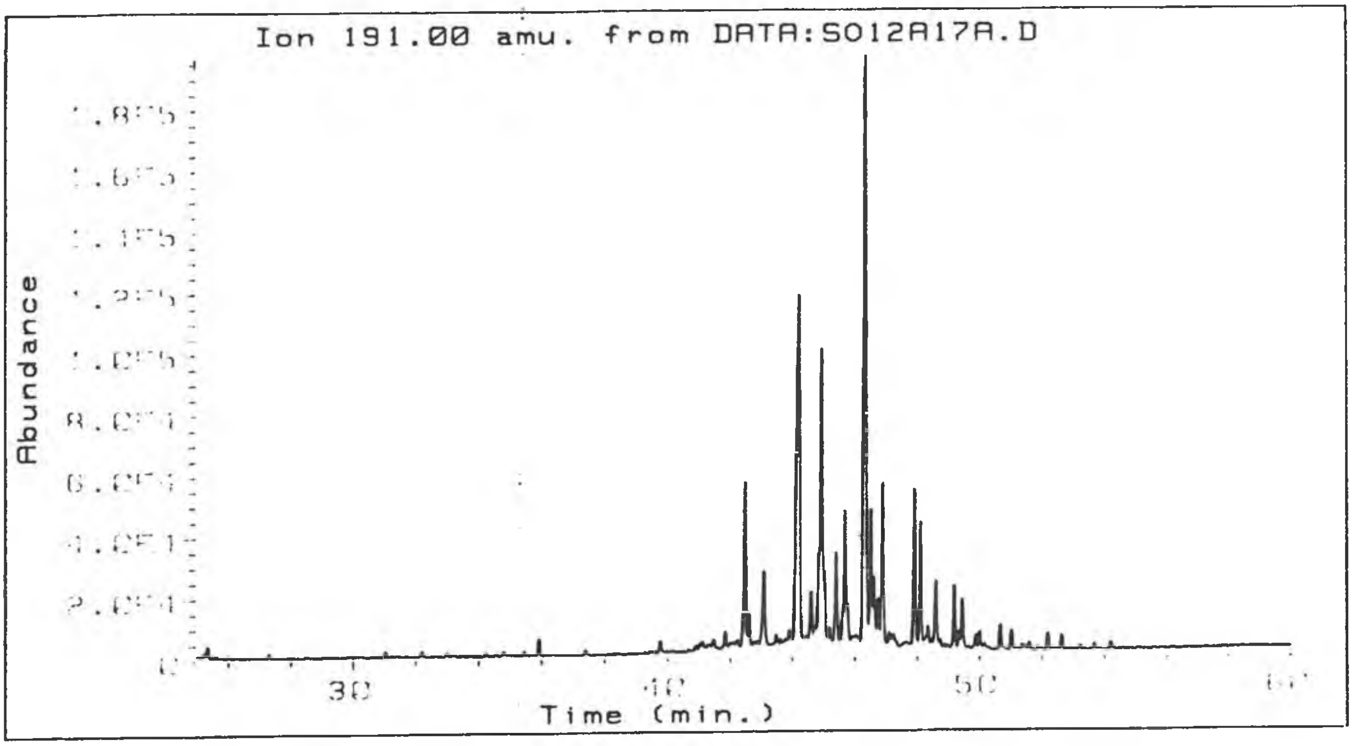
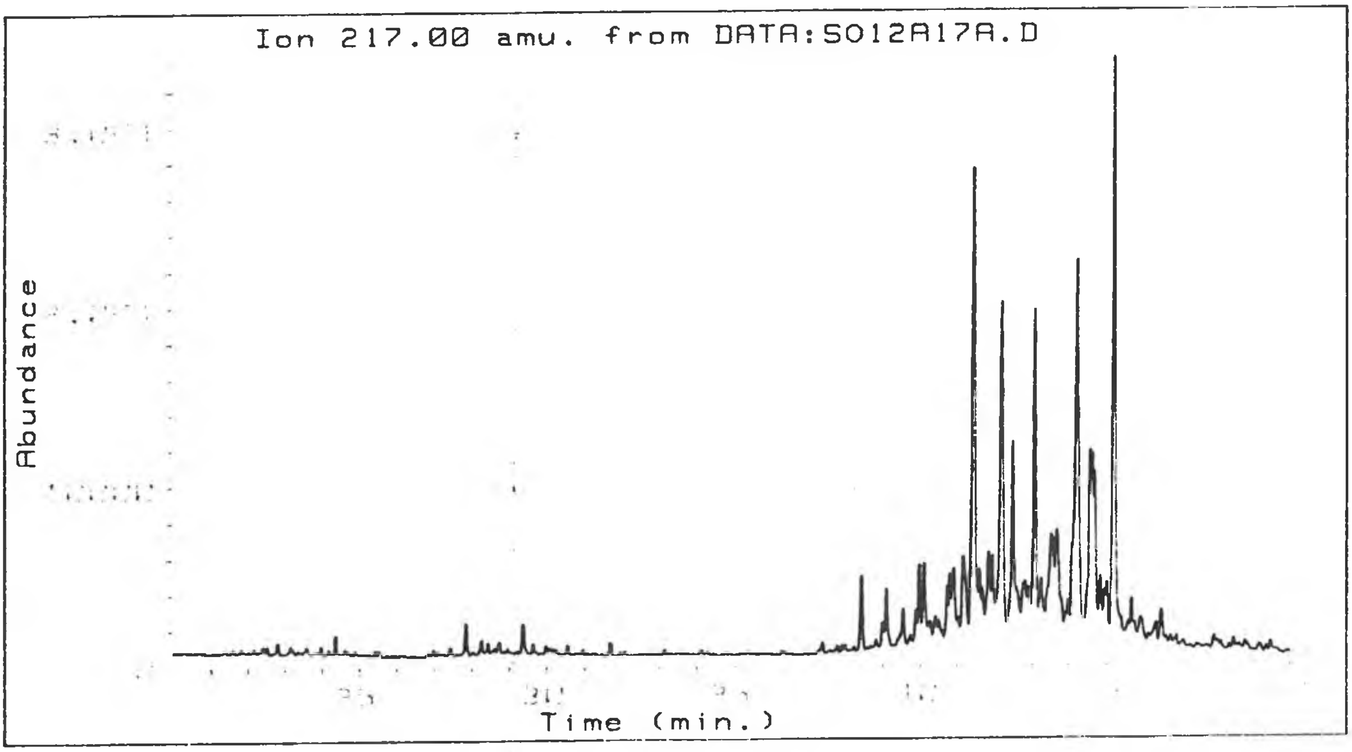
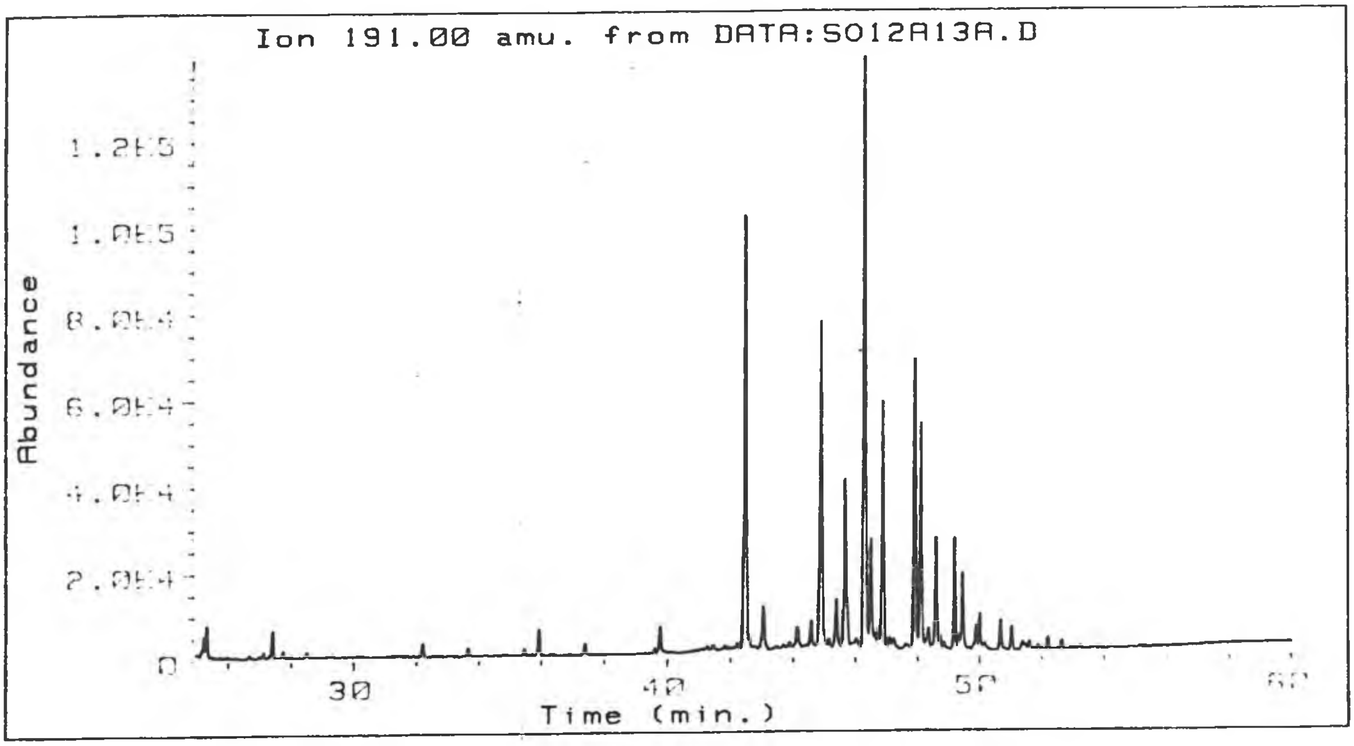
Abundance
Time (min.)



30/9-9 2355.75 m

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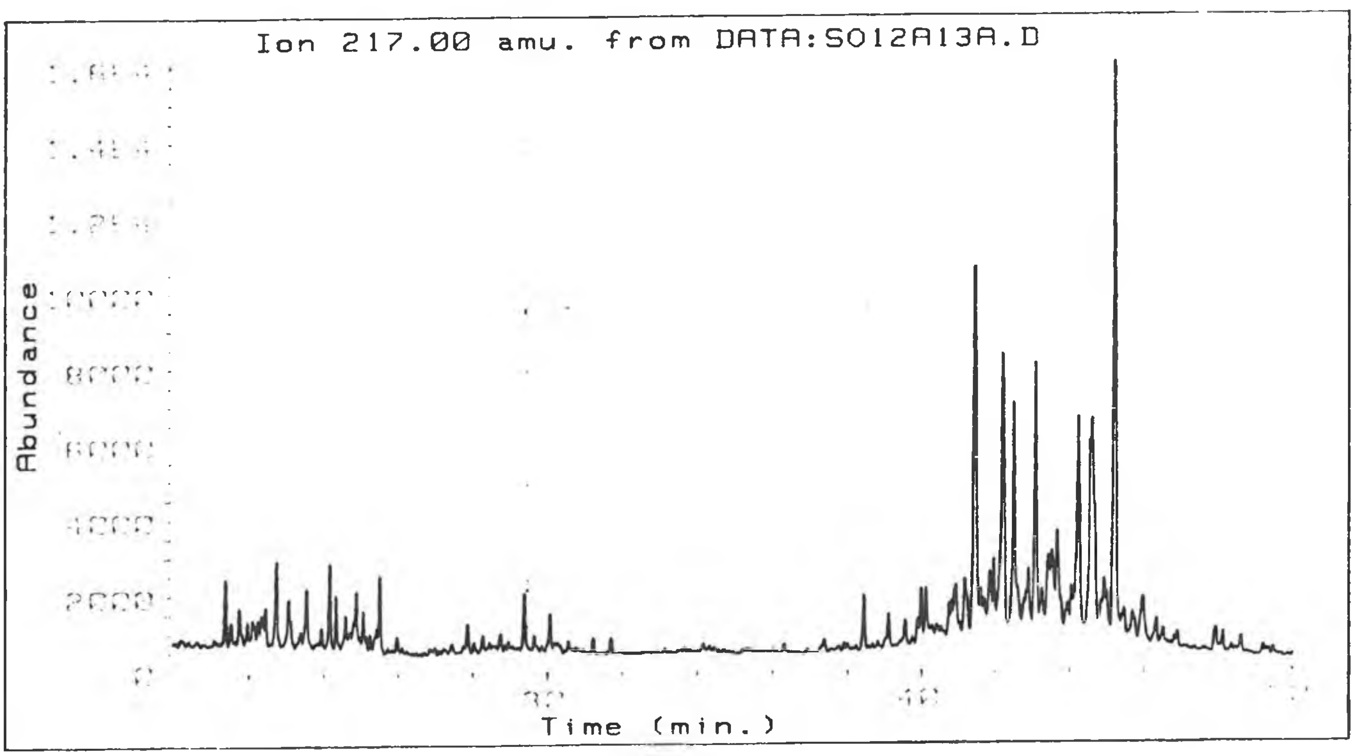
Abundance
Time (min.)

30/9-9 2356.5 m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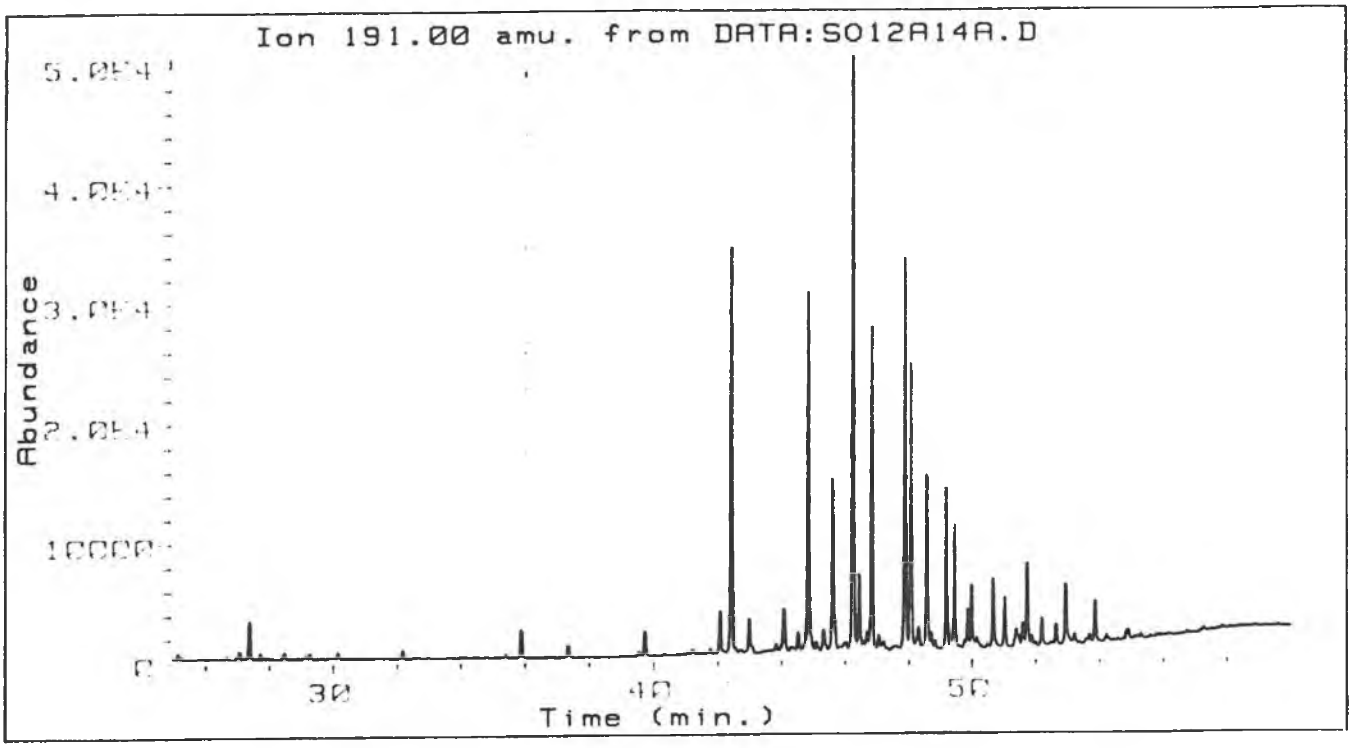
Abundance
Time (min.)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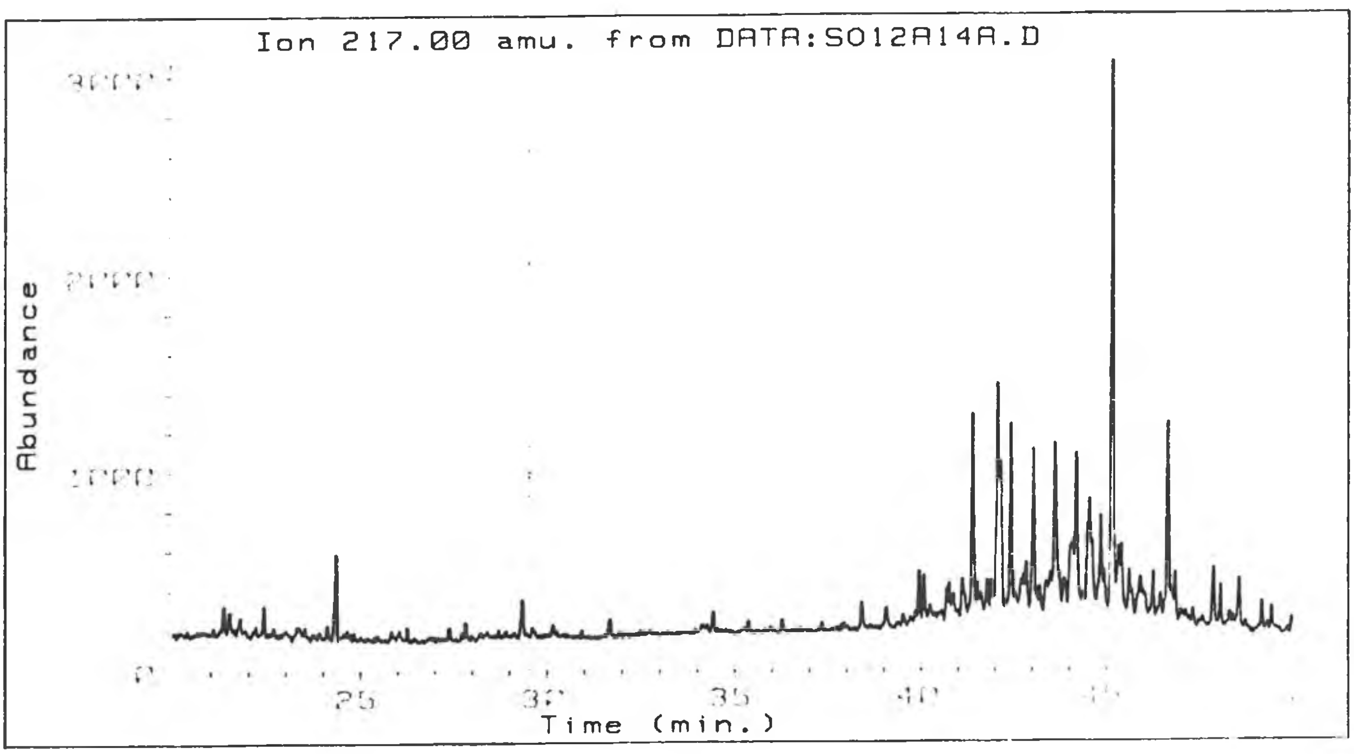
Abundance
Time (min.)

30/9-9 2408.5 m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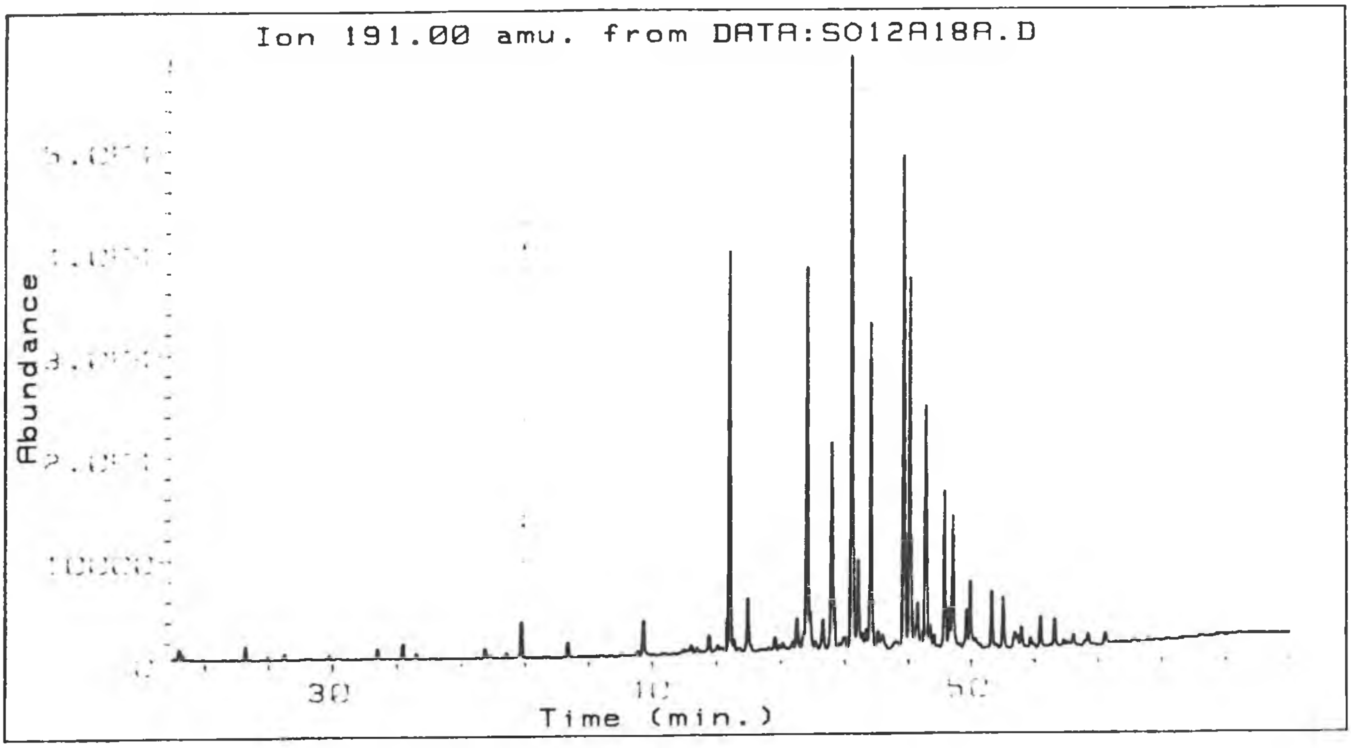
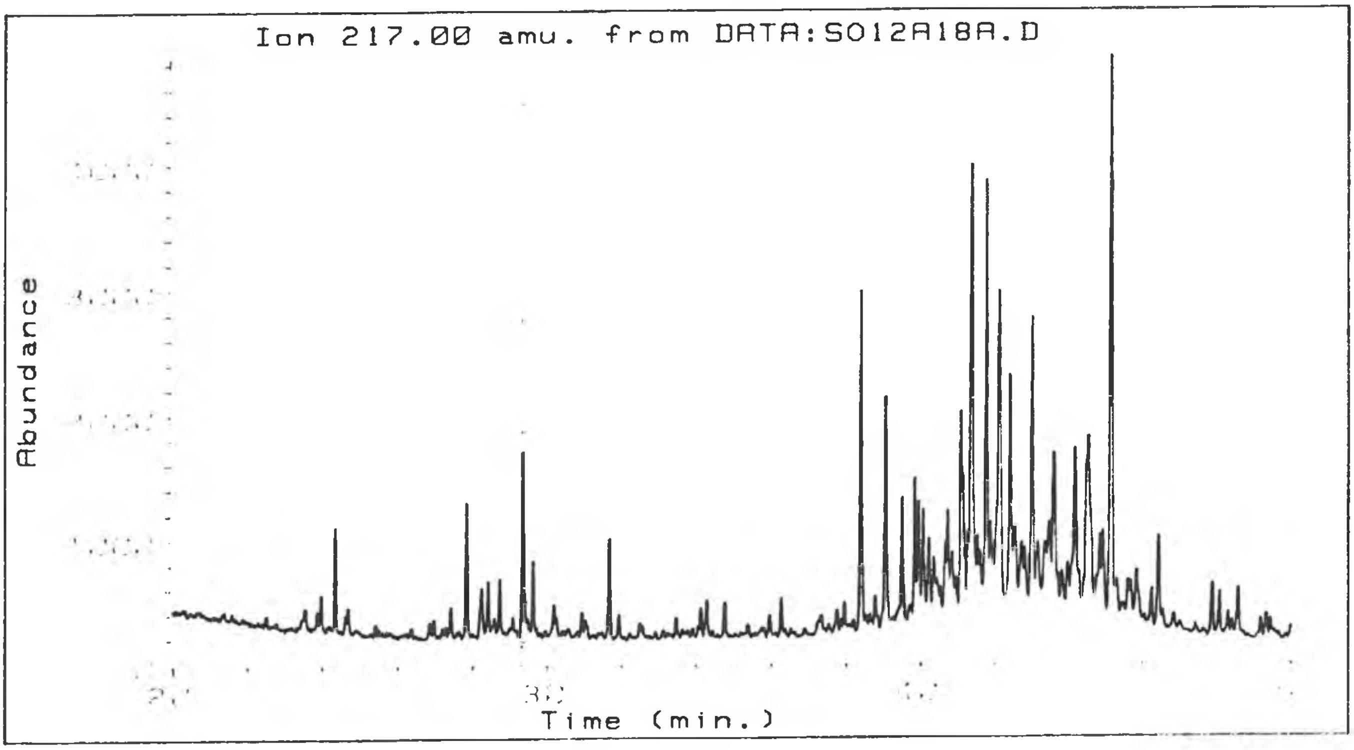
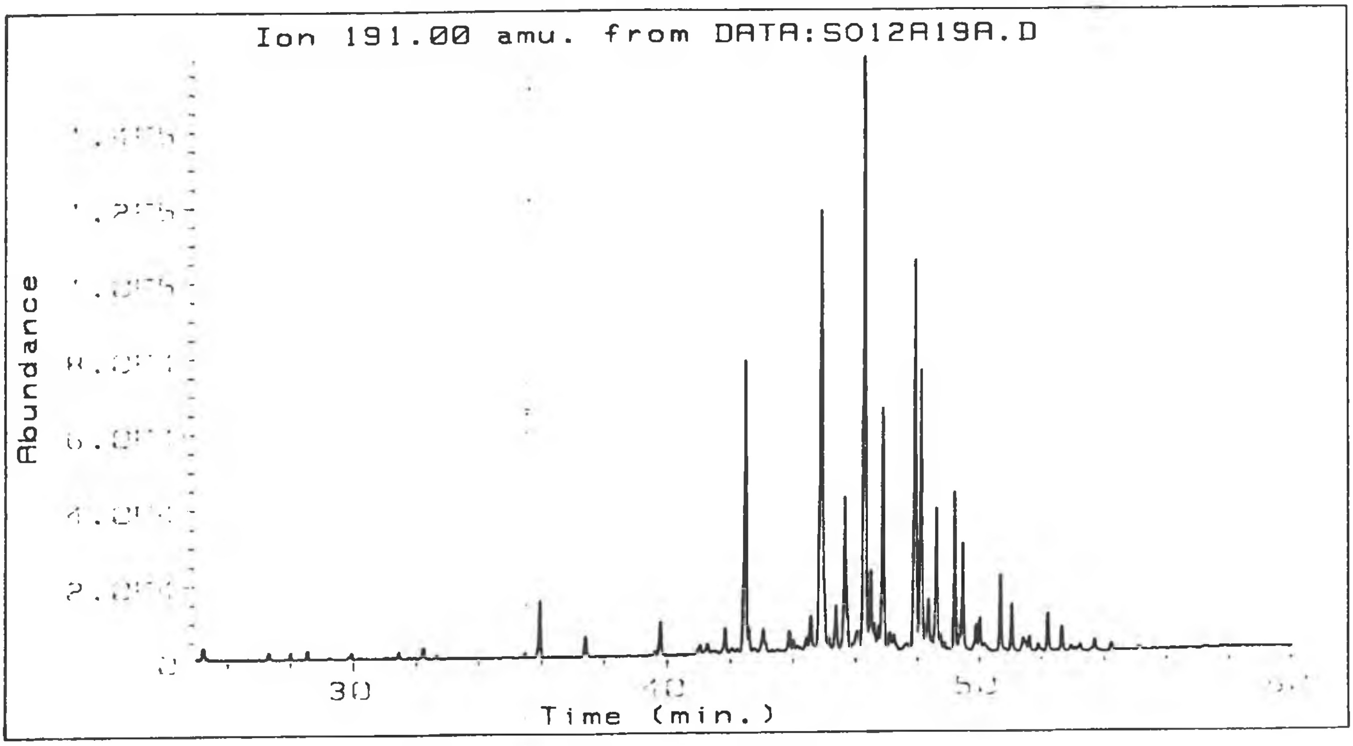
Abundance
Time (min.)



30/9-9 2424.70 m

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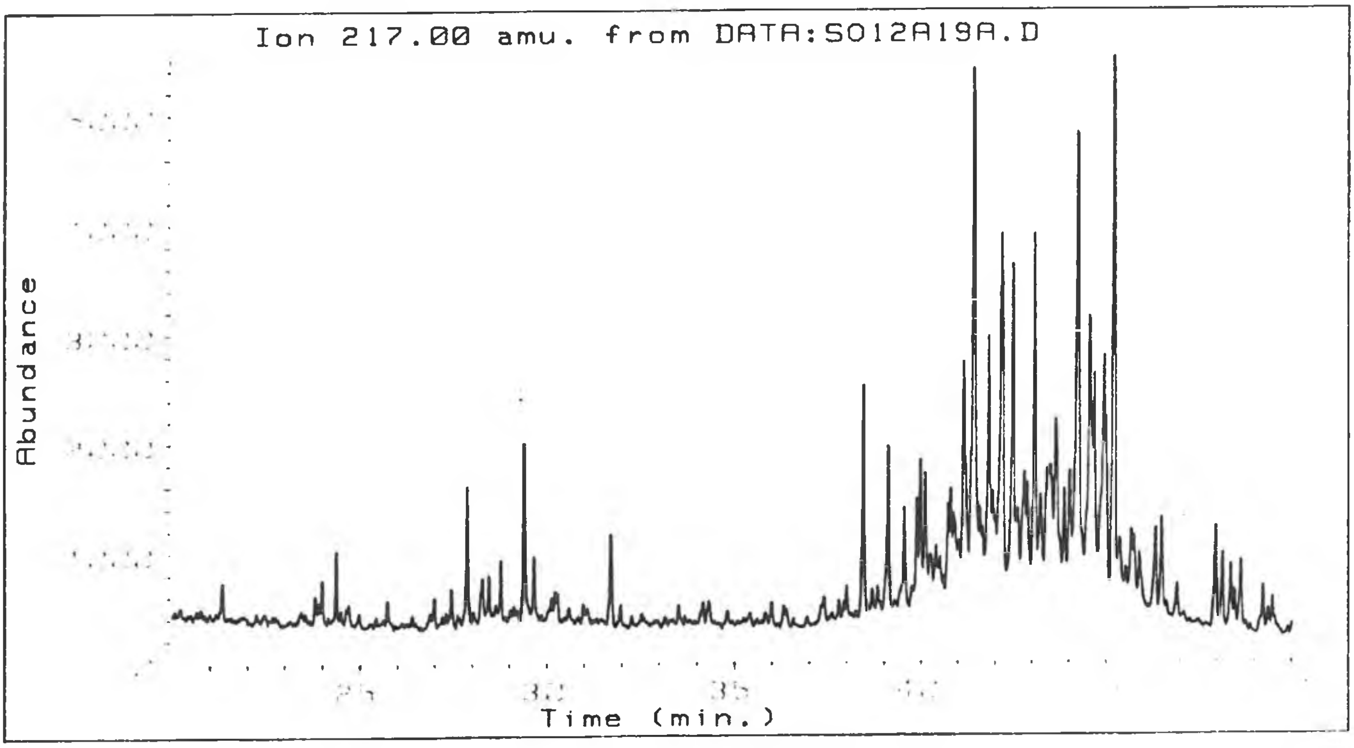
Abundance
Time (min.)
30

30/9-9 2727.0 m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Abundance
Time (min.)
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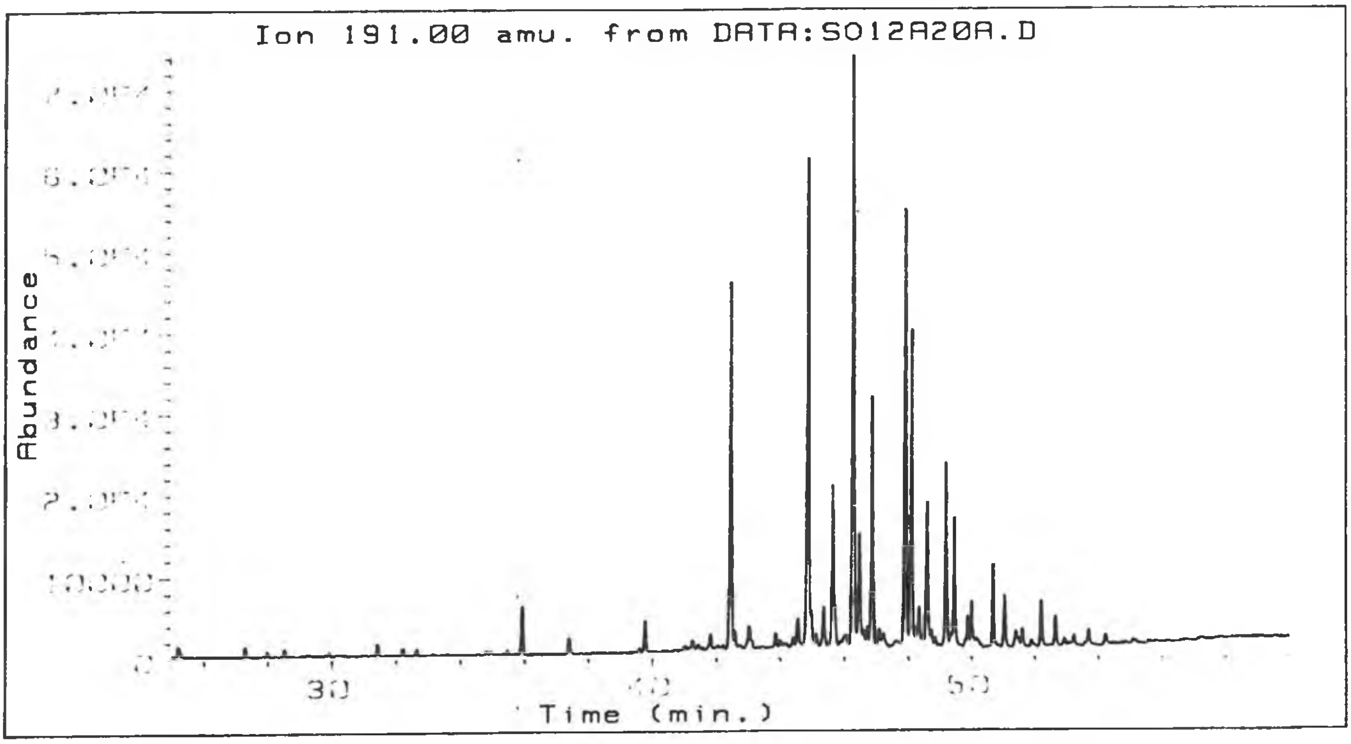
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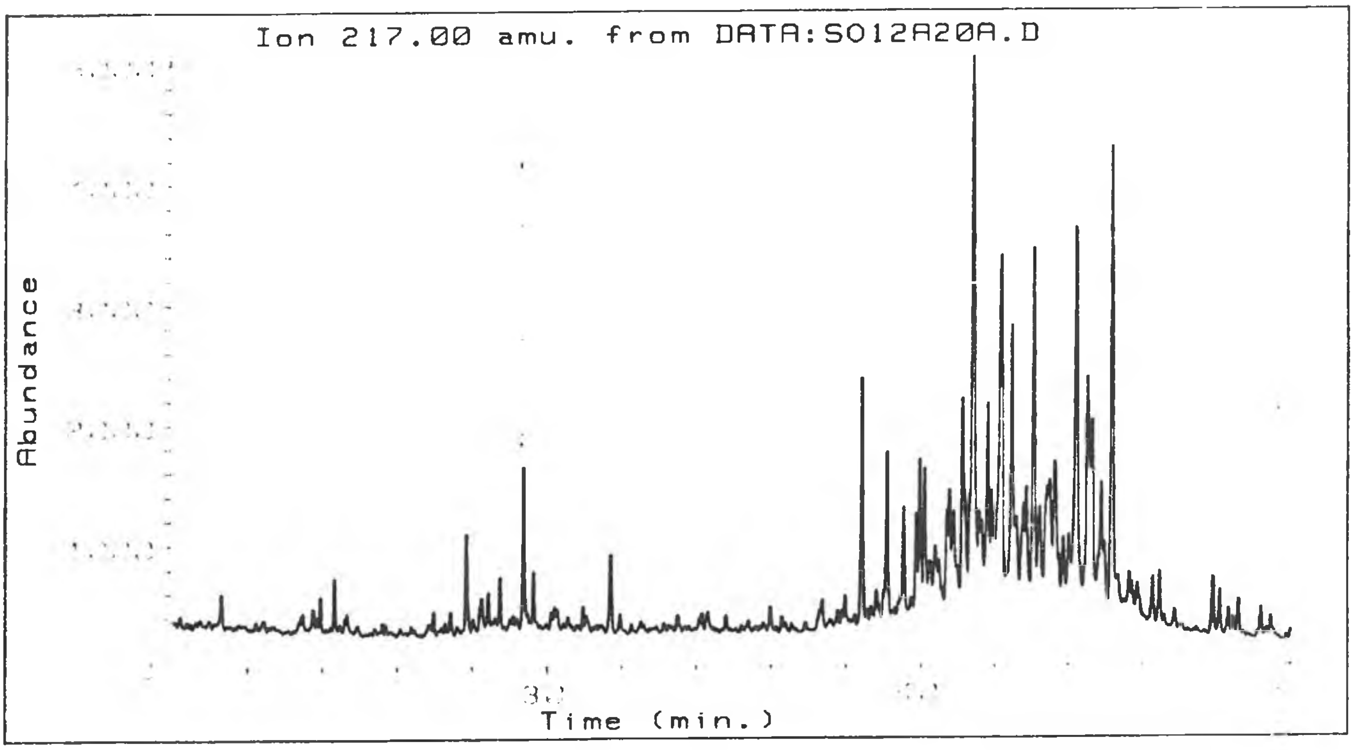
Abundance
30
50
Time (min.)

30/9-9 2778.0 m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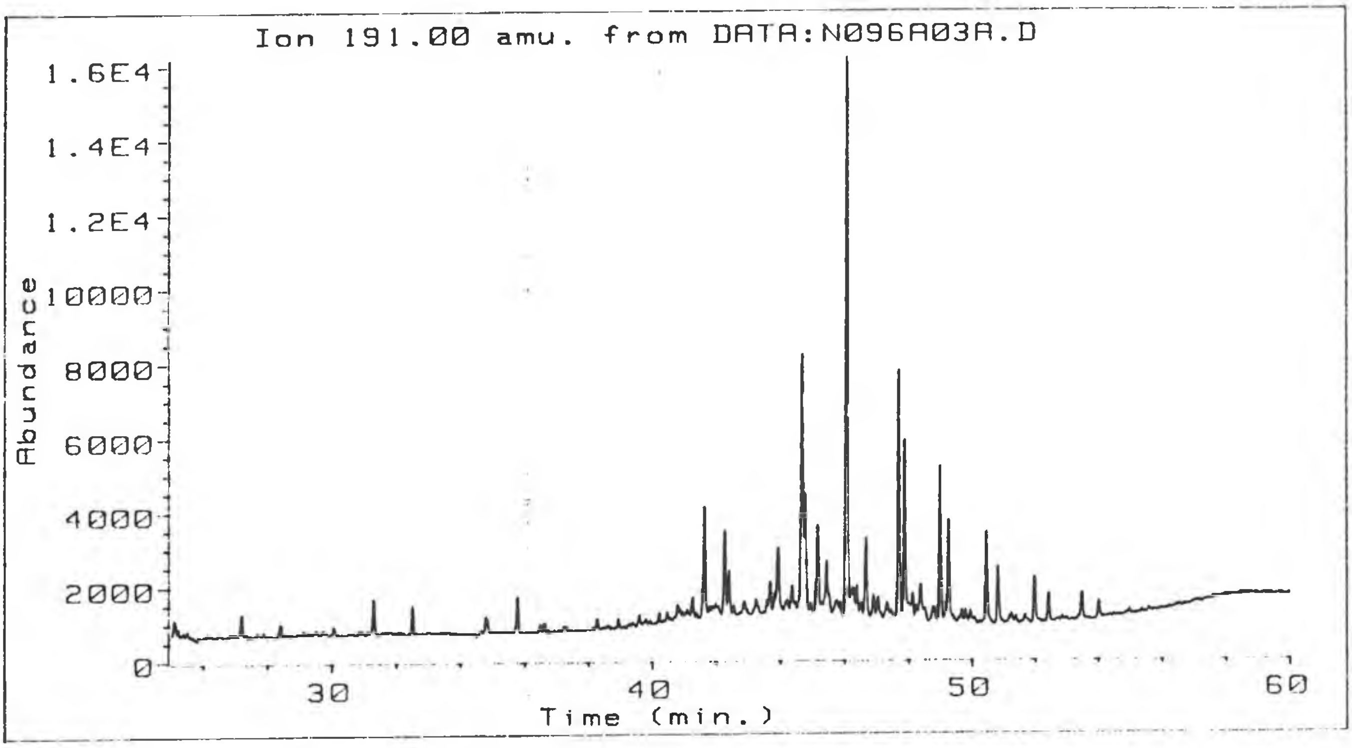
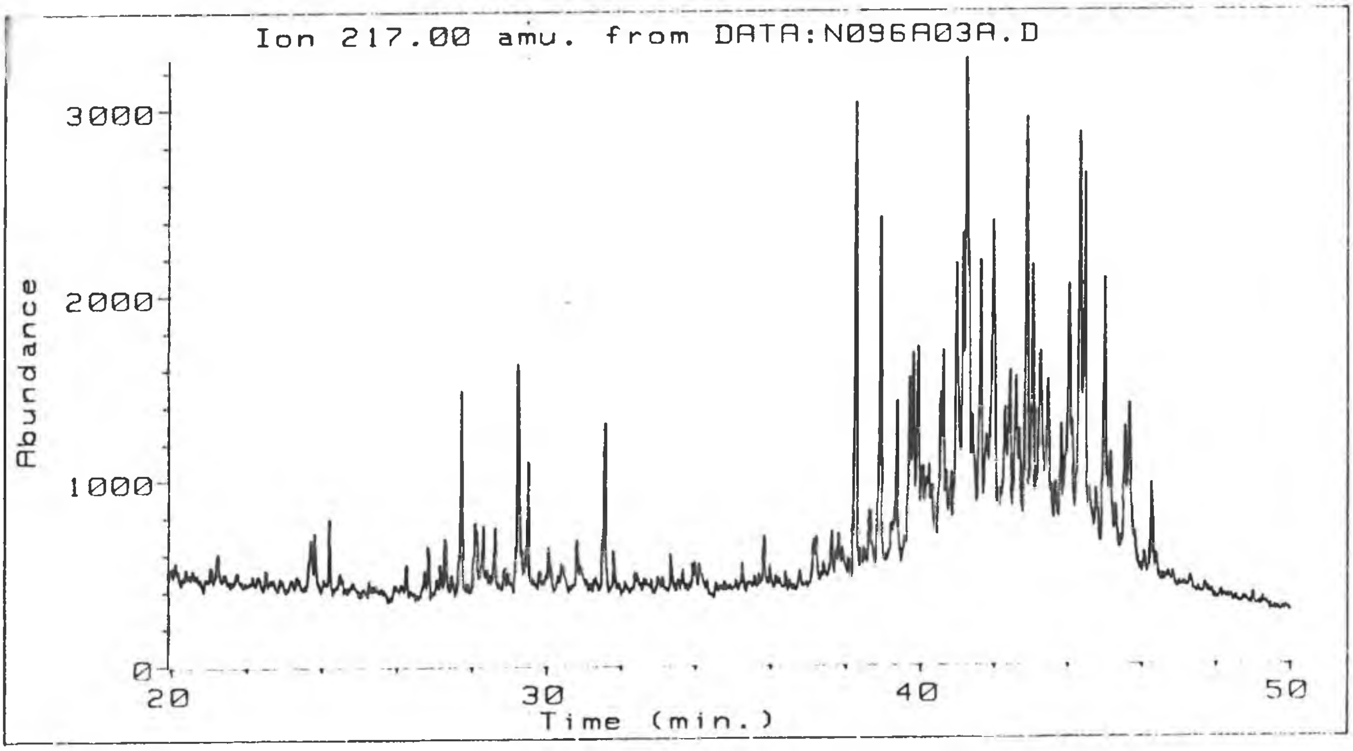
Abundance
Time (min.)


Ion 191.00 amu. from DATA:N096A03A.D
Abundance
1.6E4
1.4E4
1.2E4
10000
8000
6000
4000
2000
0
30
40
50
60
Time (min.)

30/9-9 DST 1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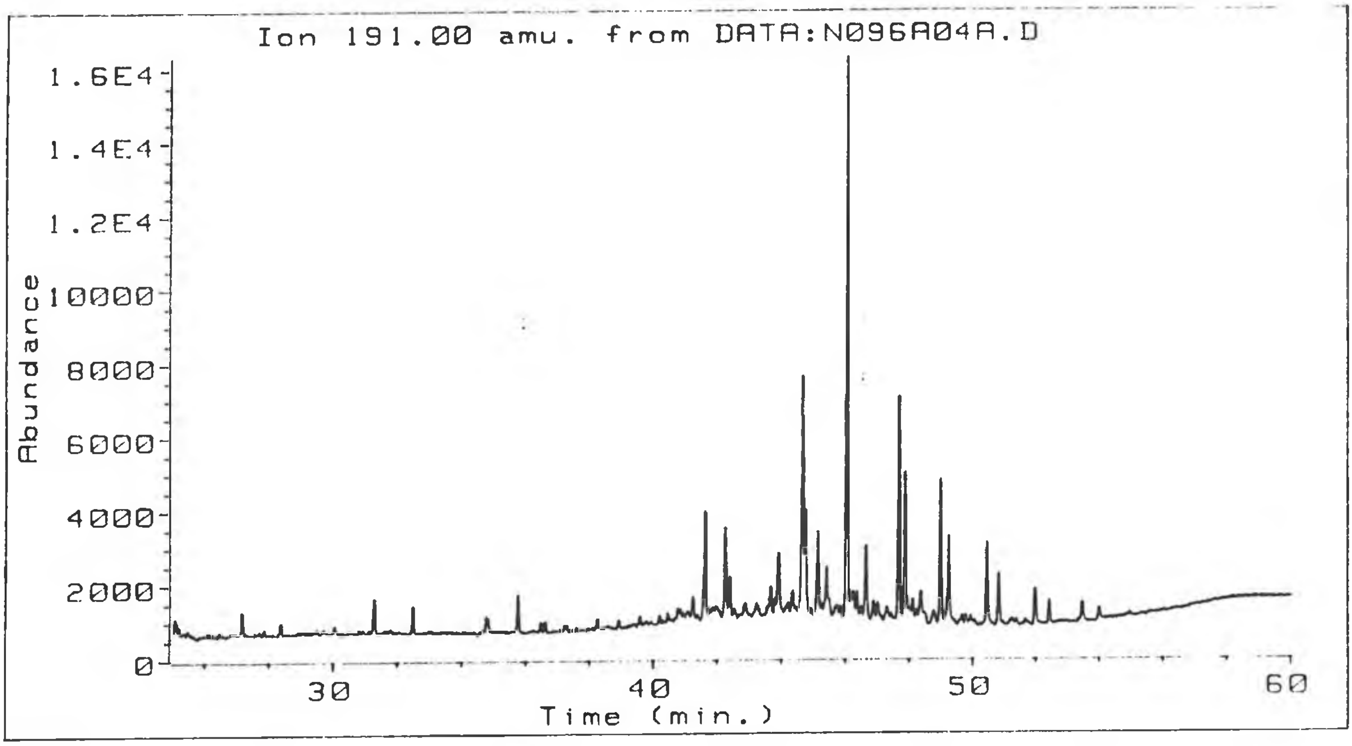
Abundance
3000
2000
1000
0
20
30
40
50
Time (min.)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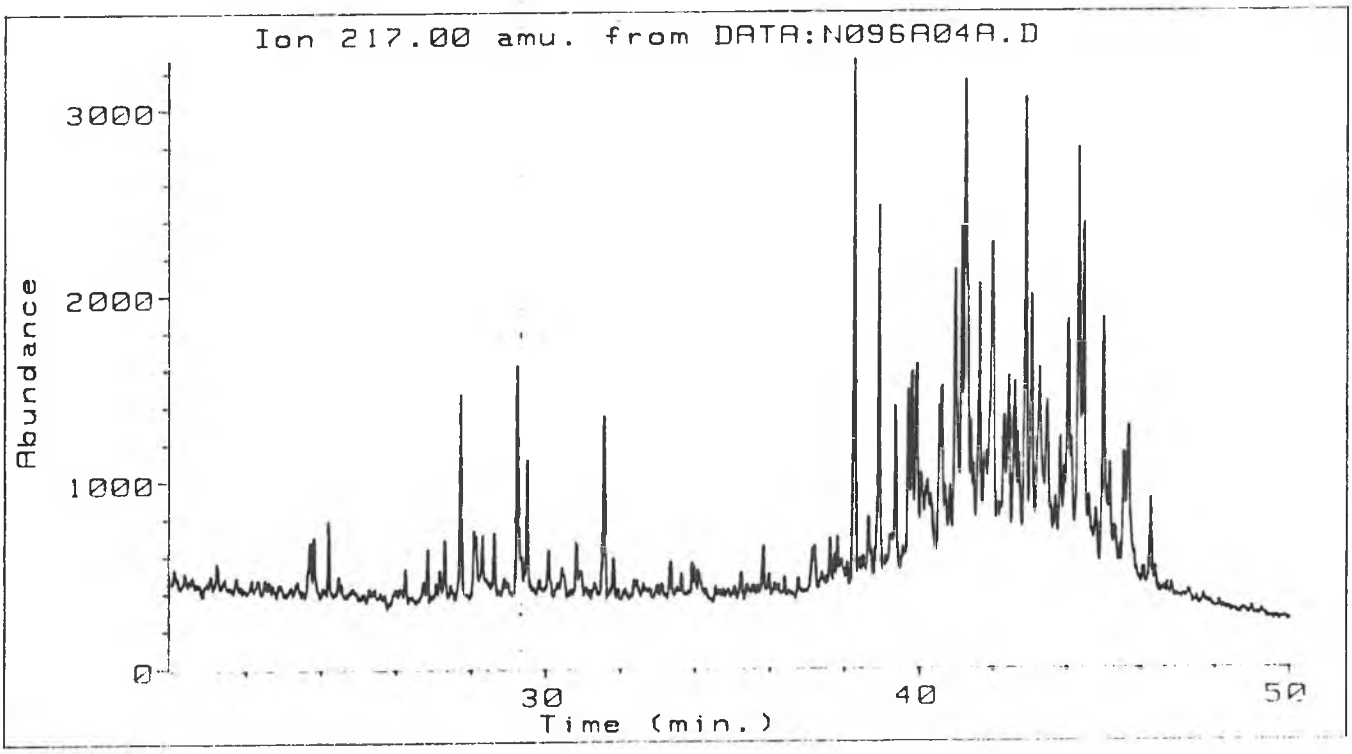
1.6E4
1.4E4
1.2E4
10000
8000
6000
4000
2000
0
Abundance
30
40
50
60
Time (min.)

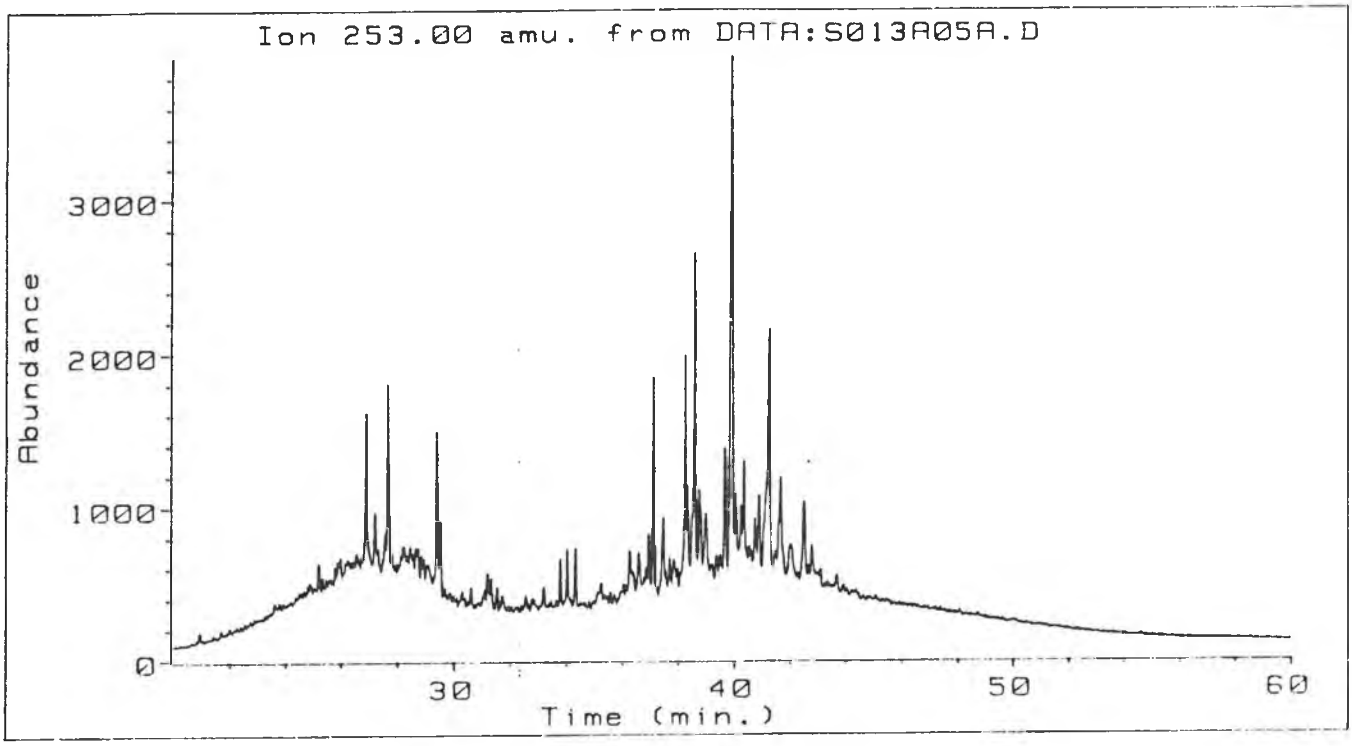
30/9-9 DST 2


Ion 217.00 amu. from DATA:N096A04A.D
3000
2000
1000
0
Abundance
30
40
50
Time (min.)

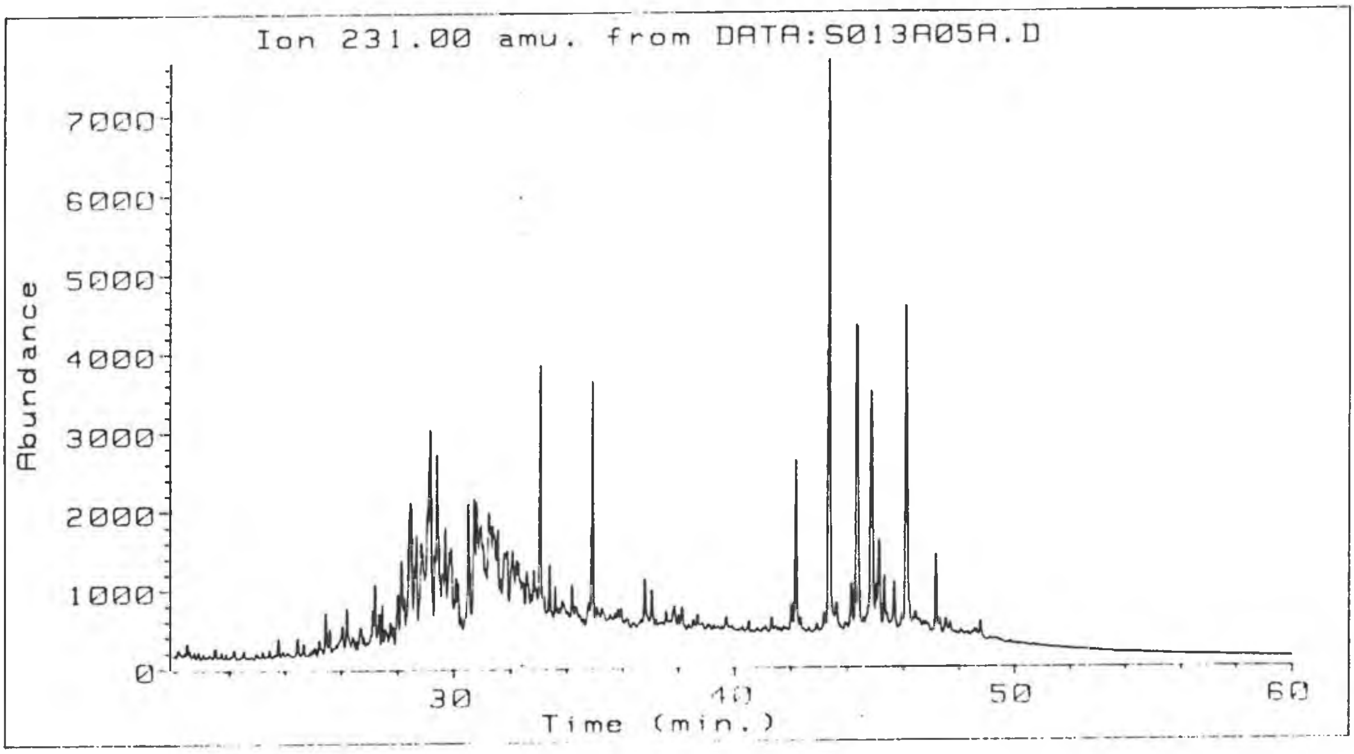
APPENDIX V

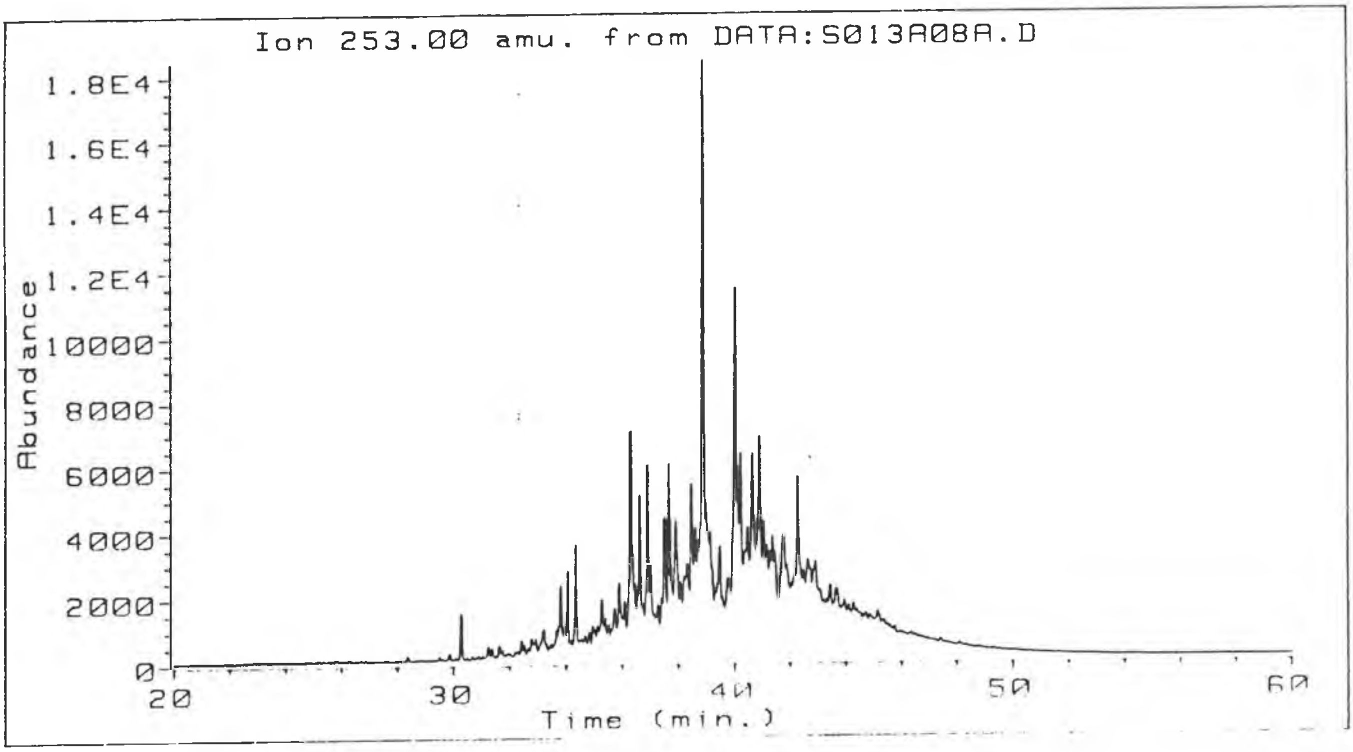
Fragmentograms of Triaromatic Steranes, (Ion 231 m/z).

Fragmentograms of Monoaromatic Steranes, (Ion 253 m/z).

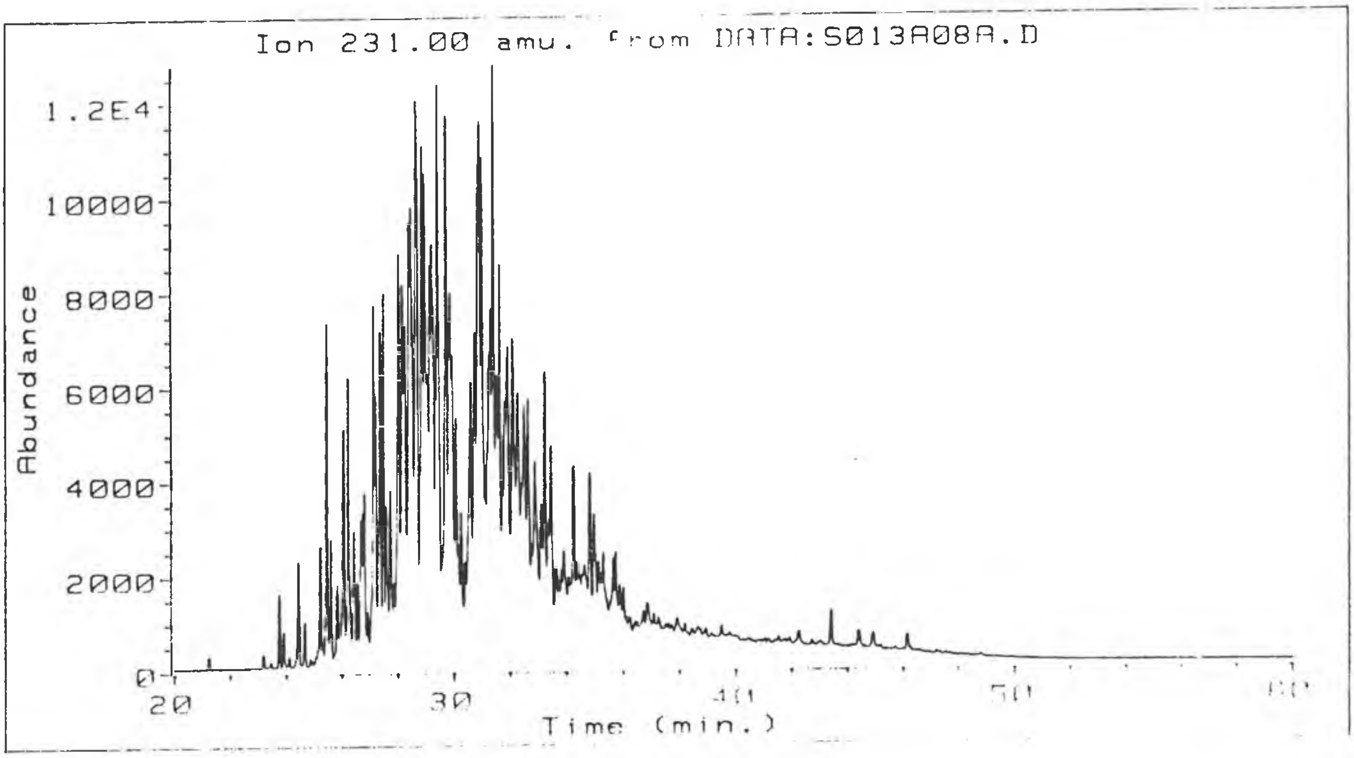


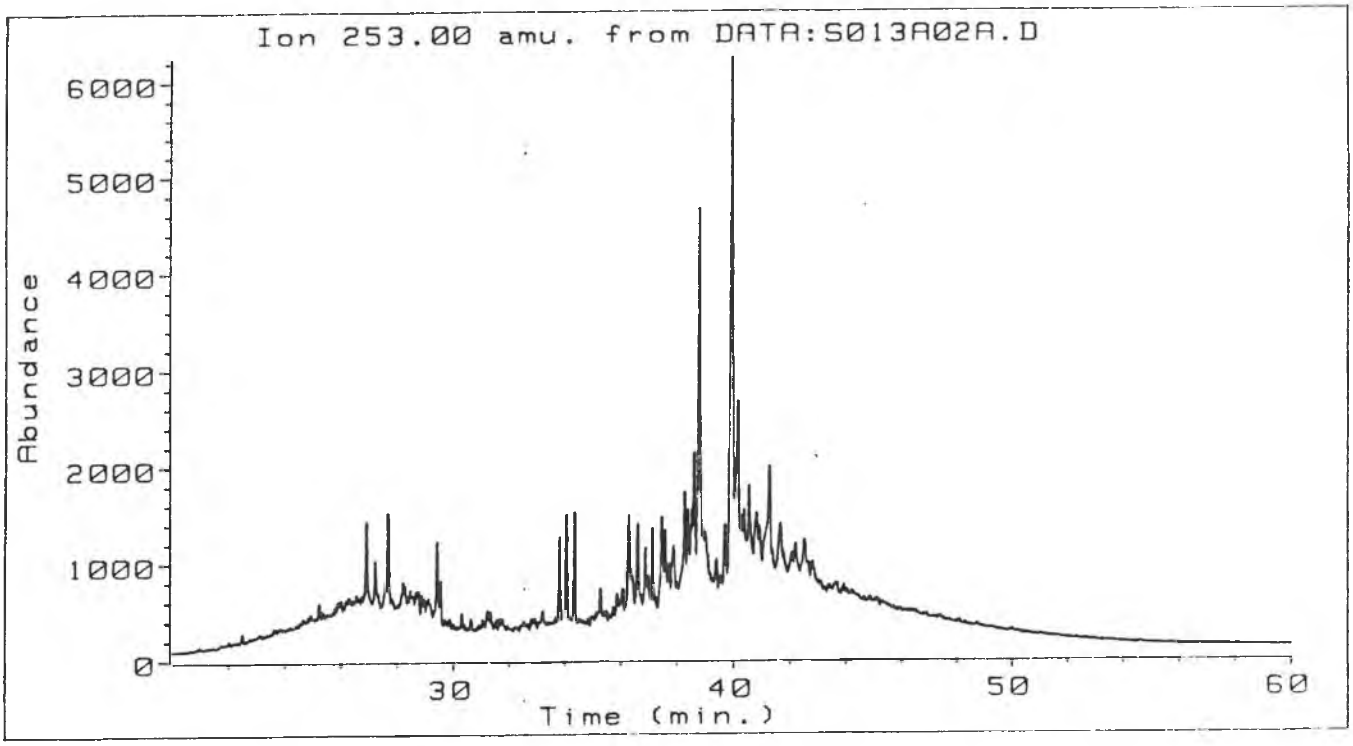
30/9-9 2291.10 m



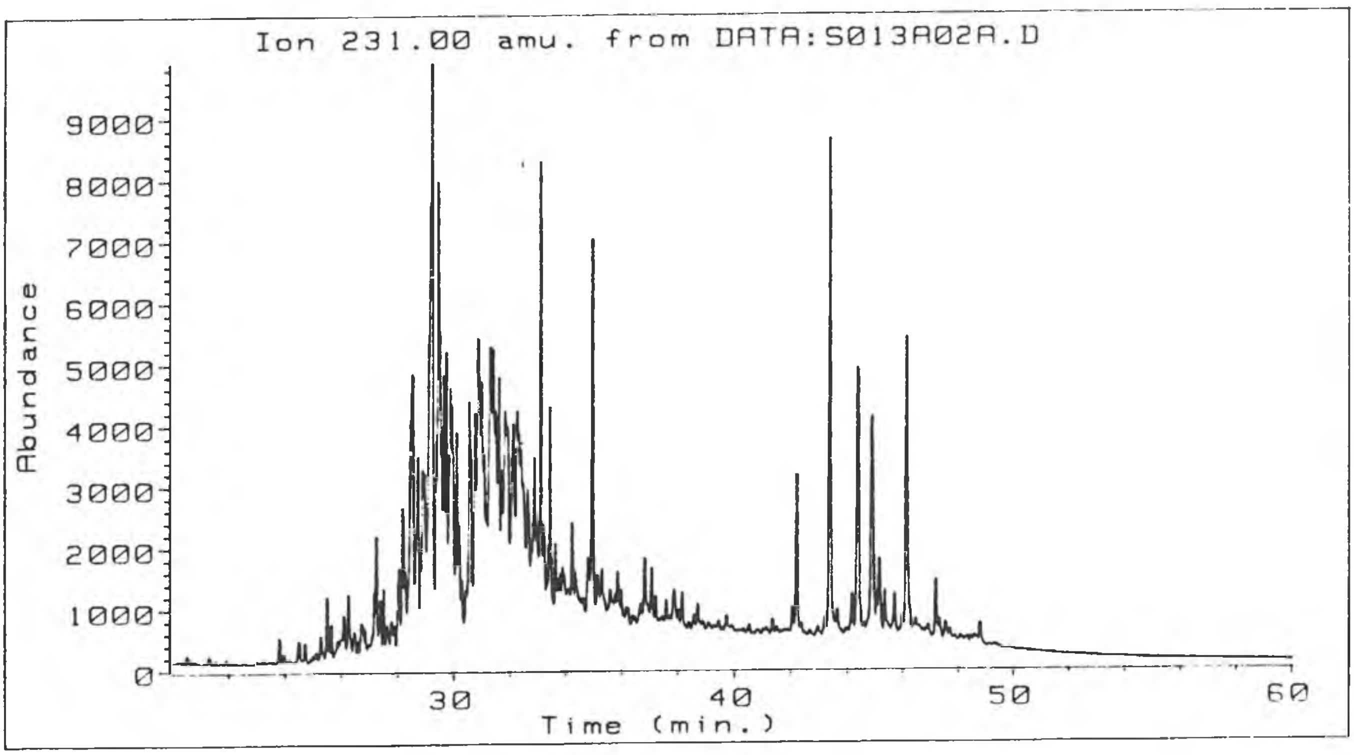


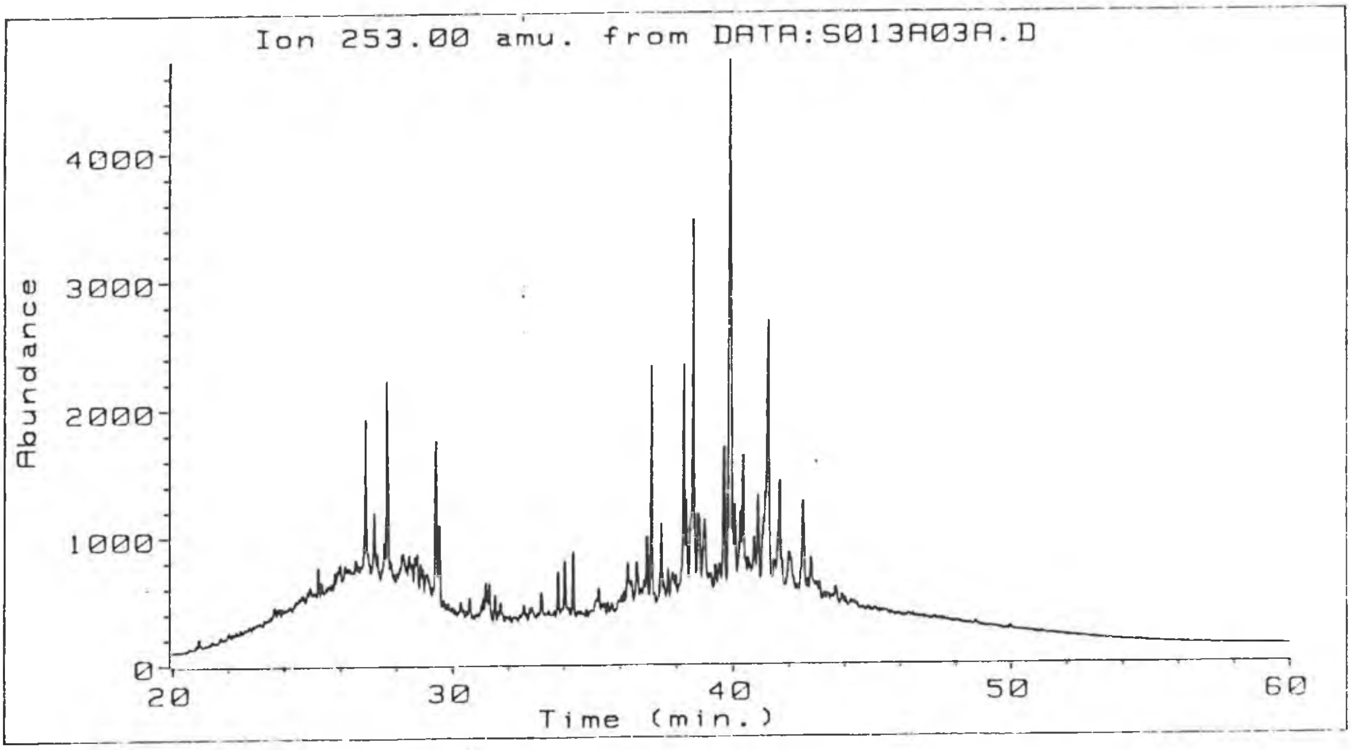
30/9-9 2291.75 m



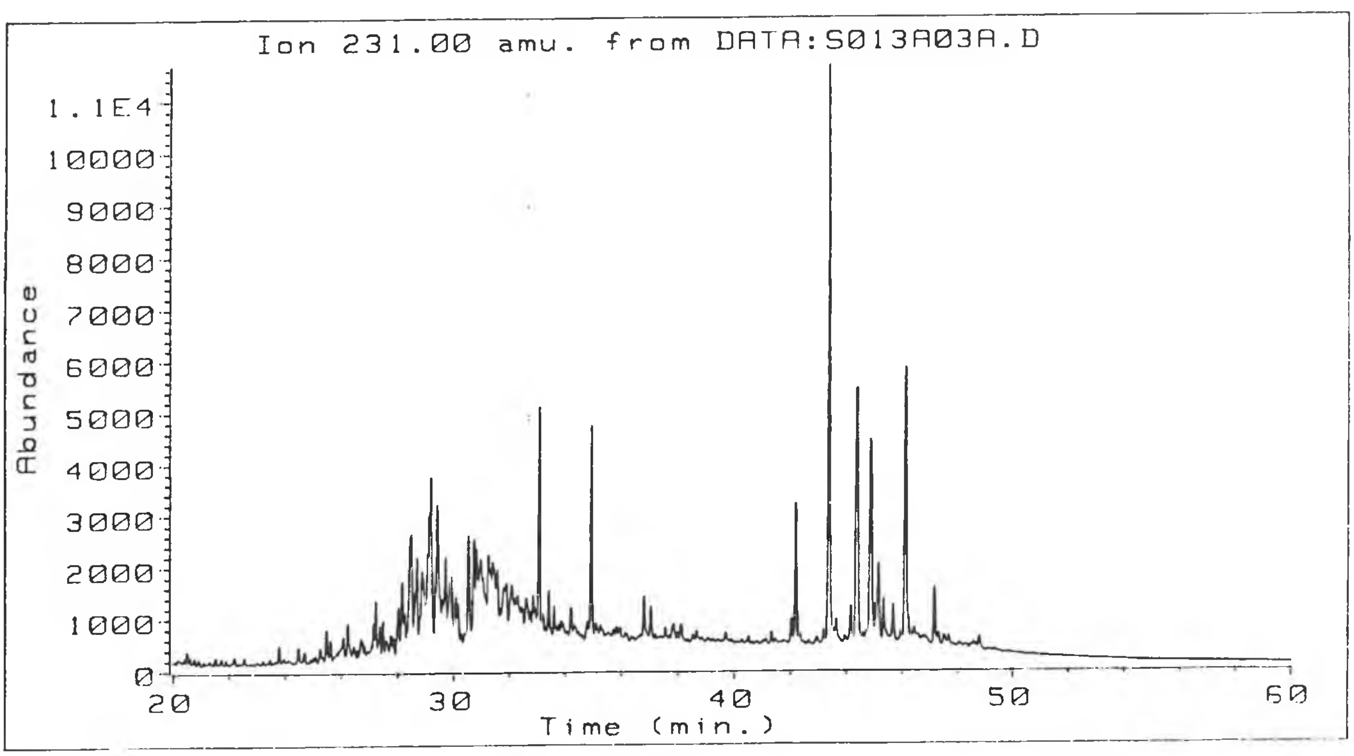


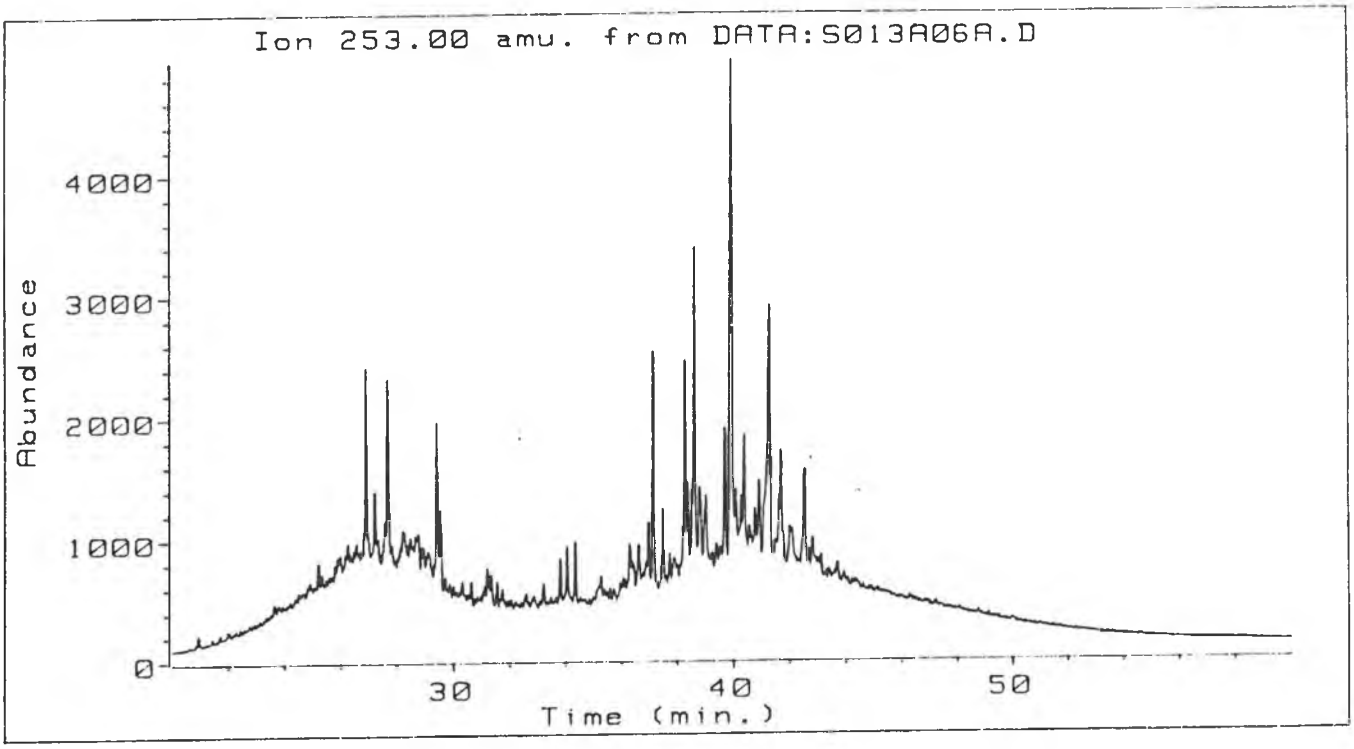
30/9-9 2292.50 m



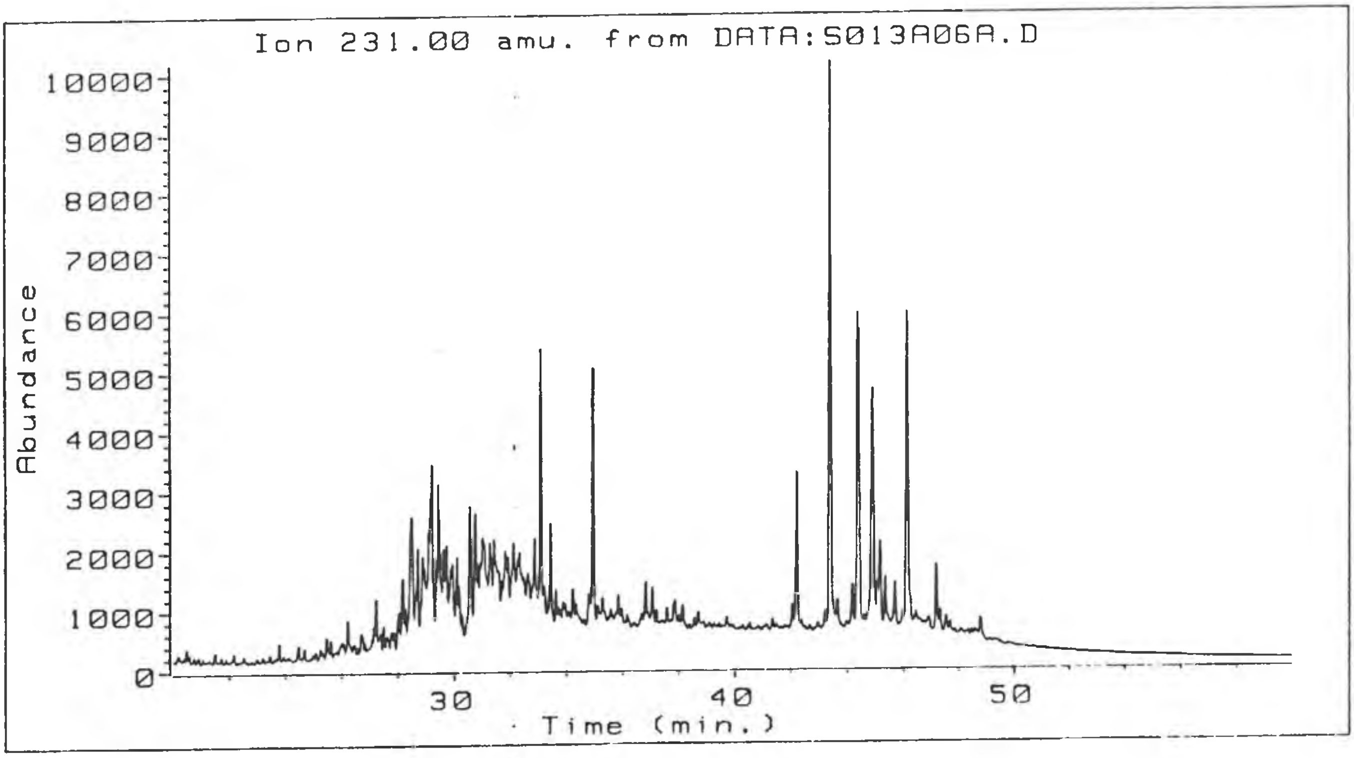

Ion 253.00 amu. from DATA:S013A03A.D
Abundance
4000
3000
2000
1000
0
20
30
40
50
60
Time (min.)

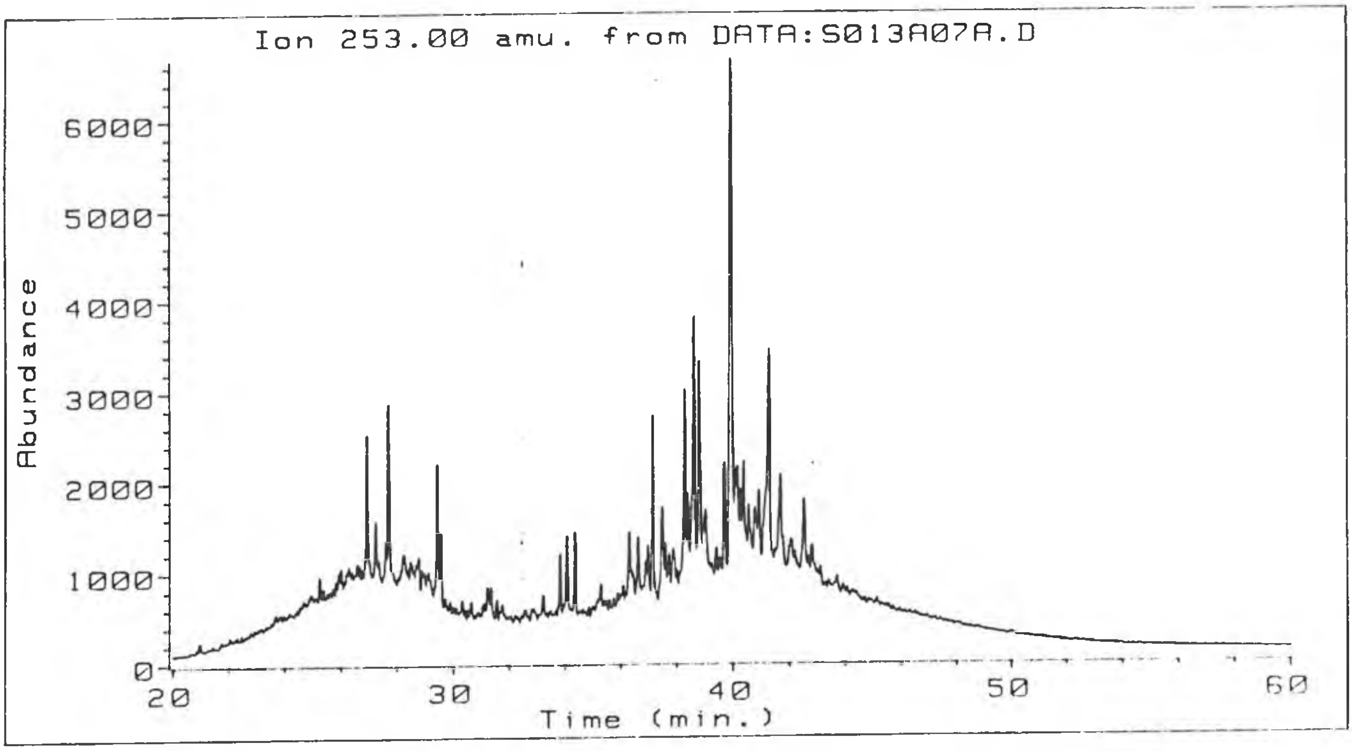
30/9-9 2293.0 m


Ion 231.00 amu. from DATA:S013A03A.D
Abundance
1.1E4
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
20
30
40
50
60
Time (min.)

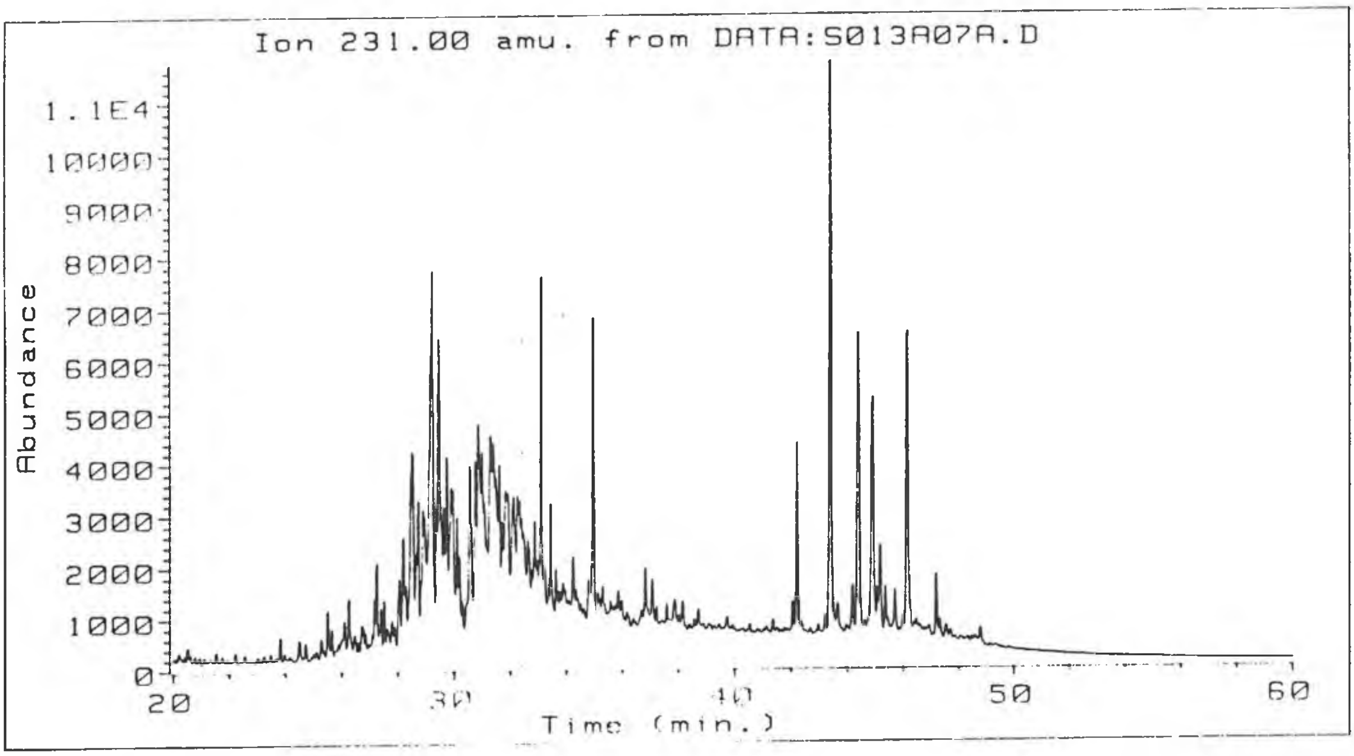


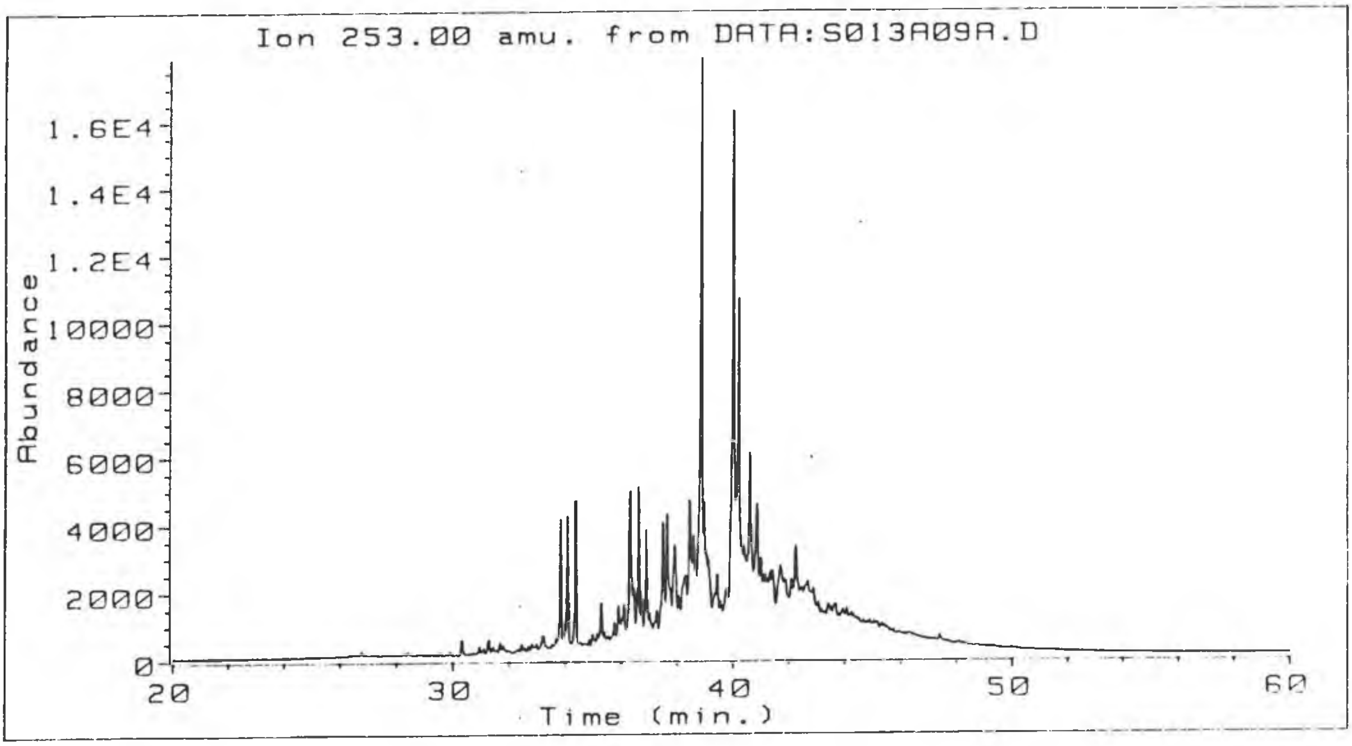
30/9-9 2393.02 m



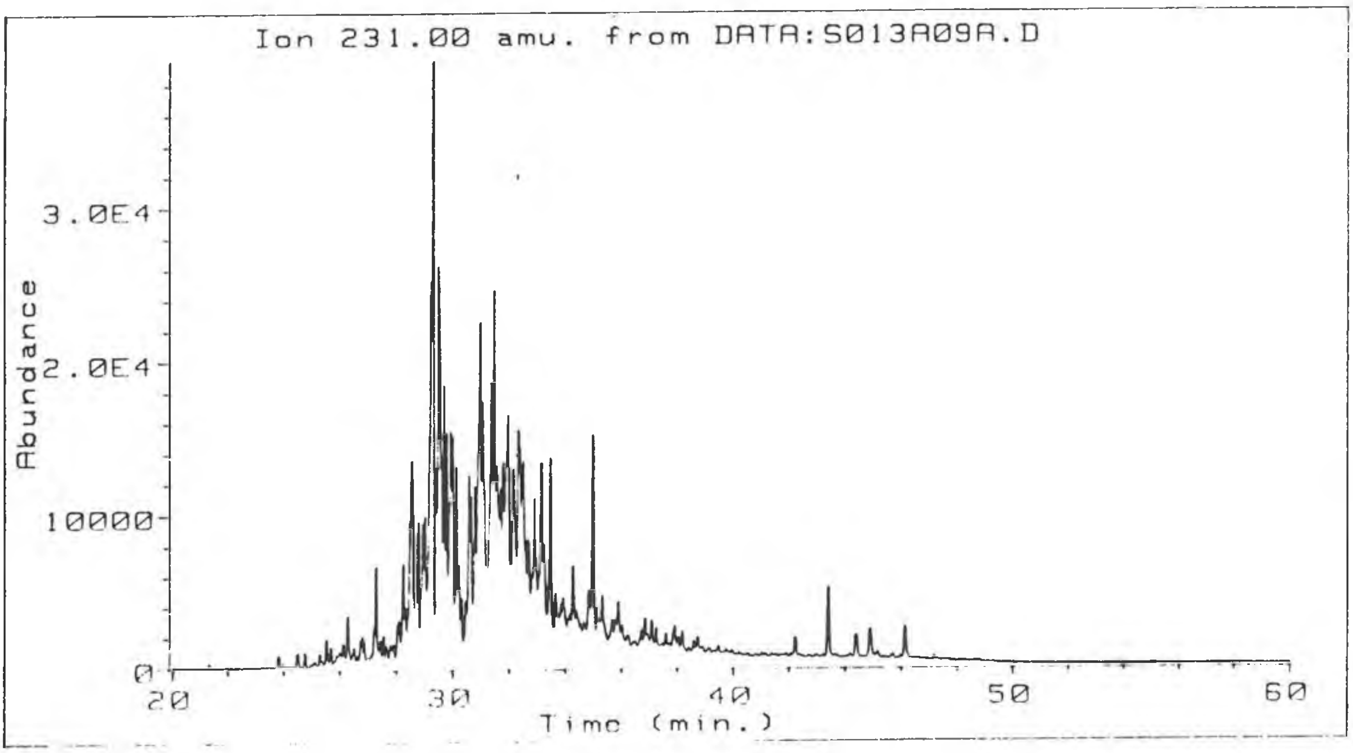


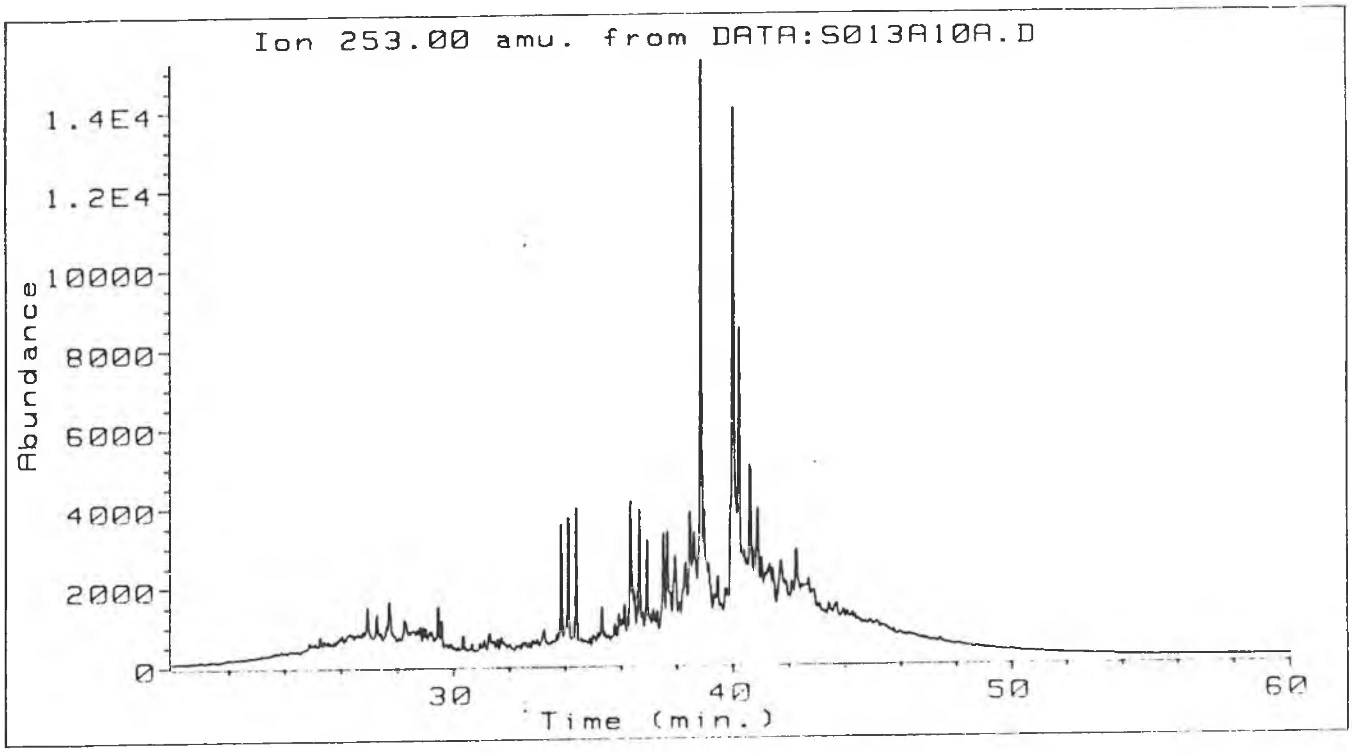
30/9-9 2293.70 m



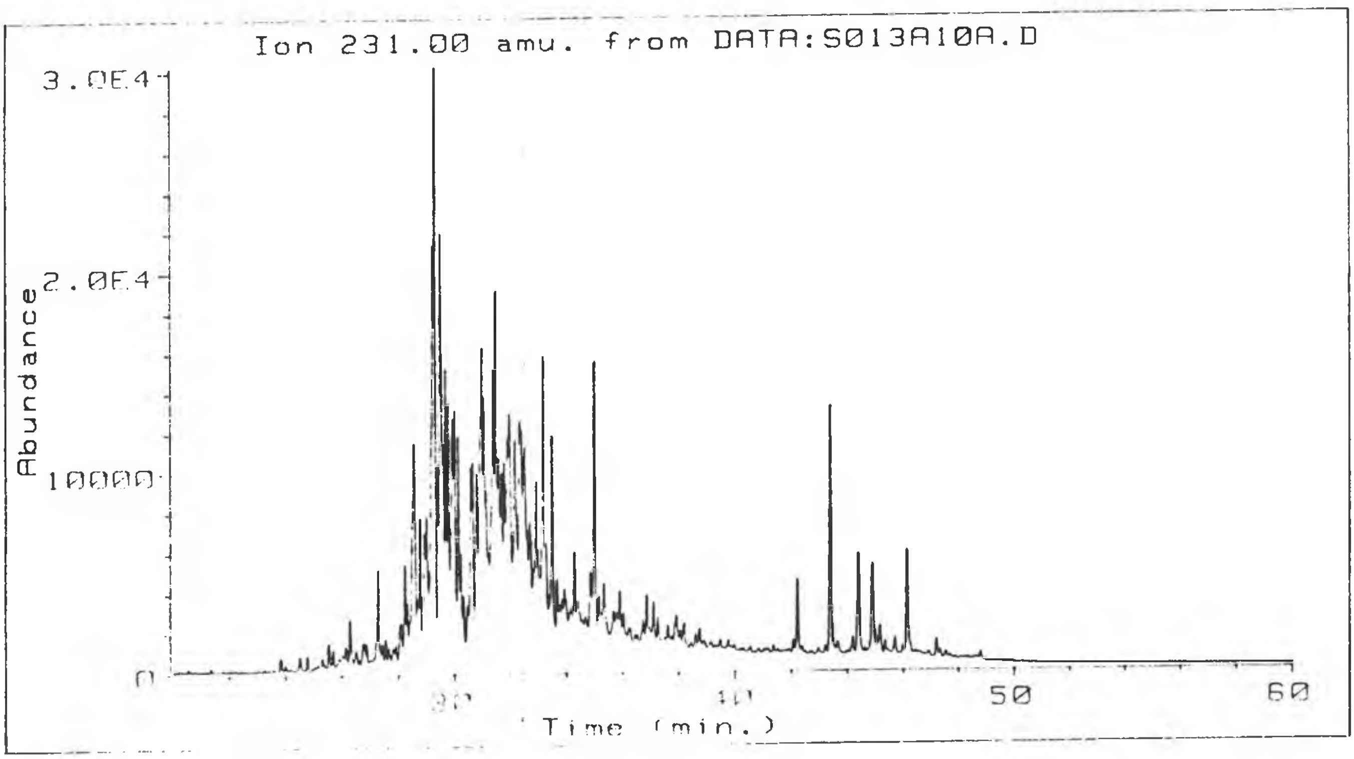


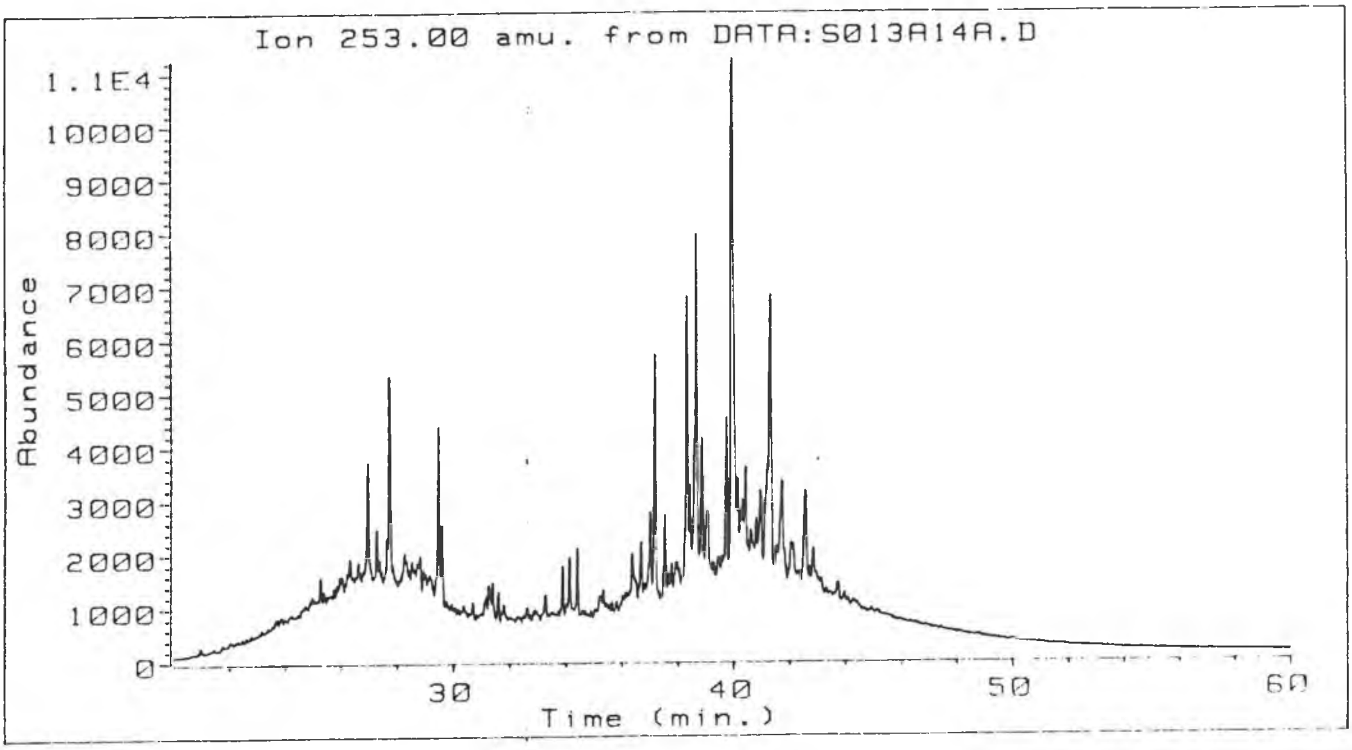
30/9-9 2295.75 m



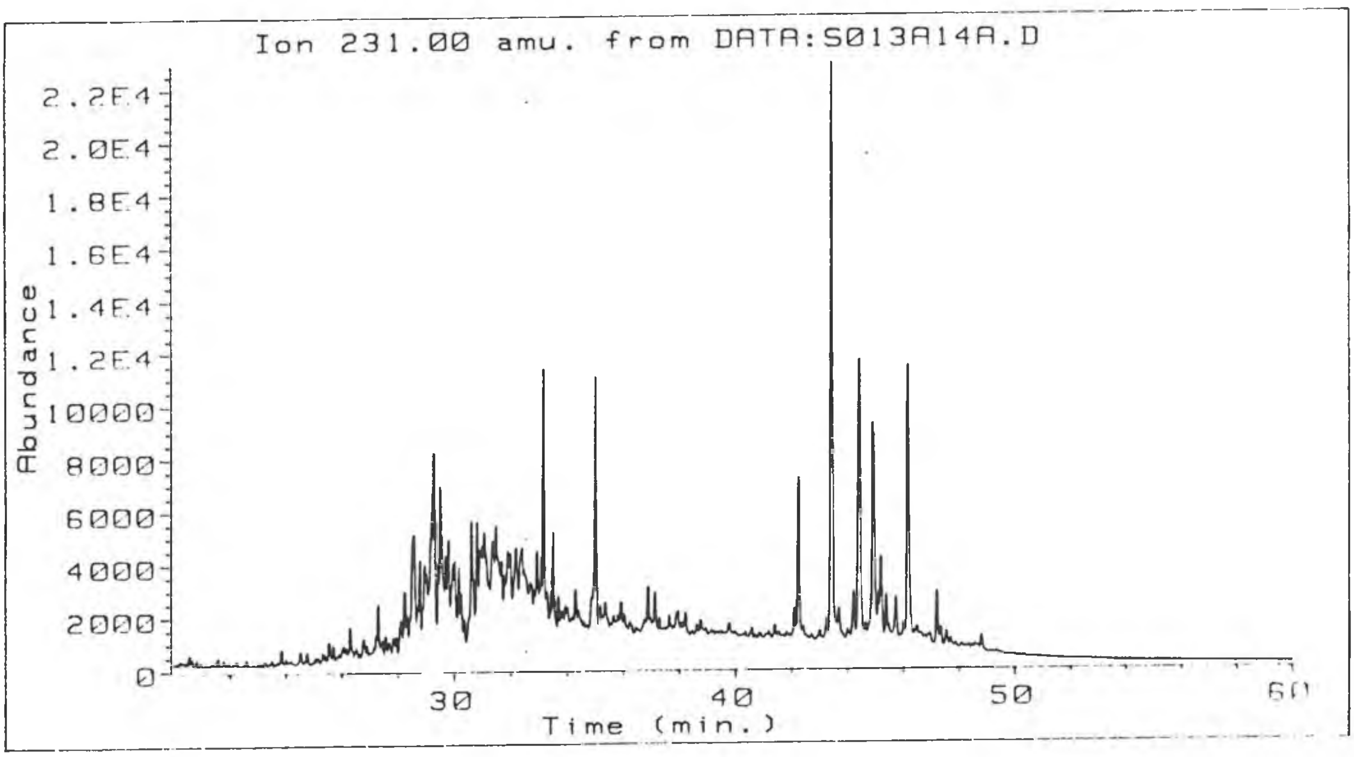


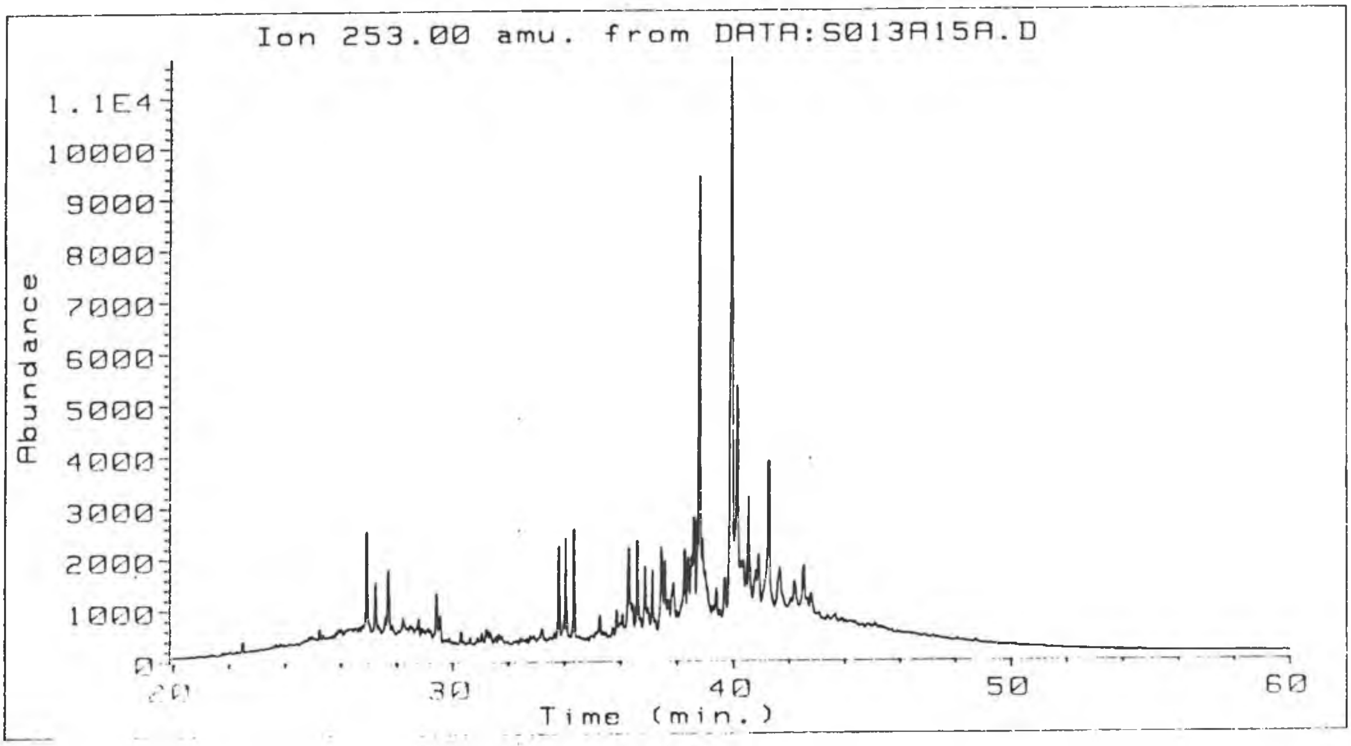
30/9 9 2297.40 m



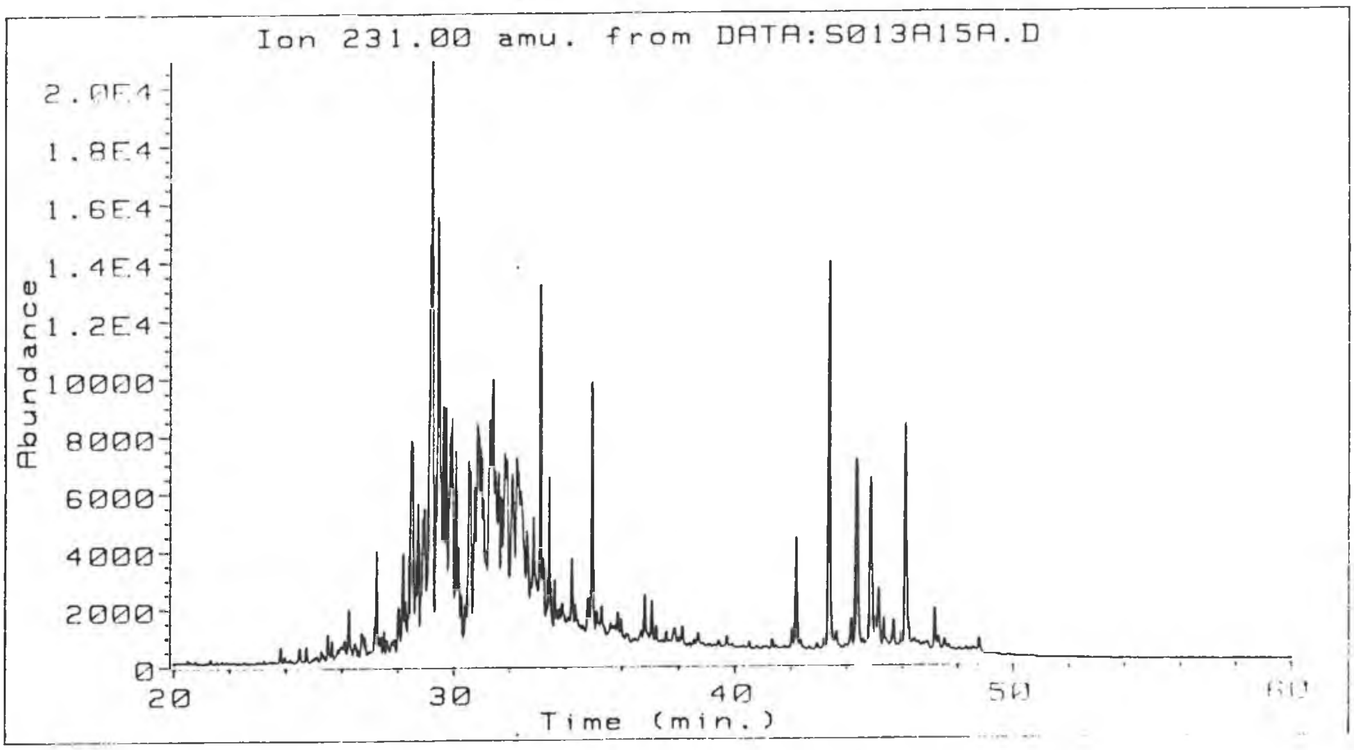


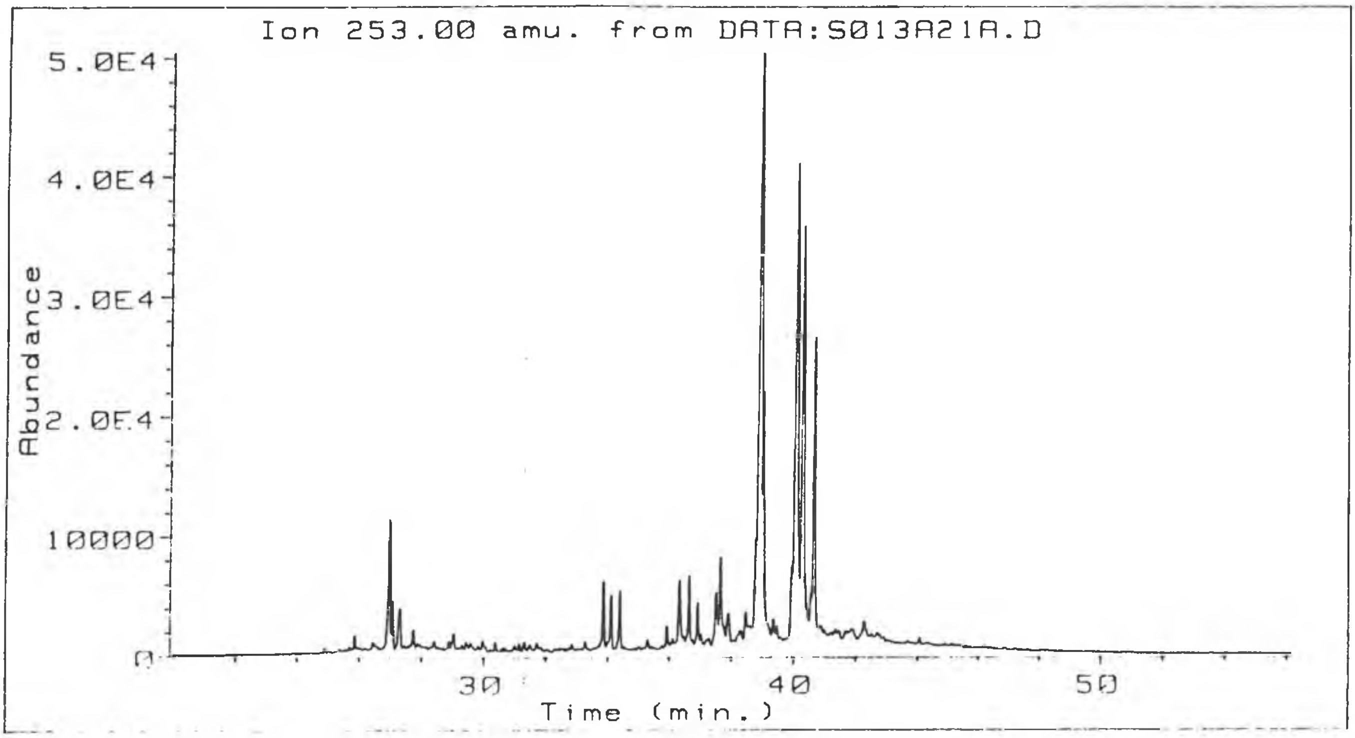
30/9-9 2299.02 m





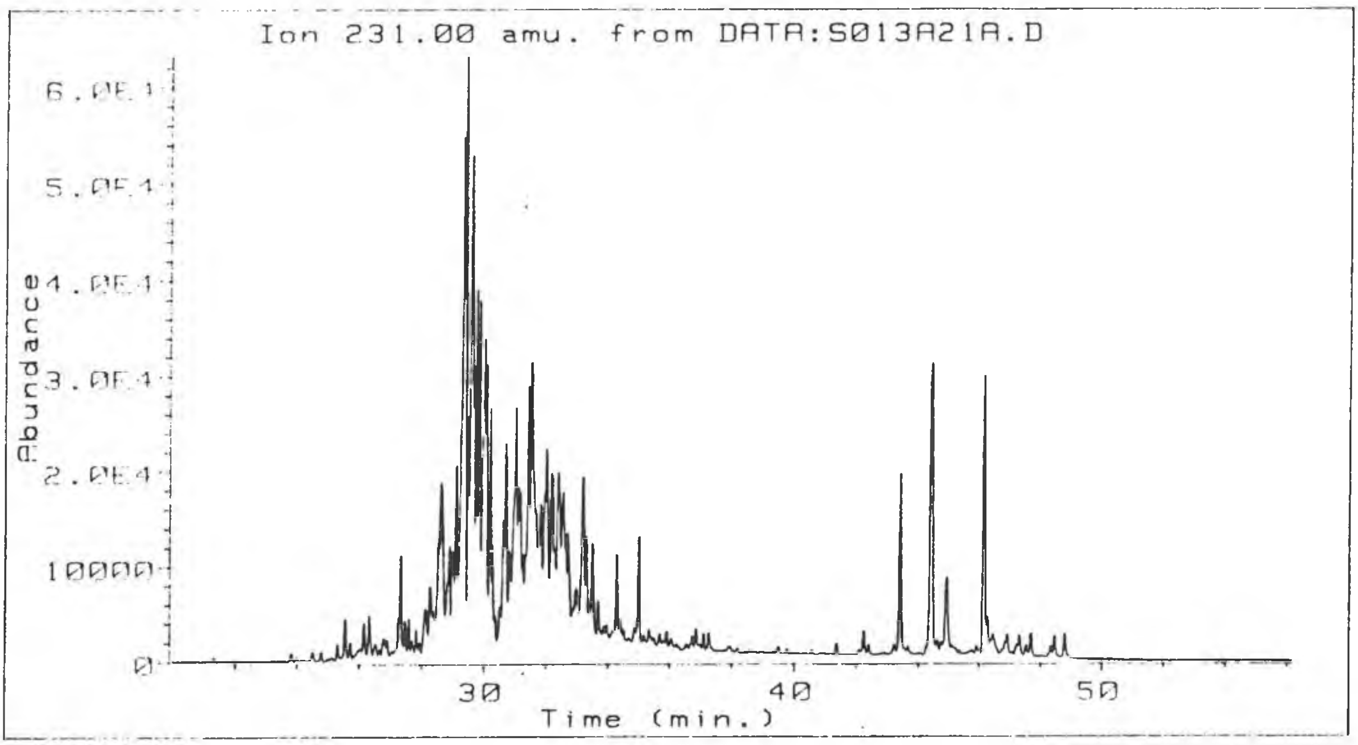
30/9 9 2308.60 m



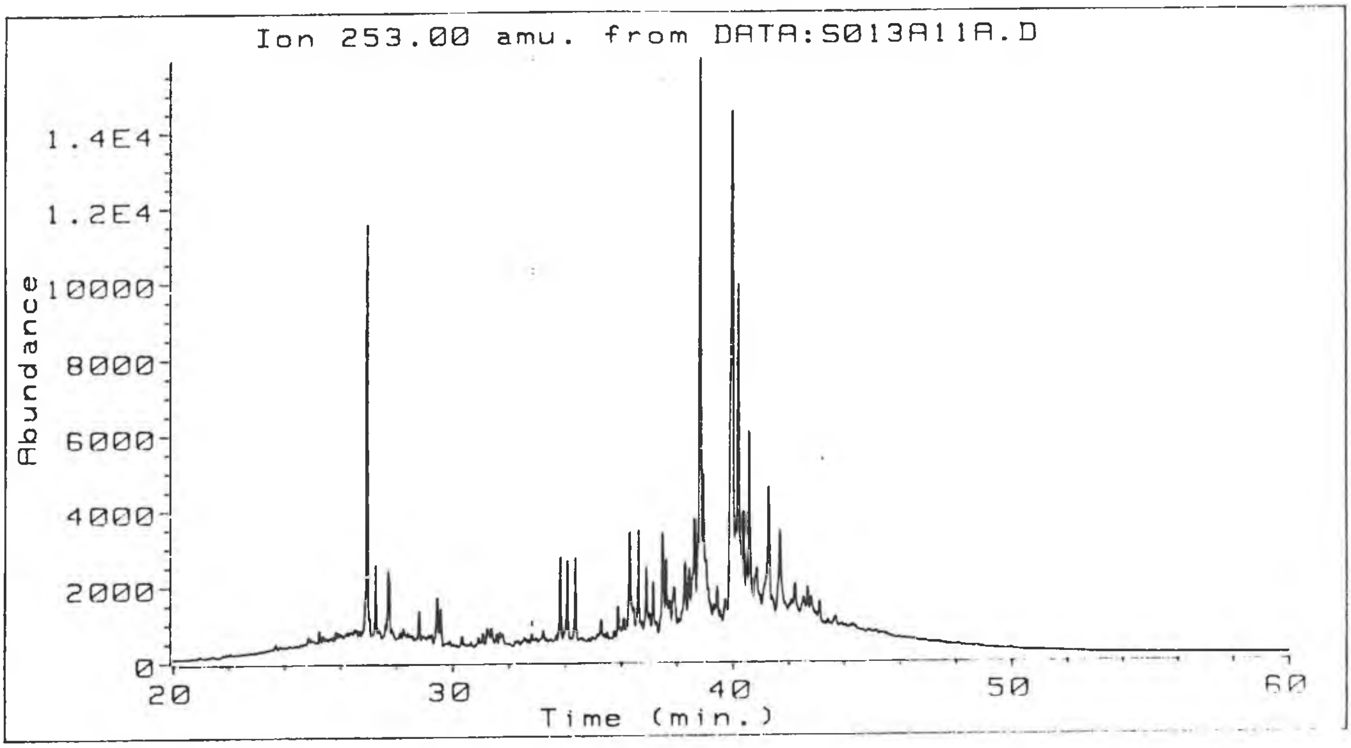


Ion 253.00 amu. from DATA:S013A21A.D
5.0E4
4.0E4
3.0E4
2.0E4
10000
0
Abundance
30
40
50
Time (min.)

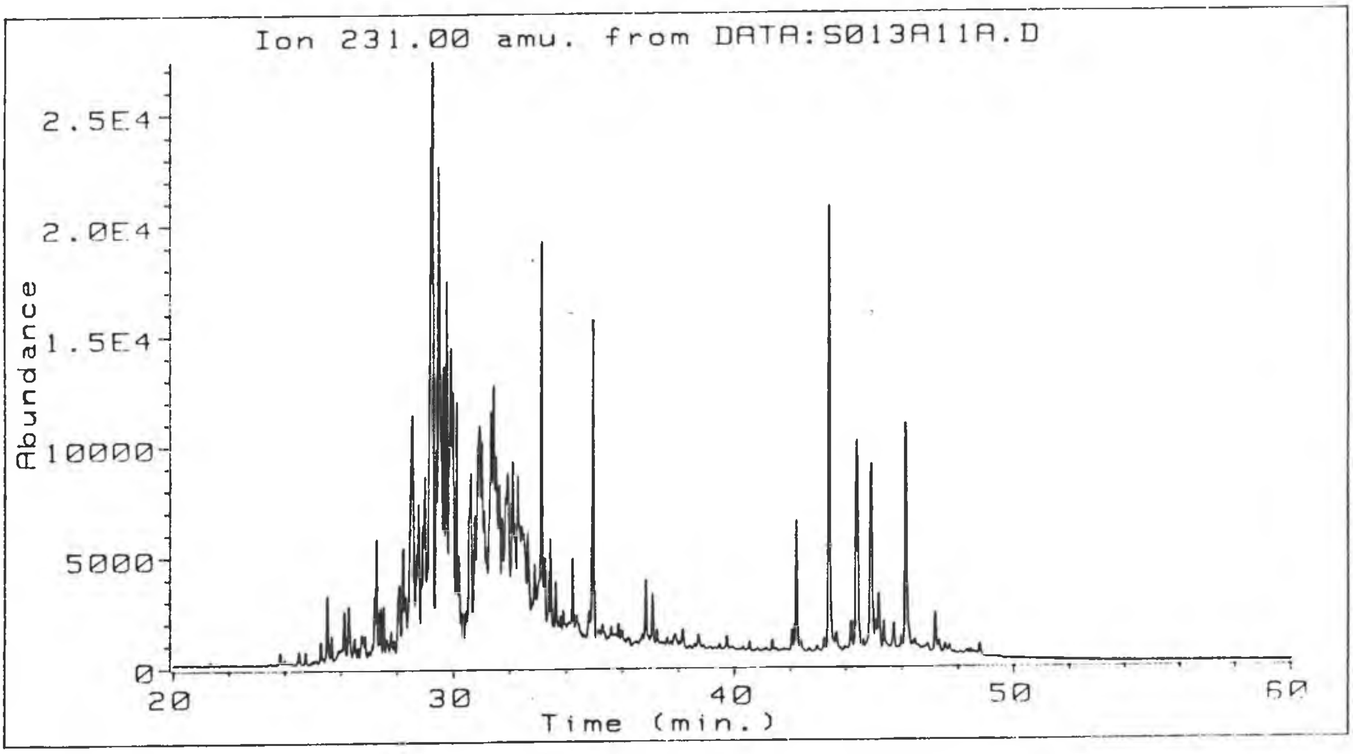
30/9-9 2312.3 m

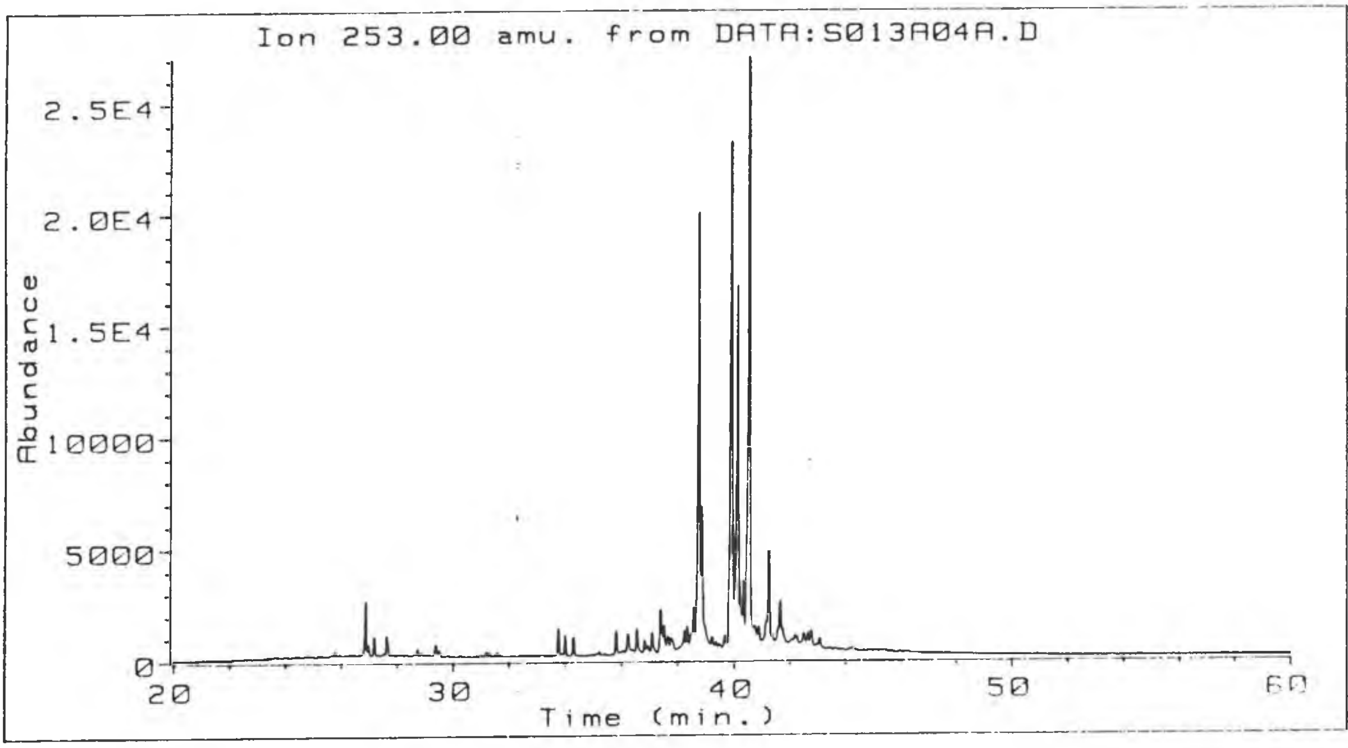


Ion 231.00 amu. from DATA:S013A21A.D
6.0E4
5.0E4
4.0E4
3.0E4
2.0E4
10000
0
Abundance
30
40
50
Time (min.)

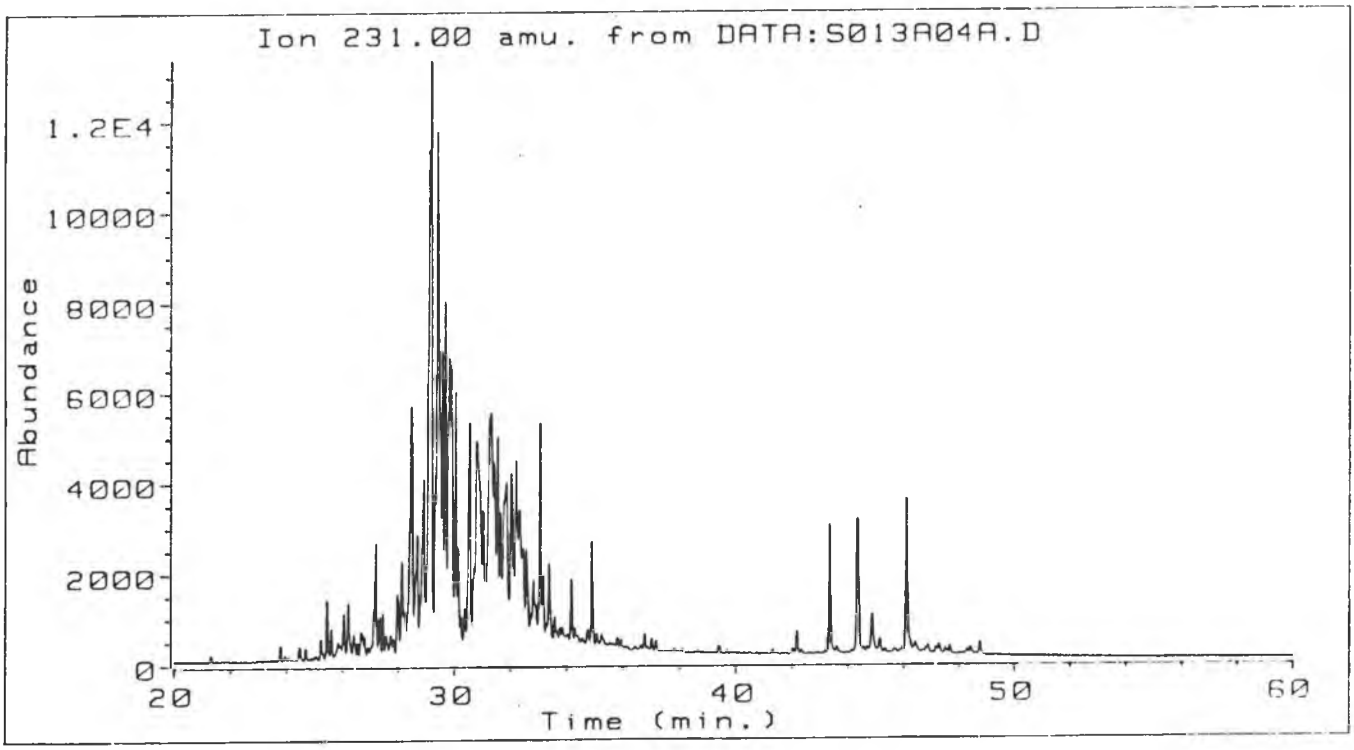

Ion 253.00 amu. from DATA:S013A11A.D
Abundance
1.4E4
1.2E4
10000
8000
6000
4000
2000
0
20
30
40
50
60
Time (min.)

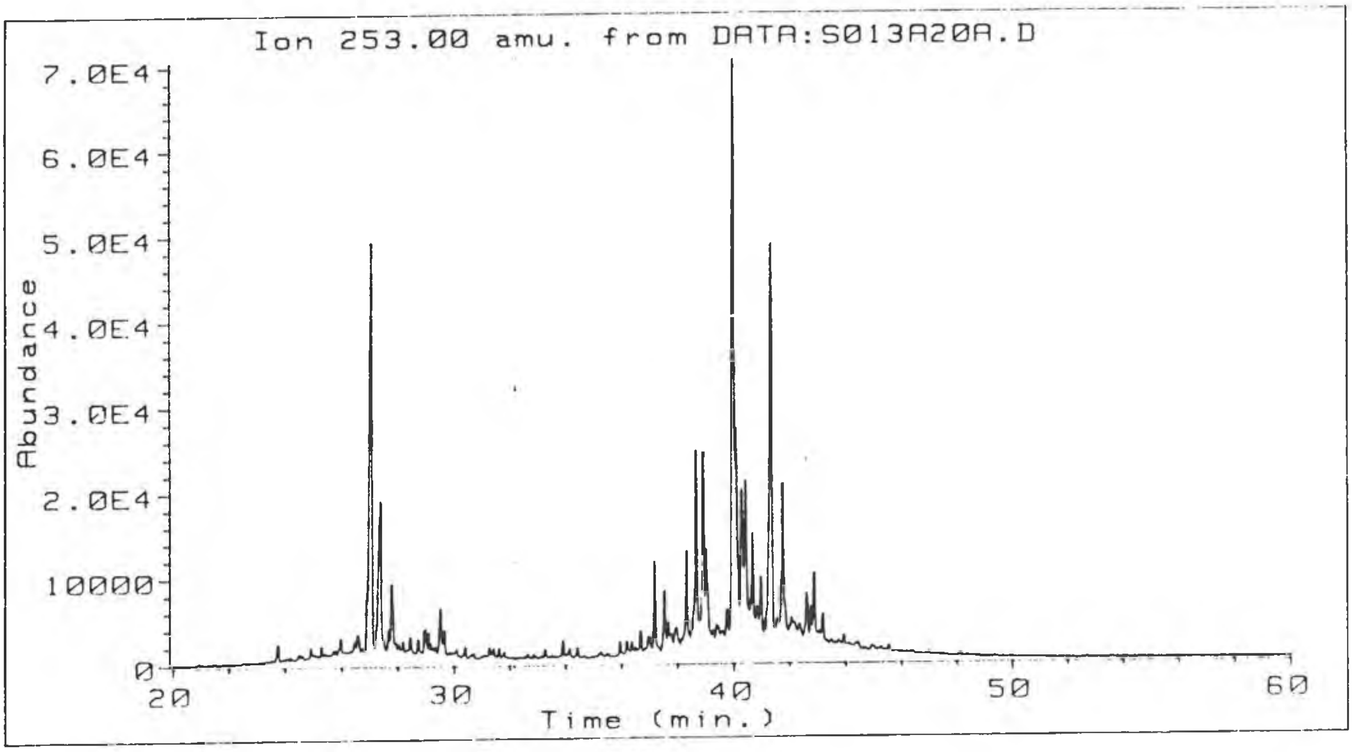
30/9-9 2313.5 m


Ion 231.00 amu. from DATA:S013A11A.D
Abundance
2.5E4
2.0E4
1.5E4
10000
5000
0
20
30
40
50
60
Time (min.)

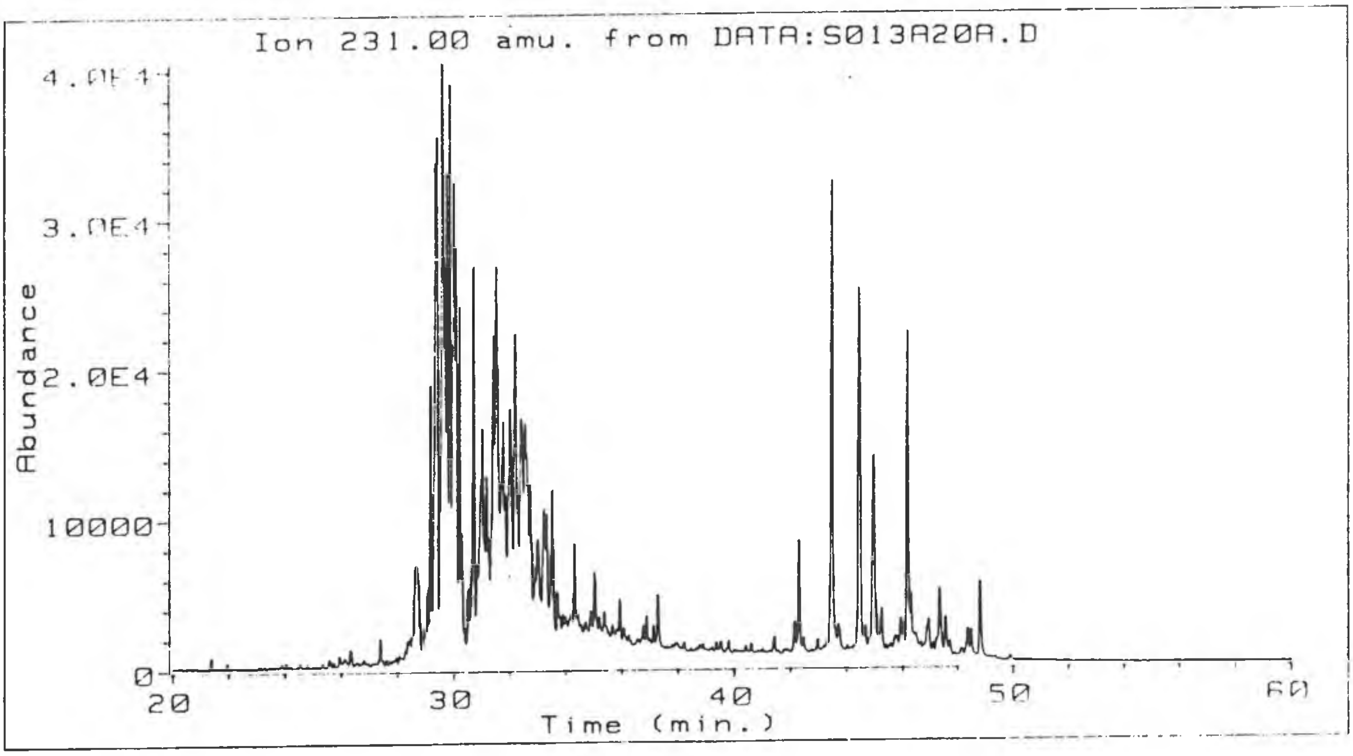


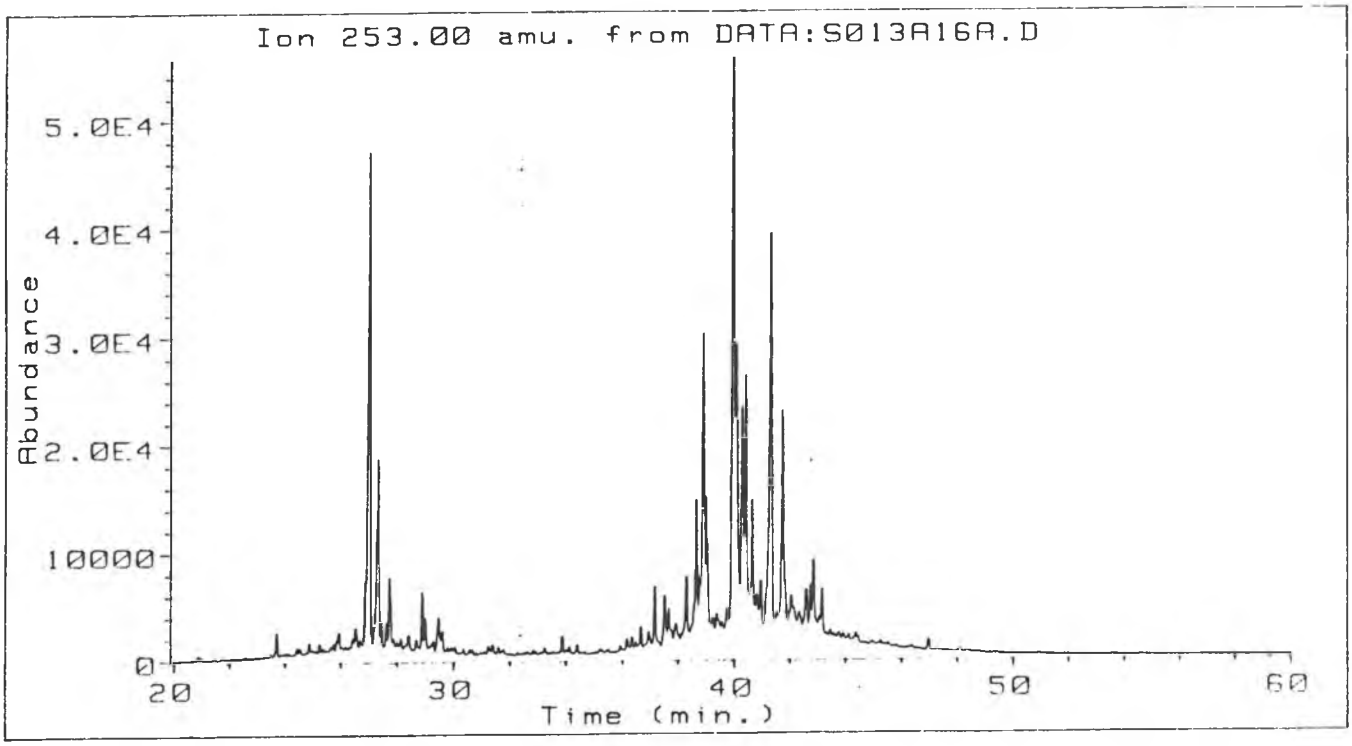
30/9-9 2318.50 m



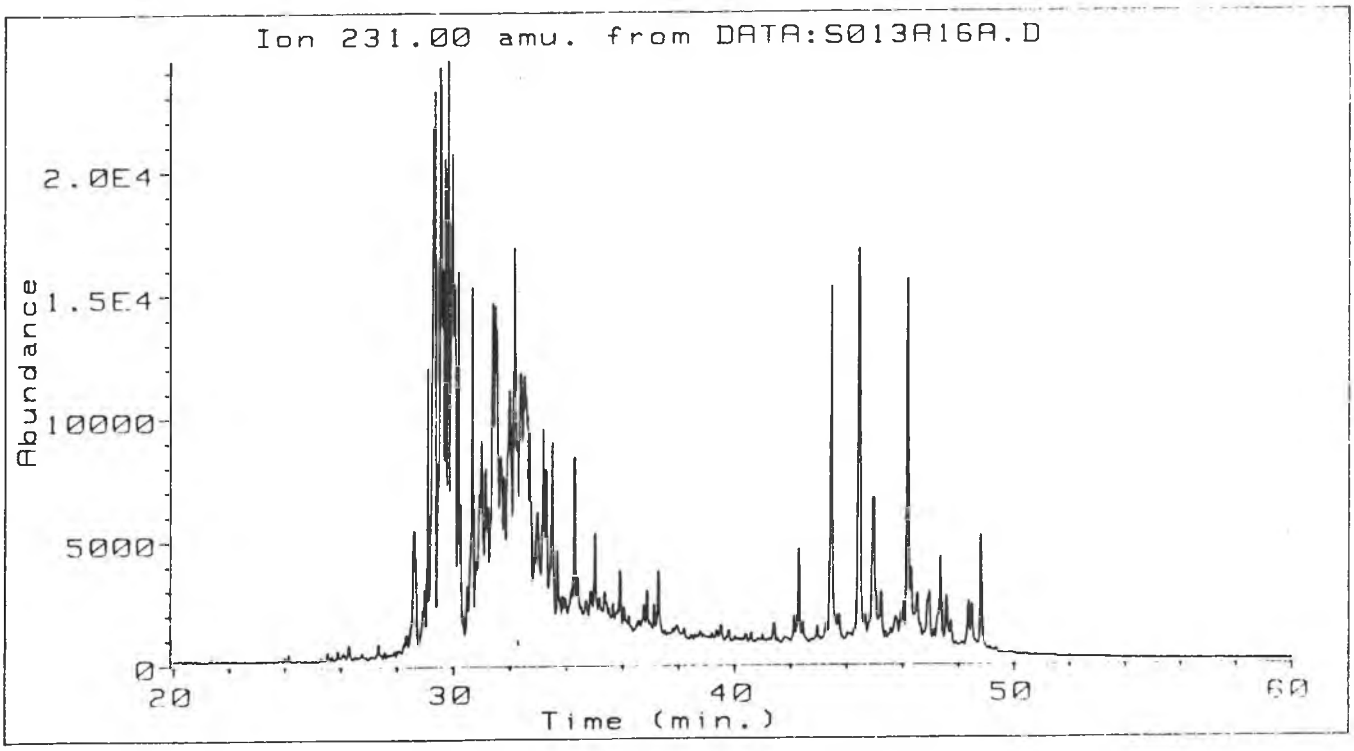

Ion 253.00 amu. from DATA:S013A20A.D
Abundance
7.0E4
6.0E4
5.0E4
4.0E4
3.0E4
2.0E4
10000
0
20
30
40
50
60
Time (min.)

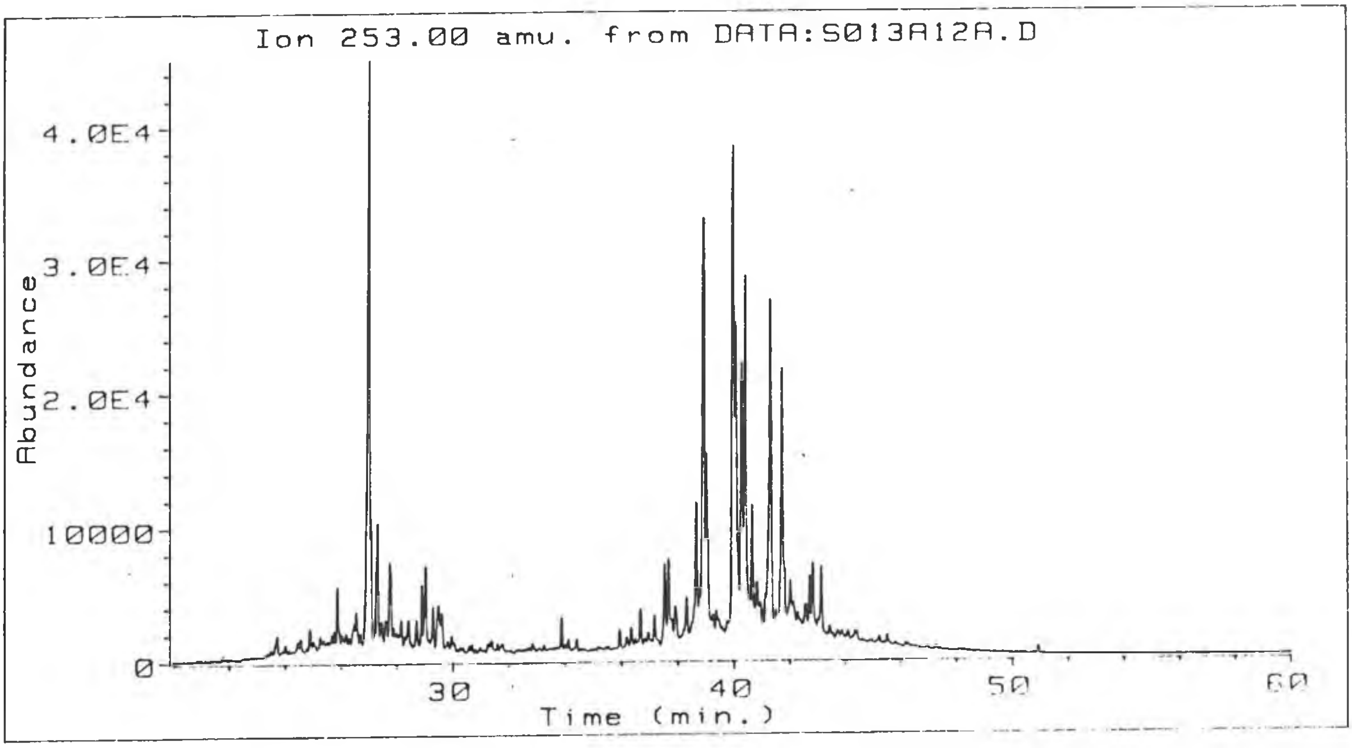
30/9-9 2352.5 m


Ion 231.00 amu. from DATA:S013A20A.D
Abundance
4.0E4
3.0E4
2.0E4
10000
0
20
30
40
50
60
Time (min.)

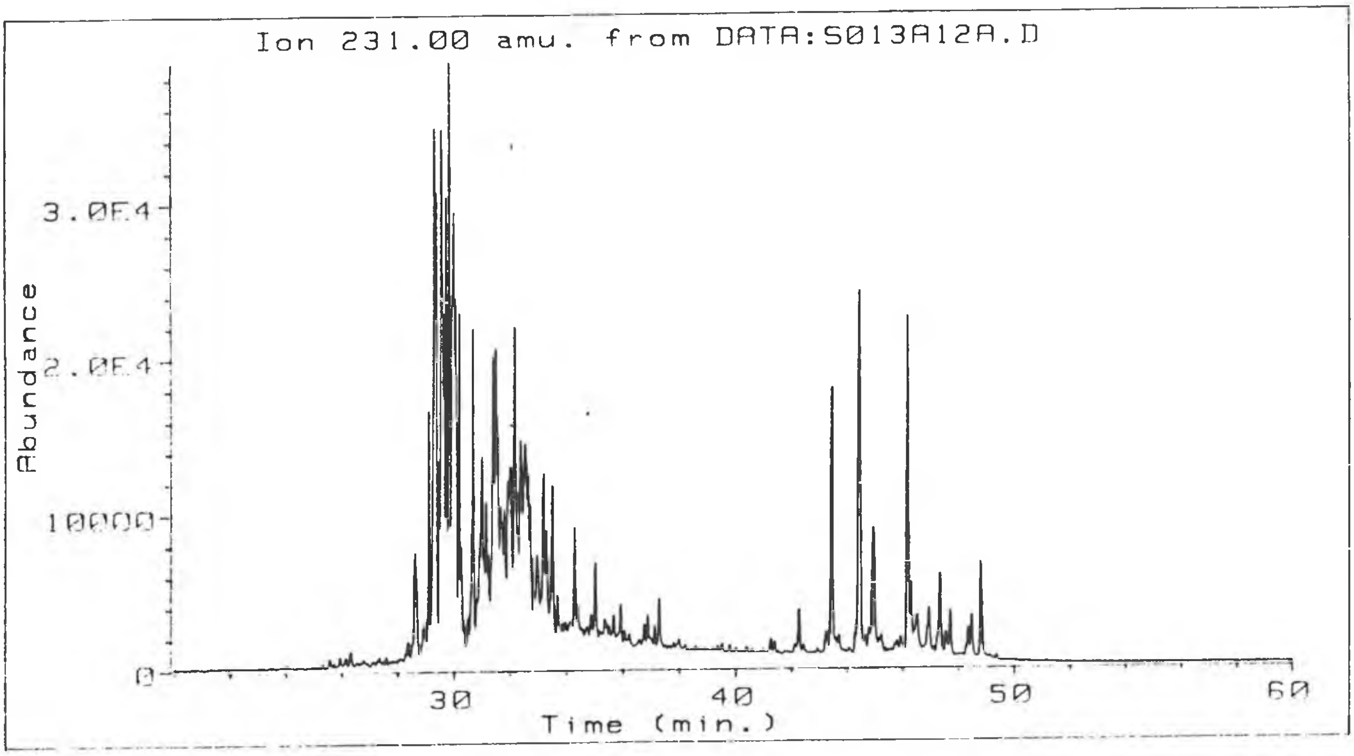


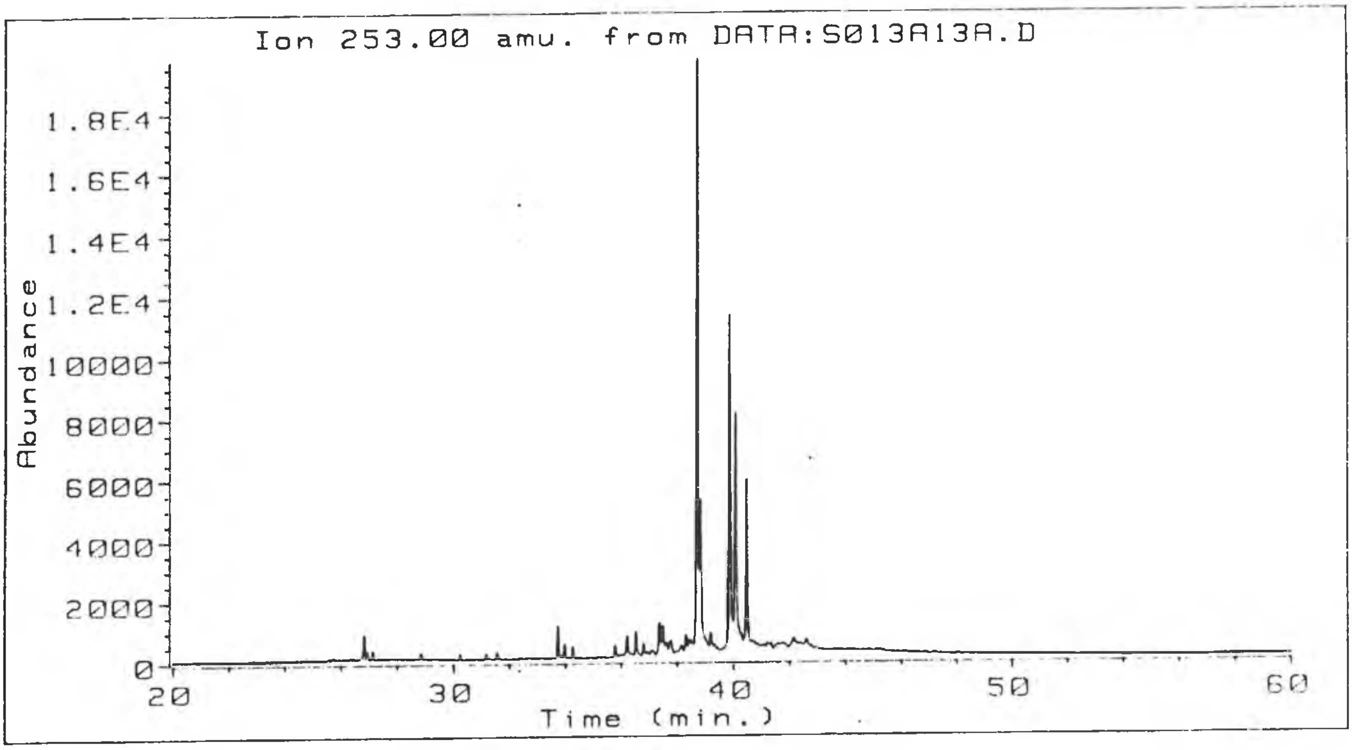
30/9-9 2355.75 m



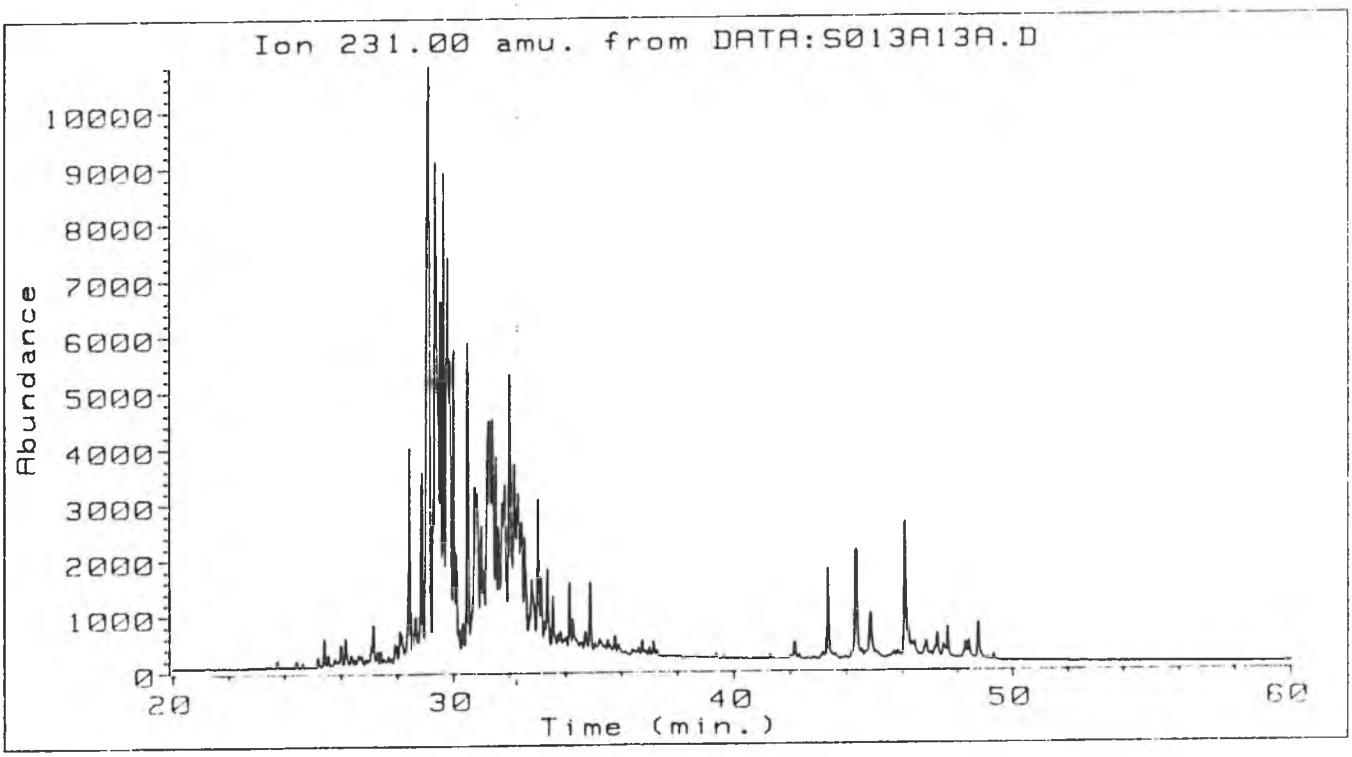

Ion 253.00 amu. from DATA:S013A12A.D
Abundance
4.0E4
3.0E4
2.0E4
10000
0
30
40
50
60
Time (min.)

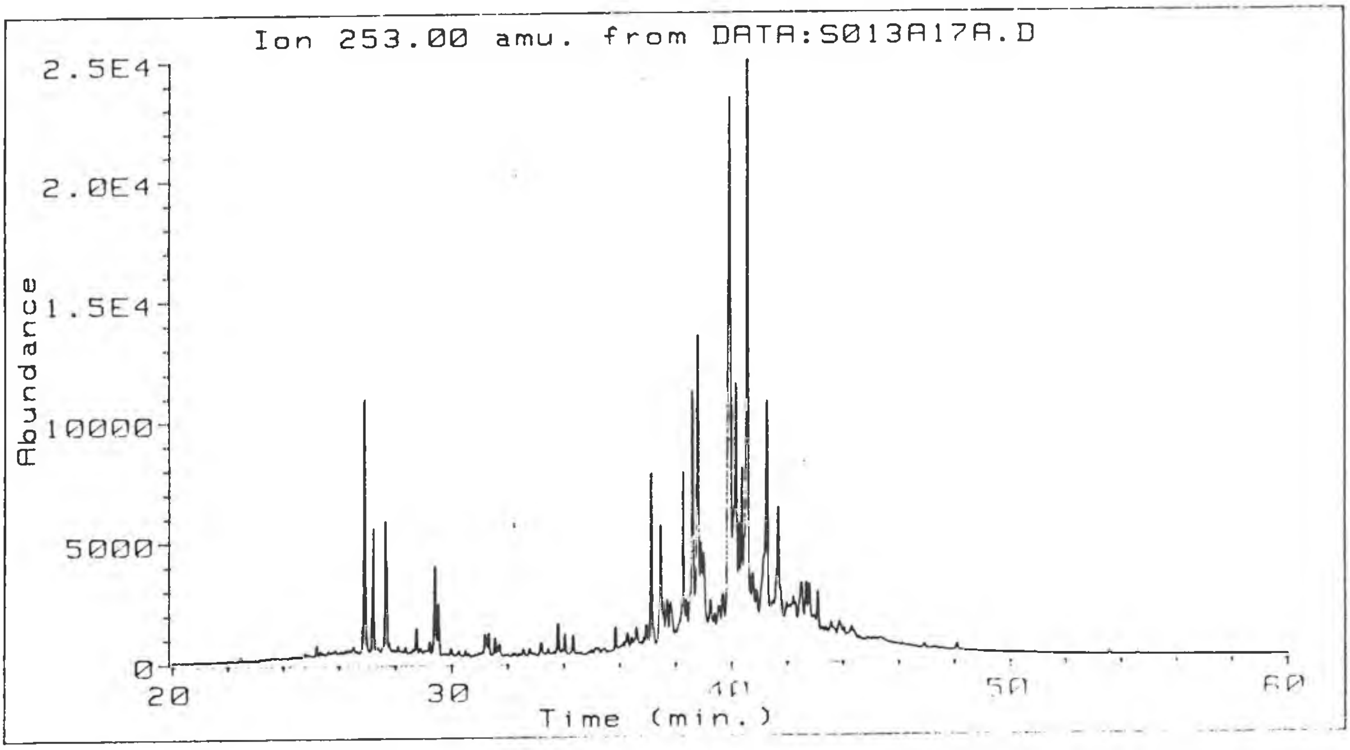
30/9-9 2356.5 m


Ion 231.00 amu. from DATA:S013A12A.D
Abundance
3.0E4
2.0E4
10000
0
30
40
50
60
Time (min.)

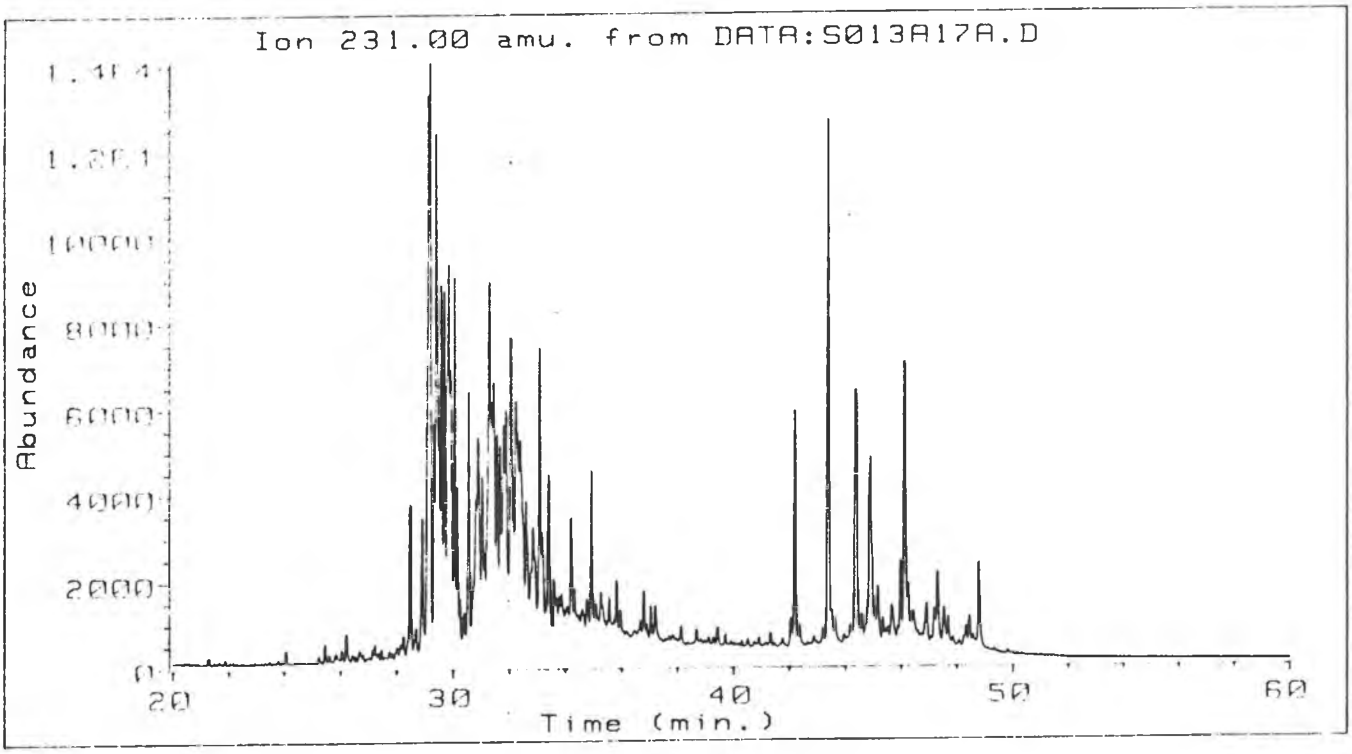

Ion 253.00 amu. from DATA:S013A13A.D
Abundance
1.8E4
1.6E4
1.4E4
1.2E4
10000
8000
6000
4000
2000
0
20
30
40
50
60
Time (min.)

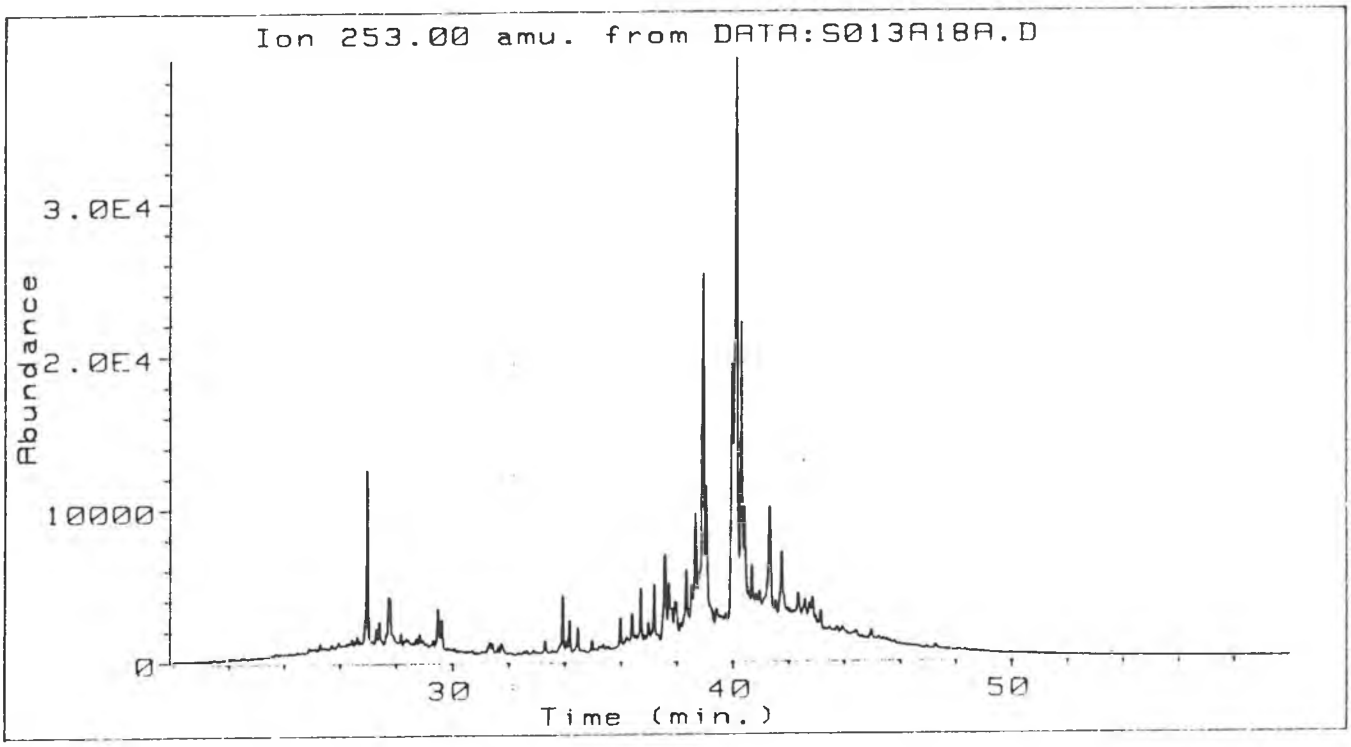
30/9 9 2408.5 m


Ion 231.00 amu. from DATA:S013A13A.D
Abundance
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
20
30
40
50
60
Time (min.)

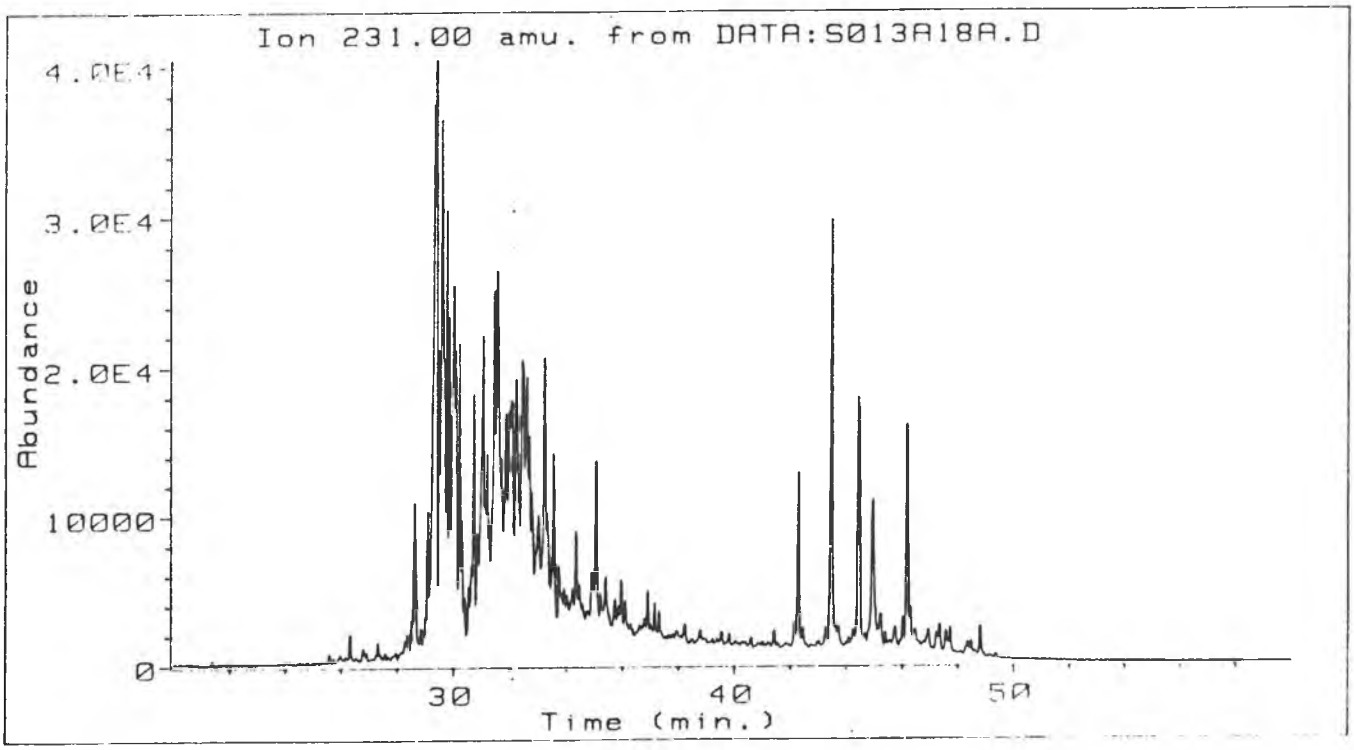


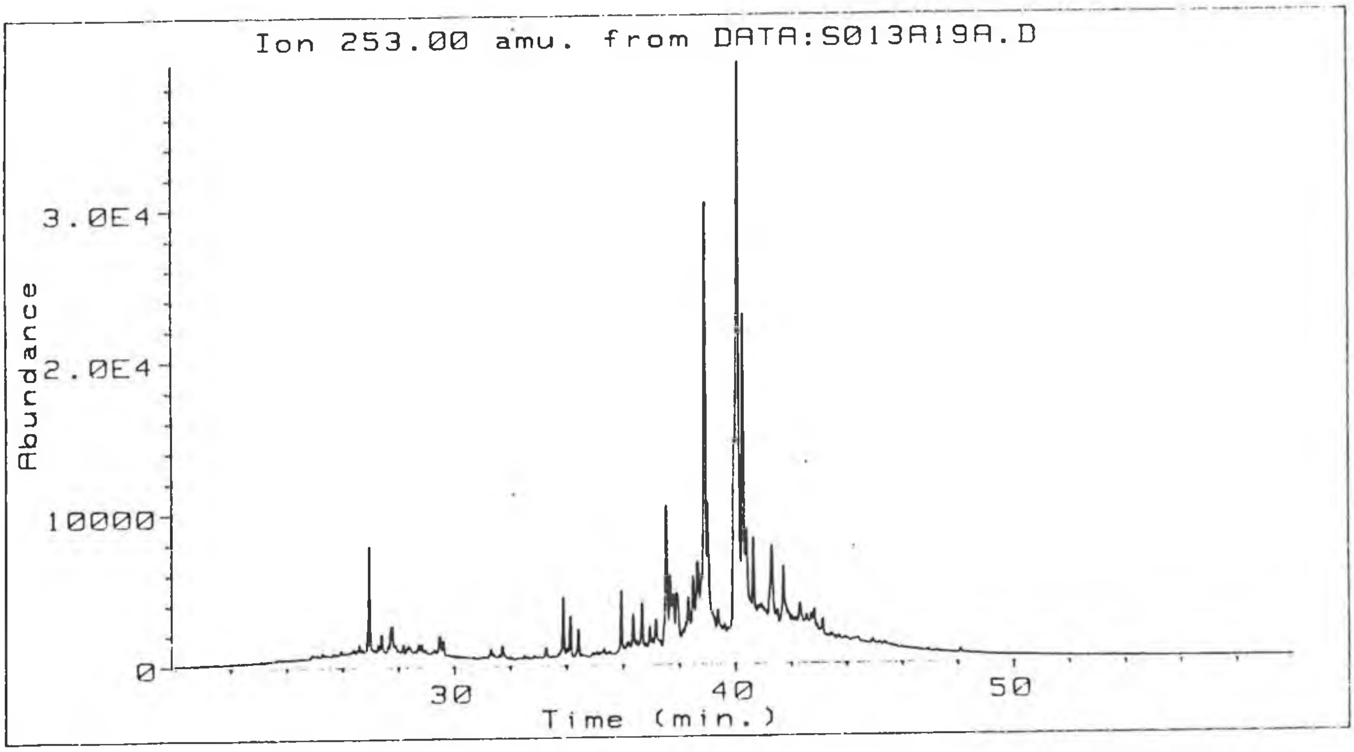
30/9-9 2424.70 m




Ion 253.00 amu. from DATA:S013A18A.D
Abundance
3.0E4
2.0E4
10000
0
30
40
50
Time (min.)

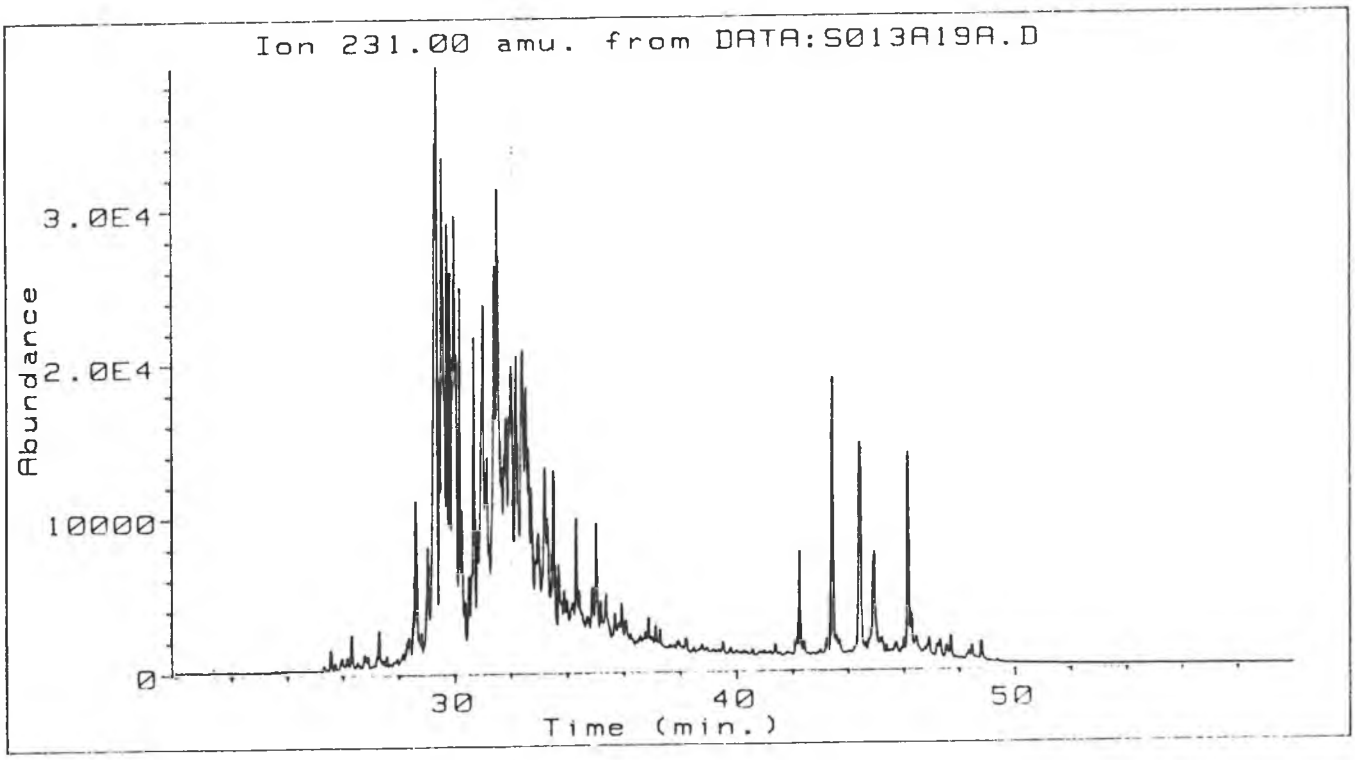
30/9-9 2727.0 m


Ion 231.00 amu. from DATA:S013A18A.D
Abundance
4.0E4
3.0E4
2.0E4
10000
0
30
40
50
Time (min.)



Ion 253.00 amu. from DATA:S013A19A.D
Abundance
3.0E4
2.0E4
10000
0
30
40
50
Time (min.)

30/9-9 2778.0 m



Ion 231.00 amu. from DATA:S013A19A.D
Abundance
3.0E4
2.0E4
10000
0
30
40
50
Time (min.)

APPENDIX VI

Vitrinite reflectance readings.

Sample ID: 30/9-9 1000m
R.o. Aver.: 0.34 (20)
Lithology: Silty shale 100%
Phytoclast Content: Trace
    Vitrinite: 70%
    Inertinite: 30%
    Exinite: -
UV fluorescence: Carbonate - mod. - y/o; dino. - low - g/y; spores - tr. - y/o
Bitumen: Stain. - mod.; wisps + blebs - trace
VR populations: 1
Mineralogy: Forams. Calcareous glauconite
General Comments: -
0.36
0.34
0.31
0.30
0.38
0.44
0.40
0.32
0.31
0.31
0.33
0.29
0.44
0.30
0.32
0.33
0.34
0.34
0.39
0.34

Sample ID: 30/9-9 1100m
R.o. Aver.: 0.35 (20)
Lithology: Silty shale 100%
Phytoclast Content: Trace
    Vitrinite: 70%
    Inertinite: 30%
    Exinite: -
UV fluorescence: Spores - low - y-y/o
Bitumen: Stain. - mod.; wisps + blebs - mod.
VR populations: 1
Mineralogy: Forams. Glauconite calcareous
General Comments: -
0.29
0.37
0.30
0.37
0.37
0.33
0.34
0.46
0.31
0.29
0.33
0.37
0.33
0.31
0.38
0.34
0.43
0.40
0.33
0.33

Sample ID: 30/9-9 1200m
R.o. Aver.: 0.36 (13)
Lithology: Silty shale 50%; sandstone 50%; cement tr.

Phytoclast Content: Trace
Vitrinite: Tr.
Inertinite: Tr.
Exinite: -
UV fluorescence: Dino. low - g/y; spores - low - y-y/o

Bitumen: Stain. - light/mod; wisps - low
VR populations: 1
Mineralogy: Forams
General Comments: -
0.34
0.36
0.36
0.39
0.36
0.37
0.38
0.35
0.33
0.31
0.35
0.44
0.38

Sample ID: 30/9-9 1300m
R.o. Aver.: 0.39 (11)
Lithology: Sandstone 70%; shale 30%
Phytoclast Content: Trace
Vitrinite: Tr.
Inertinite: Tr.
Exinite: -
UV fluorescence: Spores - tr. - y/o
Bitumen: Stain. - mod in shale; wisps + blebs - low in shale
VR populations: 1
Mineralogy: -
General Comments: -
0.29
0.37
0.43
0.45
0.30
0.37
0.43
0.47
0.40
0.36
0.43

Sample ID: 30/9-9 1400m
R.o. Aver.: 0.35 (20)
Lithology: Sandstone 80%; shale 20%
Phytoclast Content: Trace
Vitrinite: 70%
Inertinite: 30%
Exinite: -
UV fluorescence: Spores - tr. - y-y/o
Bitumen: Stain. - mod. in shale; wisps + blebs - mod. in shale
VR populations: 1
Mineralogy: -
General Comments: -
0.43
0.44
0.40
0.35
0.40
0.37
0.27
0.39
0.35
0.27
0.32
0.36
0.35
0.33
0.31
0.33
0.29
0.31
0.32
0.44

Sample ID: 30/9-9 1500m
R.o. Aver.: 0.37 (20)
Lithology: Shale 100%
Phytoclast Content: Trace
Vitrinite: 70%
Inertinite: 30%
Exinite: -
UV fluorescence: Spores - low/mod. - y/o
Bitumen: Stain. - mod.; wisps - mod./rich
VR populations: 1
Mineralogy: -
General Comments: -
0.34
0.39
0.32
0.38
0.38
0.39
0.33
0.39
0.37
0.38
0.40
0.38
0.38
0.32
0.37
0.41
0.41
0.34
0.37
0.40

Sample ID: 30/9-9 1600m
R.o. Aver.: 0.39 (19)
Lithology: Silty shale 100%
Phytoclast Content: Trace
    Vitrinite: 80%
    Inertinite: 20%
    Exinite: -
UV fluorescence: Spores - tr. - y/o
Bitumen: Stain. - mod.; wisps + blebs - mod./rich
VR populations: 1
Mineralogy: Forams. calcareous
General Comments: -
0.31
0.46
0.38
0.34
0.36
0.37
0.39
0.43
0.39
0.41
0.40
0.43
0.40
0.38
0.39
0.42
0.45
0.35
0.35

Sample ID: 30/9-9 1700m
R.o. Aver.: 0.50 (4)
Lithology: Shale 100%
Phytoclast Content: Trace
    Vitrinite: Tr.
    Inertinite: Tr.
    Exinite: -
UV fluorescence: Algae - tr. - y-y/o; spores - tr. - y/o

Bitumen: Stain. - light; wisps - mod.
VR populations: 1
Mineralogy: -
General Comments: -
0.58
0.38
0.44
0.58

Sample ID: 30/9-9 1800m
R.o. Aver.: 0.52 (4)
Lithology: Shale 100%
Phytoclast Content: Trace
    Vitrinite: Tr.
    Inertinite: Tr.
    Exinite: -
UV fluorescence: Spores - tr. - y/o+l.o.
Bitumen: Stain. - v. light; wisps + blebs - mod.
VR populations: 1
Mineralogy: -
General Comments: -
0.58
0.40
0.43
0.65

Sample ID: 30/9-9 1900m
R.o. Aver.: 0.45 (20)
Lithology: Shale 100%
Phytoclast Content: Trace
    Vitrinite: 90%
    Inertinite: 10%
    Exinite: -
UV fluorescence: Spores - low - y-y/o; dino. - tr. - y

Bitumen: Stain. - v. light; wisps - mod./rich
VR populations: 1
Mineralogy: Some light haematite staining
General Comments: Phyt. degraded
0.48
0.51
0.43
0.40
0.45
0.35
0.47
0.40
0.41
0.51
0.46
0.54
0.47
0.50
0.46
0.38
0.38
0.44
0.51
0.53

Sample ID: 30/9-9 2000m
R.o. Aver.: 0.50 (7)
Lithology: Shale 100%
Phytoclast Content: Trace
Vitrinite: Tr.
Inertinite: Tr
Exinite: -
UV fluorescence: Spores - tr. - y/o+l.o.
Bitumen: Stain. - mod.; wisps + blebs - mod./rich
VR populations:1
Mineralogy: -
General Comments: -
0.54
0.51
0.47
0.42
0.42
0.56
0.61

Sample ID: 30/9-9 2100m
R.o. Aver.: 0.51 (6)
Lithology: Shale 100%
Phytoclast Content: Low
Vitrinite: Tr.
Inertinite: 100%
Exinite: -
UV fluorescence: Spores - tr. - y/o-l.o.
Bitumen: Stain. - light/mod.
VR populations: 1
Mineralogy: Iron oxide specks
General Comments: -
0.57
0.56
0.52
0.51
0.39
0.51

Sample ID: 30/9-9 2200m
R.o. Aver.: 0.49 (20)
Lithology: Marl 60%; shale 40%
Phytoclast Content: Trace
Vitrinite: 50%
Inertinite: 50%
Exinite: -
UV fluorescence: Carbonate - mod. - y; algae - tr. - y; spores - tr. - l.o.
Bitumen: Stain. - nil in marl; mod/strong in shale; wisps - mod in shale
VR populations: 1
Mineralogy: -
General Comments: Phyt. restricted to shale
0.51
0.45
0.37
0.54
0.59
0.53
0.42
0.41
0.44
0.42
0.42
0.71
0.41
0.43
0.45
0.53
0.73
0.54
0.44
0.49

Sample ID: 30/9-9 2292.5m SWC
R.o. Aver.: 0.50 (21)
Lithology: Silty shale 100%
Phytoclast Content: V. low
Vitrinite: 20%
Inertinite: 80%
Exinite: -
UV fluorescence: Spores - mod. - y/o-l.o.
Bitumen: Stain. - light; wisps - mod.
VR populations: 1
Mineralogy: -
General Comments: -
0.45
0.49
0.51
0.51
0.52
0.45
0.54
0.39
0.59
0.44
0.52
0.51
0.56
0.47
0.47
0.46
0.49
0.39
0.67
0.51
0.56

Sample ID: 30/9-9 2308.6m SWC
R.o. Aver.: 0.49 (20)
Lithology: Silty shale 100%
Phytoclast Content: Mod.
    Vitrinite: Tr.
    Inertinite: 100%
    Exinite: -
UV fluorescence: Spores - mod./rich - l.o.
Bitumen: Stain. - light; wisps - mod.
VR populations: 1
Mineralogy: -
General Comments: -
0.52
0.51
0.53
0.56
0.53
0.52
0.42
0.42
0.43
0.36
0.56
0.57
0.47
0.48
0.54
0.43
0.45
0.57
0.50
0.46

Sample ID: 30/9-9 2424.7m SWC
R.o. Aver.: 0.50 (21)
Lithology: Silty shale 100%
Phytoclast Content: Mod.
    Vitrinite: 20%
    Inertinite: 80%
    Exinite: -
UV fluorescence: Spores - low - l.o.
Bitumen: Stain. - mod./strong; wisps - mod.
VR populations: 1
Mineralogy: Siderite rich
General Comments: -
0.56
0.45
0.50
0.56
0.50
0.50
0.53
0.53
0.47
0.52
0.63
0.54
0.52
0.42
0.56
0.37
0.38
0.44
0.44
0.56
0.57

Sample ID: 30/9-9 2500m
R.o. Aver.: 0.54 (22)
Lithology: Shale 100%
Phytoclast Content: Mod.
Vitrinite: Tr.
Inertinite: 100%
Exinite: -
UV fluorescence: Spores - mod./rich - l-m.o.; algae - tr. - y/o
Bitumen: Stain. - mod./strong
VR populations: 1
Mineralogy: -
General Comments: -
0.55
0.52
0.52
0.52
0.54
0.51
0.53
0.55
0.65
0.53
0.55
0.58
0.57
0.42
0.45
0.59
0.42
0.51
0.44
0.55
0.72
0.68

Sample ID: 30/9-9 2600m
R.o. Aver.: 0.55 (21)
Lithology: Shale 100%
Phytoclast Content: Low-mod.
Vitrinite: 50%
Inertinite: 50%
Exinite: -
UV fluorescence: Spores - mod. - l.o.
Bitumen: Stain. - mod.; wisps - mod.
VR populations: 1
Mineralogy: -
General Comments: -
0.62
0.62
0.59
0.65
0.64
0.57
0.57
0.42
0.45
0.59
0.45
0.44
0.50
0.50
0.50
0.45
0.55
0.59
0.65
0.60
0.65

Sample ID: 30/9-9 2778m SWC
R.o. Aver.: 0.60 (21)
Lithology: Silty shale 100%
Phytoclast Content: Mod.
Vitrinite: 20%
Inertinite: 80%
Exinite: -
UV fluorescence: Spores - mod./rich - l-m.o.
Bitumen: Stain. - mod./strong; wisps - mod.
VR populations: 1
Mineralogy: -
General Comments: -

0.53
0.60
0.59
0.54
0.56
0.59
0.68
0.59
0.57
0.75
0.56
0.61
0.59
0.56
0.54
0.60
0.66
0.61
0.60
0.59
0.64

Well I.D.: 30/9-9 1000-2778m

T.D.	B.D.	Ravg.	N
1000	-	0.34	20
1100	-	0.35	20
1200	-	0.36	13
1300	-	0.39	11
1400	-	0.35	20
1500	-	0.37	20
1600	-	0.39	19
1700	-	0.50	4
1800	-	0.52	4
1900	-	0.45	20
2000	-	0.50	7
2100	-	0.51	6
2200	-	0.49	20
2292.5	-	0.50	21
2308.6	-	0.49	20
2424.7	-	0.50	21
2500	-	0.54	22
2600	-	0.55	21
2778	-	0.60	21