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Source Rock Analyses of well 34/2-2

CLIENT/ OPPDRAGSGIVER

Amoco, Norway

RESPONSIBLE SCIENTIST/ PROSJEKTANSVARLIG

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SUMMARY/ SAMMENDRAG

The sequence 2000-3200 m was analysed and divided into seven zones with the following ratings.

Zone A; 2000-2180 m: Immature, fair potential as a source rock for gas.

Zone B; 2180-2240 m: Immature, fair potential as a source rock for gas (and oil?). Indications of free HC in limestone.

Zone C; 2240-2340 m: As B.

Zone D; 2340-2540 m: Immature, fair potential as a source rock for gas (and oil).

Zone E; 2540-2580 m: Claystone and sandstone. No evidence for migrated HC in sandstone.

Zone F; 2580-2700 m: Immature, fair potential as a source rock for gas. Free heavy HC in sandstone.

Zone G; 2700-3200: Immature increasing to moderate mature. Fair potential as a source rock for gas.

KEY WORDS/ STIKKORD

EXPERIMENTAL AND DESCRIPTION OF INTERPRETATION LEVELS

Headspace gas analyses

One ml. of the headspace gas from each of the cans was analysed gas chromatographically for light hydrocarbons. The results are shown in Table la. The canned samples were washed with temperated water on 4, 2, 1 and 0.125 mm sieves to remove drilling mud and thereafter dried at 35^oC.

Occluded gas

An aliquot of the 12 mm fraction of each sample before drying was crushed in water using an airtight ball mill, and one ml. of the headspace analysed chromatographically. The results are shown in Table lb.

Total Organic Carbon (TOC).

Picked cuttings of the various lithologies in each sample were crushed in a centrifugal mill. Aliquots of the samples were then weighed into Leco crucibles and treated with hot 2N HCl to remove carbonate and washed twice with distilled water to remove traces of HCl. The crucibles were then placed in a vacuum oven at 50^oC and evacuated to 20 mm Hg for 12 hrs. The samples were then analysed on a Leco E C 12 carbon analyser, to determine the total organic carbon (TOC).

Light Hydrocarbons by Hydrogen stripping

Aliquots of the samples were removed from the original canns and frozen imidiately in small canns. Shortly prior to the analyses, the samples were tawed and washed in cold water. The cuttings were crushed gently and the fraction 0.5-1.0 mm used in the analyses. The analyses were performed on a modified Carlo Erba 2051 chromatograph in the same mode as described by Schraefer et.al, J. Chrom. 167, (1978), 355-363.

Extractable Organic Matter (EOM)

From the TOC results samples were selected for extraction. Of the selected samples, approximately 100 gm of each was extracted in a flow through system (Radke et al., 1978, Anal. Chem. 49, 663-665) for 10 min. using dichloromethane (DCM) as solvent. The DCM used as solvent was distilled in an all glass apparatus to remove contaminants.

Activated copper filings were used to remove any free sulphur from the samples.

After extraction, the solvent was removed on a Buchi Rotavapor and transferred to a 50 ml flask. The rest of the solvent was then removed and the amount of extractable organic matter (EOM) determined.

Chromatographic Separation.

The extractable organic matter (EOM) was separated into saturated fraction, aromatic fraction and non hydrocarbon fraction using a MPLC system with hexane as eluant (Radke et al., Anal. Chem, 1980). The various fractions were evaporated on a Buchi Rotavapor and transferred to glassvials and dried in a stream of nitrogen. The various results are given in Table III-VI.

Gas chromatographic analyses.

The saturated and eromatic fractions was diluted with n-hexane and analysed on a HP 5730 A gas chromatograph, fitted with a 25 m OV101 glass capillary column and an automatic injection system. Hydrogen (0.7 ml/min.) was used as carrier gas and the injection was performed in the split mode (1:20).

Vitrinite Reflectance.

Samples, taken at various intervals, were sent for vitrinite reflectance measurements to Geoconsultants, Newcastle-upon-Tyne. The samples were mounted in Bakelite resin blocks; care being taken during the setting of the plastic to avoid temperatures in excess of 100^{o}C. The samples were then ground, initially on a diamond lap followed by two grades of corundum paper. All grinding and subsequent polishing stages in the preparation were carried out using isopropyl alcohol as lubricant, since water leads to the swelling and disintegration of the clay fraction of the samples.

Polishing of the samples was performed on Selvyt cloths using three grades of alumina, 5/20, 3/50 and Gamma, followed by careful cleaning of the surface.

Reflectance determinations were carried out on a Leitz M.P.V. microphotometer under oil immersion, R.I. 1.516 at a wavelength of 546 nm. The field measured was varied to suit the size of the organic particle, but was usually of the order of 2 micron diameter.

The surface of the polished block was searched by the operator for suitable areas of vitrinitic material in the sediment. The reflectance of the organic particle was determined relative to optical glass standards of known reflectance. Where possible, a minimum of twenty individual particles of vitrinite was measured, although in many cases this number could not be achieved.

The samples were also analysed in UV light, and the colour of the fluorescing material determined. Below, a scale comparing the vitrinite reflectance measurements and the fluorescence measurements are given.

VITRINITE REFLECTANCE R. AVER. 546 nm 1516	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10
% CARBON CONTENT DAF.	57	62	70	73	76	79	80.5	82.5	84	85.5

LIPTINITE FLUOR nm	725	750	790	820	840	860	890	940	

EXC. 400 nm
BAR. 530 nm

colour	G	G/Y	Y	Y/O	L.O.	M.O.	D.O.	O/R	R
zone	1	2	3	4	5	6	7	8	9

NOTE LIPTINITE NM = NUMERICAL MEASUREMENTS OF OVERALL SPORE COLOUR AND NOT PEAK FLUORESCENCE WAVELENGTH

RELATIONSHIP BETWEEN LIPTINITE FLUORESCENCE COLOUR, VITRINITE REFLECTANCE AND CARBON CONTENT IS VARIABLE WITH DEPOSITIONAL ENVIRONMENT AND CATAGENIC HISTORY. THE ABOVE IS ONLY A GUIDE. LIPTINITE WILL OFTEN APPEAR TO PROCESS TO DEEP ORANCE COLOUR AND THEN FADE RATHER THAN DEVELOP O/R RED SHADE. TERMINATION OF FLUORESCENCE IS ALSO VARIABLE.

Processing of Samples and Evaluation of Visual Kerogen

Crushed rock samples were treated with hydrochloric and hydrofluoric acids to remove the minerals. A series of microscopic slides contain strew mounts of the residue:

T-slide represents the total acid insoluble residue.
N-slide represents a screened residue (15 meshes).
O-slide contains palynodebris remaining after flotation ($ZnBr_2$) to remove disturbing heavy minerals.
X-slides contain oxidized residues, (oxidizing may be required due to sapropel which embeds palynomorphs, or to high coalification preventing the identification of the various groups).

T and/or O slides are necessary to evaluate kerogen composition/palynofacies which is closely related to sample lithology.

Screened or oxidized residues are normally required to concentrate the larger fragments, and to study palynomorphs (pollen, spores and dinoflagellates) and cuticles for paleodating and colour evaluation.

So far visual evaluations of kerogen have been undertaken from residues mounted in glycerine jelly, and studied by Leitz Dialux in normal light (halogene) using x10 and x63 objectives. By x63 magnification it is possible to distinguish single particles of diameters about 2 and, if wanted, to make a more refined classification of the screened residues (particles >15).

The colour evaluation is based on colour tones of spores and pollen (preferably) with support from other types of kerogen (woody material, cuticles and sapropel). These colours are dependant upon the maturity, but also are under influence of the paleo-environment (lithology of the rock, oxidation and decay processes). The colours and the estimated colour index of an individual sample may therefore deviate from those of the neighbouring samples. The techniques in visual kerogen studies are adopted from (Staplin 1969 and Burgess 1974).

In interpretation of the maturity from the estimated colour indices we follow a general scheme that is calibrated against vitrinite reflectance values (R_o).

Ro	0.45	0.6	0.9	1.0	1.3
colour	2-	2	2+	3-	3
3+					
index					
Maturity intervals	Moderate mature	Mature (oil window)			Condensate window

Rock-Eval Pyrolyses

100 mg crushed sample was put into a platinum crucible whose bottom and cover are made of sintered steel and analysed on a Rock-Eval pyrolyser.

RESULTS AND DISCUSSION

Gas Analyses

Based on the analyses of the headspace gas and the cutting gas analyses, together with the lithological desciption, the analysed sequence of the well, 2000-3200 m was divided into seven zones:

A: 2000-2180 m
B: 2180-2240 m
C: 2240-2340 m
D: 2340-2540 m
E: 2540-2580 m
F: 2580-2700 m
G: 2700-3200 m

Zone A: The abundances of both $C_1 - C_4$ and $C_5 - C_7$ hydrocarbons increase sharply at the top of this zone and is found to be good for most of the zone. The wetness of the gas is low while the iC_4/nC_4 ratio is close to unity. This would indicate the zone to be immature.

Zone B: The abundance of $C_5 - C_7$ hydrocarbons increases rapidly in this zone which contains some limestone. The wetness of the gas is higher than in zone A. This would indicate that the limestone in this zone contains free hydrocarbons.

Zone C: The abundances of both the $C_1 - C_4$ and the $C_5 - C_7$ hydrocarbons fall in this zone compared with zone A. A similar fall is also seen in the wetness of the gas while the iC_4/nC_4 ratio is constant for the top of the zone with a slight increase towards the lower part of this zone.

Zone D: The abundance of $C_1 - C_4$ and $C_5 - C_7$ hydrocarbons increases in this zone compared with the zone above and is found to be almost of the same level as zone B. Both the iC_4/nC_4 ratio and the wetness of the gas are almost constant throughout the zone.

Zone E: This zone is distinguished by the change in lithology to a more sandy sequence. The light hydrocarbon data are almost identical to the zone above.

Zone F: The abundance of both the C_1 - C_4 and C_5 - C_7 hydrocarbons in this zone is less than in the zone above while the wetness of the gas shows a sharp increase.

Zone G: The abundances of C_1 - C_4 and C_5 - C_7 hydrocarbons decrease steadily with increasing depth down to approximately 3150 m where they start to increase again. Both the wetness of the gas and the iC_4/nC_4 ratio is found to vary somewhat from sample to sample, but show on the whole quite stable values with a gentle increase of the wetness values.

Total Organic Carbon

The total organic carbon values for the claystone are stable around 0.8% throughout most of the analysed sequence, with a few higher values between 2700-2800 m.

C_2 - C_7 hydrocarbons by hydrogen stripping. (Gasoline range hydrocarbons.)

Light Hydrocarbons by Hydrogen Stripping

A total of eighteen samples were analysed by the hydrogen stripping technique (Table III). A number of the various compounds are plotted (Fig. 1-4). Normally the generation of light hydrocarbons will increase with increased depth of burrial due to increasing maturity. Such a trend is not encountered in this well. The results indicate that the hydrocarbons encountered throughout the analysed sequence are well mature and the high consentration of all compounds at approximately 2200 m indicates this interval to contain migrated hydrocarbons.

Extraction and Chromatographic Separations

Zone A: One sample 2060-2100 m from this zone was extracted and found to have a good abundance of extractable hydrocarbons. This is verified when the results are normalized to organic carbon. The chromatographic separation shows the samples to contain a large proportion of saturated hydrocarbons compared to aromatic hydrocarbons. The gas chromatogram of the saturated hydrocarbons is very front biased with a maximum at nC_{16}

and tailing sharply off from nC_{17}. A chromatogram like this could either be due to the source rock being overmature, i.e. in the condensate window, or the sample being contaminated by diesel. There is no indication of the sample being overmature and it is therefore believed that the sample is contaminated by diesel.

Zones B and C: Four samples from these two zones were extracted and all found to have a rich abundance of extractable hydrocarbons. The organic carbon normalized values are very high indicating all the samples to contain free hydrocarbons. The chromatographic separation of the extracts show the composition to be very similar for the four samples, with approximately 20-25% aromatic hydrocarbons and 25-80% saturated hydrocarbons. The gas chromatograms of the saturated hydrocarbons are very similar with a smooth front biased n-alkane distribution with maximum at nC_{17}. The pristane/phytane ratio is close to unity for all four samples while the pristane/nC_{17} ratio is low. This indicates well-mature hydrocarbons possibly originating from organic matter deposited in strongly reducing environment.

Zone D: Two samples from this zone were extracted and found to have a rich abundance of extractable hydrocarbons. The organic carbon normalized values are slightly lower than for the samples from zones B and C, but still high enough to indicate that the samples contain free hydrocarbons. The gas chromatograms of the saturated hydrocarbons are similar to those from zones B and C, but with a larger pristane/phytane ratio, indicating a less reducing environment of deposition.

Zone E and F: No samples from these zones were extracted.

Zone G: Five samples from this zone were extracted and all found to have a rich abundance of extractable hydrocarbons. The two uppermost samples, 2700-2720 m and 2720-2760 m have high values for extractability when the extraction values are normalized to organic carbon, similar to those from zone D. The hydrocarbon composition is also similar to that found for the analysed samples higher up in the well. The last three samples, 2760-2800 m, 3020-40 m and 3200 m have all far lower organic carbon normalized values and with a higher proportion of aromatic hydrocarbons for the samples from 2760-2800 m and 3820-40 m.

The gas chromatograms of the three uppermost samples are similar to those from Zone B and C while the two lowermost samples show a far higher input of high molecular weight n-alkanes, indicating a terrestric origin.

Aromatic Hydrocarbons

Very little is known about the geochemical significance of aromatic compounds in crude oils and rock extracts. Alkyl-benzenes, -naphthalenes, -phenantrenes, -antracenes are usually abundant showing characteristic distribution patterns in GC traces (Unpublished results, IKU 1981).

The aromatic fraction of the rock extracts were analysed by capillary GC (Appendix). However, the GC traces show little similarity to results from previous studies on aromatic compounds in IKU's laboratories. The GC traces of samples K 7489, 90, 95 and 97 show an unresolved envelope. A series of small evenly spaced peakes on top of the envelope indicates an homologous series of compounds. Samples K 7499, 7501, 06, 07, 11, 12, 24, 25, 37 and 45 show a well developed homology. It appears that an homologous series of compounds are being formed with increasing depth and maturation.

It is known that crude oils and rock extracts contain an homologous series of long chain alkyl benzenes (Solli et al., Adv. Organic Geochemistry 1979, p. 591). However, they occur in such low concentrations that they could only be detected using GC- mass spectrometry (MS) in the selected ion monitoring mode.

Sample K 7501 was selected for detailed GC-MS analysis since the GC trace shows a well developed homology. Ion chromatograms (m/z= 92, 106 and 120) as well as mass spectra of individual peaks, marked 1, 2 and 3 (see appendix) show that the homologous series of peaks are indeed mono-, di- and tri-substituted long chain alkyl benzenes.

It is rather surprising to find these compounds in such high concentrations and more research on the aromatic compounds need to be done before results of this kind can be explained in an organic geochemical context.

Examination in Reflected Light

Twenty samples were examined in reflected light and in ultra violet light. Each sample is described below, and other information from the analyses is given.

Sample K 7489, 2060-80 m: Shale, carbonate and pyrite masses, Ro = 0.39(20)

The organic material is restricted to shale cuttings showing a low content of inertinite and reworked particles with subordinate vitrinite particles and bitumen wisps. UV light shows a yellow fluorescence from spores and a low exinite content.

Sample K 7491, 2100-20 m: Mixed shales, Ro = 0.43(10)

The organic material content is low. Inertinite and reworked particles are dominant with traces only of poor vitrinite particles and bitumen wisps. UV light shows a yellow and yellow/orange fluorescence from spores and a low exinite content.

Sample K 7493, 2140-60 m: Shale and carbonate, Ro = 0.45(9)

The organic material content is low to moderate and there is light bitumen staining. Inertinite and reworked particles are dominant with traces only of true vitrinite particles. UV light shows a yellow and yellow/orange fluorescence from spores and a low exinite content.

Sample K 7497, 2220-40 m: Carbonate and shale, Ro = 0.48(5)

The organic material content is low with a few inertinite and reworked particles. There are traces only of the vitrinite and a few bitumen wisps. UV light shows a yellow/orange fluorescence from spores and a low exinite content.

Sample K 7502, 2320-40 m: Shale and carbonate, Ro = 0.44(4)

The organic material content is very low with light bitumen staining and wisps. There are a few particles of inertinite and reworked material with a few true vitrinite particles. UV light shows yellow/orange fluorescence from spores and a low to moderate exinite content.

Sample K 7506, 2400-20 m: Shale, Ro = 0.43(9)

The organic material content is low with particles of inertinite and reworked material and traces of vitrinite particles. Light bitumen staining and bitumen wisps. UV light shows a yellow/orange fluorescence and a low exinite content.

Sample K 7508, 2440-60 m: Shale, Ro = 0.44(5)

The organic material content is very low with a few particles of inertinite and reworked material. Only a handfull of vitrinite particles. Bitumen staining. UV light shows a yellow and yellow/orange fluorescence from spores and a moderate exinite content.

Sample K 7512, 2520-40 m: Shale and carbonate, Ro = 0.46(7)

The organic material content is low with overall light bitumen staining. Inertinite and reworked particles with traces of true vitrinite particles. UV light shows a yellow and yellow/orange fluorescence from spores and a low to moderate exinite content.

Sample K 7515, 2580-600 m: Shale, Ro = 0.50(7)

Some bitumen wisps but only traces of organic particles, mostly inertinite but some true and reworked vitrinite. UV light shows yellow fluorescence from spores and hydrocarbon wisps and a low exinite content.

Sample K 7518, 2640-60 m: Shale, Ro = 0.49(11)

The organic material content is very low and is dominated by inertinite and reworked particles with traces only of vitrinite particles. Light bitumen staining. UV light shows yellow and yellow/orange fluorescence from spores and hydrocarbon specks and a low to moderate exinite content.

Sample K 7520, 2680-700 m: Calcareous shale and limestone, Ro = 0.48(19)

Contains bitumen wisps and a low content of vitrinite and inertinite particles. Lowest Ro particles were measured but mostly reworked material. UV light shows yellow fluorescence from spores and hydrocarbon specks and a low to moderate exinite content.

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Sample K 7523, 2740-60 m: Shale, calcareous, Ro = 0.47(15)

Bitumen wisps but a low content of inertinite and reworked particles. Lowest Ro particles which are possibly true vitrinite were measured. UV light shows yellow and yellow/orange fluorescence from spores and a moderate exinite content.

Sample K 7524, 2760-80 m: Shale, calcareous, shale and carbonate, Ro = 0.49(2)

There are traces only of organic material, inertinite and reworked particles. A few lower Ro particles were measured, (possibly true). Bitumen wisps. UV light shows yellow and yellow/orange fluorescence from spores and a low exinite content.

Sample K 7525, 2780-800 m: Shale, Ro = 0.54(7)

The organic material content is low. Particles of vitrinite and inertinite. Mostly reworked material. Lowest Ro particles were measured, (possibly true). UV light shows yellow/orange fluorescence from spores and moderate content of exinite.

Sample K 7528, 2840-60 m: Shale and carbonate, Ro = 0.53(10)

The organic material content is low with particles of inertinite and vitrinite. Mostly, if not wholly, reworked material. Lowest Ro particles were measured. UV light shows yellow and yellow/orange fluorescence from spores and hydrocarbon specks and a low content of exinite.

Sample K 7530, 2880-900 m: Shale and carbonate, Ro = 0.57(9)

The organic material content is low to moderate with inertinite and vitrinite particles. Mostly reworked material. Lowest Ro particles were measured. UV light shows yellow and yellow/orange fluorescence from spores and a moderate exinite content.

Sample K 7532, 2920-40 m: Shale, Ro = 0.52(6)

The organic material content is low with gnarled particles of inertinite and vitrinite, mostly reworked. Lowest Ro particles were measured, (possibly true). Bitumen wisps. UV light shows yellow/orange fluorescence from spores wtih a low content of exinite.

Sample K 7537, 3020-40 m: Shale, Ro = 0.55(8)

The organic material content is low with gnarled inertinite and vitrinite particles, mostly reworked. Lowest Ro particles were measured, (possibly true). Bitumen wisps. UV light shows yellow/orange fluorescence from spores and a low content of exinite.

Sample K 7545, 3200 m: Calcareous shale, Ro = 0.50(8)

The organic material content is low to moderate with inertinite and vitrinite particles. Bitumen wisps. Lowest Ro particles were measured, possibly reworked. UV light shows yellow/orange fluorescence from spores and a moderate content of exinite.

Rock-Eval Pyrolyses

Zone A: Five samples from this zone were pyrolysed and all found to have a high oxygen and low hydrogen index indicating kerogen type III. The T_{max} temperature is low showing the samples to be immature.

Zone B: Two samples from this zone were analysed. The hydrogen index is moderate for the sample from 2180-2200 m. The oxygen index is very high for both samples. High oxygen indices are to be expected for immature samples but the very high ones encountered here could be due to CO_2 from the carbonate. The slightly higher hydrogen index in the sample from 2180-2200 m indicate this sample to contain more marine kerogen and the sample probably represent a mixture of kerogen types II and III. The samples in this zone have a high production index indicating the samples to contain free hydrocarbons.

Zone C: Four samples from this zone were analysed and all found to have low hydrogen indices and high oxygen indices typical for kerogen type III. The production index is slightly lower than for zone C but high enough still to indicate free hydrocarbons in the samples.

Zones D, E and F: Thirteen samples from these zones were pyrolysed and all found to be similar to those from zone C. The production index decreases gently with increasing depth showing a decreasing proportion of free hydrocarbons in the samples.

Zone G: Sixteen samples from this zone were pyrolysed and all found to have low hydrogen and high oxygen indices typical for kerogen type III. The production index is found to be low for almost all the analysed samples except for the sample 2740-60 m which has a higher production index, probably caused by free hydrocarbons in the sample.

Analyses in Transmitted light - Visual Kerogen Analyses

The interval from 2100 to 3200 m in this well has been evaluated on the basis of 20 samples.

The acid insoluble residues left after the standard chemical treatment are very small and partly dominated by mud additives and/or caved material. Our confidence in the results is therefore medium to low.

Small particles of organic as well as inorganic nature in aggregates suggest that we are dealing with lithologies rich in carbonate. The colours and partly the preservation of the palynomorps are variable and seem controlled by the lithology. The material of the investigated interval is therefore not very well suited for evaluation of maturity.

Most residues show a dominant or definitely marine element consisting of true amorphous sapropel and cysts which are well or fairly well preserved. The terrestrial element of most samples is dominated by reworked woody/coaly matter.

The well seems immature with presence of reworked woody material from 2100-20 m to 2220-40 m.

From 2400-20 m downwards at least to 2580-2600 m we estimate immature to moderate mature.

Further down we have very few observations because there are few pollen grains or spores.

At the level of 2940-60 m and 3000-20 m we suggest a maturity on top of or just entering the oil window.

The potential from the composition of the acid insoluble remains seems to be for gas and oil, more oil prone at 2440-60 m, 2580-2660 m, 2720-2780 m and 2860-3020 m.

Sample 2100-20 m, 2140-60 m, 2180-2000 m, 2220-40 m:

The residues are relatively small and nut shells (mud additive) were observed in all residues. The marine amorphous material occurs as aggregates which account for one to two thirds of the residues. The terrestrial remains are strongly sorted and consist mostly of finely dispersed, reworked oxidised woody (coaly) fragments. Sample 2180-2000 m seems to contain more cuticles and pollen and probably was deposited closer to the shore.

Colour index: 1, $^{1}/1+$, 2- and $^{2-}/2$ has been evaluated as reworked/oxidised pollen grains.

Remark: The cyst assemblages observed indicate material probably of different Cretaceous stages and polluted by caved Tertiary lithologies.

Samples 2400-20, 2440-60:

The small residues are dominantly marine with rich and varied cyst assemblages of variable colours and variable preservation. The terrestrial remains are dominated by reworked/oxidised woody material.

Colour index: $^{1+}/2-$

Samples 2480-2500 m and 2520-40 m:

The residues are dominated by sapropel, finely dispersed herbaceous material and inorganic material recorded as aggregates. The aggregates also embed larger crystals.

Colour index: $^{2-}/2$ probably too high as a maturation parameter.

Samples 2580-2600:

The residue is dominated by sapropel but abundant botryococcus (algae) indicate closer proximity to freshwater environment.

Colour index: $^{2-}/2$.

Samples 2600-20, 2640-60, 2680-70, 2720-40 and 2760-80:

Small residues with abundant nutshells and/or other mud additives and caved material. As an average half of the residues is amorphous material. The other part is terrestrial remains which include abundant, sapropelized cuticles and occasional botryococcus. Aggregates of minute particles indicate the presence of carbonate, but this may be derived from higher up this well.

There are very few palynomorphs which could be used for maturation studies. Fairly preserved cysts were observed in the two lowest samples but cysts have been omitted as not suited for colour studies.

Samples 2780-800, 2860-80, 2940-60 and 3000-20 m:

Amorphous material, partly as fairly dark aggregates, dominate the residues of this interval. The samples are distinguished from those of the interval above by large amounts of coaly, reworked fragments. They may represent a change from marine conditions below to shallow marine above in a low to medium high energy area.

Colour index: $^{2}/2+$ for pollen observed in the lowest samples.

Sample 3020-40 m:

Terrestrial remains, mostly of woody and reworked nature dominate this residue. The presence of botryococcus remains from 2780-800 m.

Sample 2300:

Amorphous material seems to dominate this residue which also includes a large amount of pyrite and of mud additive (nut shells).

Colour index: 2. The presence of chasmatosporites major indicate that bajocian or bajocian/bathonian deposits are represented in this sample.

CONCLUSION

The evaluation of the maturity of the analysed sequence is based on the vitrinite reflectance measurements, the spore colouration, the fluorescence of the spores in UV light and the T_{max} from the Rock-Eval pyrolyses. The richness of the samples are based on the abundance of light hydrocarbons, the amount of organic carbon in the samples, the extractability of the samples and the petroleum index from the Rock-Eval pyrolyses while the typing of the kerogen is based on the visual examination in transmitted light and Rock-Eval pyrolyses. Normally the gas chromatographic pattern of the saturated hydrocarbons will also be used in the typing of the kerogen. With a large number of samples from this well there were clear indications of the samples being contaminated with free hydrocarbons and it is therefore believed that the hydrocarbons in the samples might not be indigenous for the kerogen in the samples, and this is therefore omitted.

Based on the various analyses, the analysed sequence of the well, 2000-3200 m is found to be immature down to approximately 2800 m and immature to moderate mature down to 3200 m. The kerogen shows some changes throughout the whole of the analysed sequence, both by Rock-Eval pyrolyses and by examination in transmitted light. Almost all the analysed samples are found to have a mixture of amorphous and herbaceous material by transmitted light examination while the Rock-Eval pyrolyses shows almost all the samples to be of kerogen type III with a slight influx of kerogen type II in some. This difference in the two types of analyses, with visual kerogen showing the samples to be more oil prone than the pyrolyses is common throughout the Cretaceous sediments in the North Sea, and it is believed it is caused by sapropelization of terrestrial matter which make it look amorphous, thus the Rock-Eval pyrolyses is therefore more accurate.

The source rock rating for the different zones will then be:

Zone A; 2000-2180 m: The whole zone consisting of claystone is found to be immature with a fair potential as a source rock for gas.

Zone B; 2180-2240: The zone consists of claystone and limestone and is found to be immature. There are clear indications of migrated hydrocarbons in the zone, probably in the limestone. The claystone look to be slightly more oil prone than the zone above and is therefore rated to have a fair potential as a source rock for gas (and oil)?

Zone C; 2240-2340 m: As B but with a smaller proportion of limestone. The zone is immature with a fair potential as a source rock for gas. Clear indications of free hydrocarbons in the analysed samples.

Zone D; 2340-2540 m: A zone consisting of almost entirely claystone which is immature. Both the visual-kerogen and the Rock-Eval pyrolyses show the zone possibly to produce oil. The zone is therefore rated to have a fair potential as a source rock for gas (and oil)? The high production index indicate the possibility of free hydrocarbons in the zone. This is not verified by the other analyses.

Zone E; 2540-2580; Claystone and sandstone which is found to be immature. The claystone has a fair potential as a source rock for gas (and oil). No evidence of free hydrocarbons in the sandstone.

Zone F; 2580-2700 m: Another zone with claystone and sandstone which is immature. The claystone is found to have a fair potential as a source rock for gas. Indication of free, heavy hydrocarbons in the analysed samples.

Zone G; 2700-3200 m: Claystone which is found to be immature to moderate mature. Almost all the analysed samples are found to be gas prone with a few showing slightly higher hydrogen index. On the whole the zone is found to have a fair potential as a source rock for gas. Indications of free hydrocarbons at the upper part of the zone.

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K7487	2020	7728	120	75	36	55	847	8014	286	3.57	.64
K7488	2040	17936	242	169	106	141	1247	18593	657	3.54	.75
K7489	2060	127907	1996	1562	946	1275	14320	133687	5780	4.32	.74
K7490	2080	99675	1557	1233	800	1129	14380	104394	4719	4.52	.71
K7491	2100	233118	4086	2864	1454	1920	12785	243441	10323	4.24	.76
K7492	2120	268743	7346	4091	2076	2747	13278	285003	16260	5.71	.76
K7493	2140	327215	5737	3933	1943	2648	12705	341476	14261	4.18	.73
K7494	2160	269854	12589	12006	6281	8418	32186	309149	39294	12.71	.75
K7495	2180	578258	33129	41820	22873	29941	93400	706022	127763	18.10	.76
K7496	2200	18627	10262	14061	8686	11027	42792	62663	44036	70.27	.79
K7497	2220	11744	683	838	572	615	1664	14451	2707	18.73	.93
K7498	2240	62676	2974	2814	1600	1846	5613	71910	9234	12.84	.87
K7499	2260	47152	2673	2605	1478	1334	3285	55243	8091	14.65	1.11
K7500	2280	7471	282	234	142	130	400	8259	789	9.55	1.09
K7501	2300	54123	2739	2445	1699	1395	5812	62401	8278	13.27	1.22
K7502	2320	72742	3216	2122	1357	955	5336	80392	7650	9.52	1.42
K7503	2340	283059	12349	9128	5742	4592	19728	314870	31811	10.10	1.25
K7504	2360	252830	9074	5544	3082	2768	13175	273297	20467	7.49	1.11
K7505	2380	274835	9374	6202	3472	3175	16341	297057	22222	7.48	1.09
K7506	2400	179173	7633	5289	2993	3156	15275	198244	19071	9.62	.95
K7507	2420	28933	244524	18221	9582	12846	34859	314106	285173	90.79	.75
K7508	2440	340508	12548	12468	6425	9541	31247	381489	40980	10.74	.67
K7509	2460	165429	7788	8093	4201	5659	16088	191170	25741	13.47	.74
K7510	2480	134585	5897	5915	2831	3908	10347	153136	18551	12.11	.72
K7511	2500	216898	11070	12008	5751	8333	29600	254059	37162	14.63	.69

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K7512	2520	259100	10906	10346	4667	6302	16355	291322	32222	11.06	.74
K7513	2540	289521	12933	11688	5318	7287	24503	326747	37226	11.39	.73
K7514	2560	214134	8918	8130	3805	4564	13243	239552	25417	10.61	.83
K7515	2580	132871	8999	5981	2770	3174	8475	153795	20924	13.61	.87
K7516	2600	206919	13121	7496	3376	3242	8881	234153	27234	11.63	1.04
K7517	2620	29915	3807	2897	1436	1299	2633	39354	9439	23.98	1.11
K7518	2640	11089	2286	1467	597	536	1805	15975	4886	30.59	1.11
K7519	2660	16183	2929	1803	734	807	2006	22455	6272	27.93	.91
K7520	2680	29331	3235	1909	804	813	2024	36092	6761	18.73	.99
K7521	2700	65990	5330	3582	1651	1832	4683	78384	12394	15.81	.90
K7522	2720	24351	2009	1401	703	631	1628	29095	4744	16.30	1.11
K7523	2740	107924	7477	4844	2317	2083	5686	124646	16721	13.42	1.11
K7524	2760	55210	5166	4385	2299	2491	8876	69550	14341	20.62	.92
K7525	2780	49844	4225	3257	1614	1689	6029	60629	10785	17.79	.96
K7526	2800	13225	2464	2055	1043	1132	3322	19918	6693	33.60	.92
K7527	2820	19278	2108	1618	885	931	2492	24820	5542	22.33	.95
K7528	2840	26515	3212	2477	1249	1196	3252	34650	8134	23.48	1.04
K7529	2860	16523	2351	1905	1056	808	1771	22644	6120	27.03	1.31
K7530	2880	13057	2084	1857	1028	859	2210	18885	5828	30.86	1.20
K7531	2900	8539	1300	796	333	415	1823	11383	2843	24.98	.80
K7532	2920	5917	875	495	250	191	535	7728	1811	23.44	1.31
K7533	2940	10392	1411	769	381	296	1025	13249	2856	21.56	1.29
K7534	2960	8494	1437	1088	566	400	1511	11984	3490	29.12	1.42
K7535	2980	7016	1763	1258	558	435	1945	11030	4014	36.39	1.28
K7536	3000	6164	1063	826	420	257	808	8729	2565	29.39	1.63

IKU

TABLE I a.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN HEADSPACE.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K7537	3020	30017	3688	2419	1196	765	3088	38085	8068	21.18	1.56
K7538	3040	2708	325	253	148	114	539	3549	841	23.70	1.29
K7539	3060	6774	1100	830	413	298	1362	9415	2641	28.05	1.38
K7540	3080	8561	1573	1209	597	360	960	12300	3739	30.40	1.66
K7541	3120	27732	3378	2608	1262	805	2039	35784	8052	22.50	1.57
K7542	3140	40914	5122	4833	2564	1759	4442	55192	14278	25.87	1.46
K7543	3160	1697	249	281	132	113	370	2471	774	31.31	1.16
K7544	3180	11228	2521	2731	1406	1093	2788	18980	7752	40.84	1.29
K7545	3200	18139	4327	4505	2143	1541	3691	30656	12517	40.83	1.39

IKU

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K7487	2020	910		17	9	15	537	950	41	4.27	.60
K7488	2040	282				23	1179	305	23	7.56	.00
K7489	2060	N O	M A T E R I A L .								
K7490	2080	N O	M A T E R I A L .								
K7491	2100	594					2773	594	1	.15	1.00
K7492	2120	533	101	53		91	3736	779	245	31.52	.00
K7493	2140	400	67	66	62	136	3648	731	331	45.29	.46
K7494	2160	681	256	268	477	872	44023	2554	1874	73.35	.55
K7495	2180	2811	298	743	1309	2276	71850	7437	4625	62.20	.57
K7496	2200	1694	173	390	732	1246	39876	4235	2541	60.00	.59
K7497	2220	946	110	195	275	484	23776	2010	1064	52.93	.57
K7498	2240	747	87	143	196	349	9800	1524	776	50.94	.56
K7499	2260	1607	143	177	204	318	16256	2449	842	34.40	.64
K7500	2280	2437	109	101	99	148	8986	2895	458	15.82	.67
K7501	2300	1795	83	92	139	172	6646	2280	485	21.28	.81
K7502	2320	1120	85	95	120	136	7385	1556	436	28.01	.88
K7503	2340	946	114	154	216	277	11937	1708	762	44.60	.78
K7504	2360	1171	155	194	259	360	25010	2139	968	45.25	.72
K7505	2380	1322	149	168	191	282	15783	2112	791	37.43	.68
K7506	2400	759	136	184	180	327	11722	1586	827	52.13	.55
K7507	2420	17053	979	1225	835	1427	33066	21520	4467	20.76	.59
K7508	2440	2328	309	580	487	1184	28487	4888	2561	52.38	.41
K7509	2460	1969	354	892	1078	2222	45516	6515	4546	69.78	.48
K7510	2480	2241	456	923	814	1984	52940	6417	4176	65.08	.41
K7511	2500	1558	299	832	874	1957	43315	5521	3963	71.77	.45

IKU

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WETNESS (%)	iC4 / nC4
K7512	2520	1782	515	1146	888	2136	35138	6468	4686	72.44	.42
K7513	2540	2022	323	737	647	1435	39384	5163	3141	60.84	.45
K7514	2560	1036	227	488	405	857	20364	3014	1978	65.62	.47
K7515	2580	555	86	156	127	231	5039	1155	600	51.94	.55
K7516	2600	1180	321	550	444	804	21775	3299	2118	64.21	.55
K7517	2620	1149	289	611	612	1000	24861	3660	2512	68.62	.61
K7518	2640	2319	602	1278	838	1400	23729	6438	4119	63.98	.60
K7519	2660	1355	468	991	767	1368	23169	4948	3594	72.63	.56
K7520	2680	1925	410	672	407	846	23829	4261	2336	54.82	.48
K7521	2700	1335	235	405	315	662	20665	2952	1616	54.76	.48
K7522	2720	1510	276	494	377	710	17100	3367	1857	55.15	.53
K7523	2740	1190	157	252	181	362	8865	2141	952	44.45	.50
K7524	2760	1165	173	177	121	278	6914	1914	749	39.13	.43
K7525	2780	5869	1268	1286	899	994	10148	10316	4447	43.11	.90
K7526	2800	732	270	672	574	1088	13135	3337	2605	78.06	.53
K7527	2820	837	266	474	364	762	11976	2704	1866	69.02	.48
K7528	2840	1011	263	616	495	972	13618	3356	2345	69.88	.51
K7529	2860	942	282	704	518	971	9309	3416	2474	72.43	.53
K7530	2880	1639	356	800	685	1211	17977	4692	3053	65.07	.57
K7531	2900	298	133	236	137	269	3444	1074	776	72.24	.51
K7532	2920	91	35	57	37	57	226	276	185	67.12	.66
K7533	2940	583	251	376	215	420	5012	1845	1263	68.43	.51
K7534	2960	483	96	205	108	227	2604	1119	636	56.86	.47
K7535	2980	463	141	335	164	334	2357	1437	974	67.80	.49
K7536	3000	372	171	473	255	452	2819	1724	1352	78.41	.56

IKU

TABLE I b.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS IN CUTTINGS.

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
K7537	3020	1099	276	485	265	493	7373	2617	1518	58.02	.54
K7538	3040	378	152	316	201	314	1945	1360	982	72.20	.64
K7539	3060	369	152	400	215	395	2636	1531	1162	75.92	.54
K7540	3080	589	197	492	276	442	2414	1996	1407	70.48	.62
K7541	3120	859	290	697	321	602	3339	2770	1911	68.99	.53
K7542	3140	979	296	735	337	729	4181	3076	2097	68.18	.46
K7543	3160	222	94	242	191	265	3602	1014	792	78.08	.72
K7544	3180	3959	606	1456	1077	1699	9325	8798	4838	54.99	.63
K7545	3200	2075	515	1412	803	1406	12367	6212	4137	66.59	.57

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib).

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
K7487	2020	8638	120	92	45	70	1383	8964	327	3.65	.63
K7488	2040	18218	242	169	106	164	2426	18898	680	3.60	.65
K7489	2060	127907	1996	1562	946	1275	14320	133687	5780	4.32	.74
K7490	2080	99675	1557	1233	800	1129	14380	104394	4719	4.52	.71
K7491	2100	233712	4086	2864	1454	1920	15558	244035	10323	4.23	.76
K7492	2120	269276	7447	4145	2076	2838	17014	285782	16505	5.78	.73
K7493	2140	327614	5804	3999	2005	2784	16353	342206	14592	4.26	.72
K7494	2160	270535	12846	12274	6759	9290	76209	311703	41168	13.21	.73
K7495	2180	581069	33426	42563	24182	32218	165250	713458	132389	18.56	.75
K7496	2200	20321	10435	14451	9419	12273	82668	66898	46577	69.62	.77
K7497	2220	12690	793	1033	847	1099	25440	16462	3771	22.91	.77
K7498	2240	63424	3061	2957	1796	2195	15412	73433	10010	13.63	.82
K7499	2260	48759	2817	2782	1682	1652	19540	57692	8933	15.48	1.02
K7500	2280	9907	391	336	241	278	9386	11154	1247	11.18	.87
K7501	2300	55918	2821	2538	1838	1566	12458	64681	8763	13.55	1.17
K7502	2320	73862	3301	2216	1477	1092	12721	81949	8086	9.87	1.35
K7503	2340	284005	12463	9282	5959	4869	31665	316578	32573	10.29	1.22
K7504	2360	254001	9229	5737	3341	3128	38185	275436	21435	7.78	1.07
K7505	2380	276156	9523	6369	3663	3457	32124	299169	23013	7.69	1.06
K7506	2400	179932	7768	5473	3173	3484	26997	199830	19898	9.96	.91
K7507	2420	45986	245503	19447	10417	14272	67924	335626	289639	86.30	.73
K7508	2440	342836	12857	13048	6911	10724	59734	386377	43541	11.27	.64
K7509	2460	167397	8142	8985	5278	7881	61605	197684	30287	15.32	.67
K7510	2480	136826	6352	6838	3645	5892	63286	159553	22727	14.24	.62
K7511	2500	218456	11369	12840	6626	10290	72915	259581	41125	15.84	.64

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib).

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WETNESS (%)	iC4 / nC4
K7512	2520	260882	11421	11493	5556	8438	51494	297790	36908	12.39	.66
K7513	2540	291543	13256	12424	5965	8722	63888	331910	40367	12.16	.68
K7514	2560	215171	9145	8618	4210	5422	33608	242566	27395	11.29	.78
K7515	2580	133426	9084	6137	2897	3406	13514	154950	21524	13.89	.85
K7516	2600	208100	13441	8046	3819	4045	30656	237452	29352	12.36	.94
K7517	2620	31063	4096	3508	2048	2298	27494	43014	11950	27.78	.89
K7518	2640	13409	2888	2746	1434	1937	25534	22414	9005	40.18	.74
K7519	2660	17538	3397	2794	1501	2175	25175	27404	9866	36.00	.69
K7520	2680	31256	3645	2581	1211	1659	25854	40353	9097	22.54	.73
K7521	2700	67325	5565	3986	1966	2493	25348	81336	14011	17.23	.79
K7522	2720	25862	2284	1895	1080	1341	18728	32462	6601	20.33	.80
K7523	2740	109114	7634	5096	2498	2445	14551	126787	17673	13.94	1.02
K7524	2760	56375	5339	4562	2420	2769	15790	71464	15090	21.11	.87
K7525	2780	55713	5492	4544	2514	2683	16177	70945	15232	21.47	.94
K7526	2800	13957	2734	2727	1617	2220	16458	23255	9298	39.98	.73
K7527	2820	20116	2374	2091	1249	1694	14468	27524	7408	26.92	.74
K7528	2840	27526	3475	3093	1745	2167	16870	38006	10480	27.57	.80
K7529	2860	17465	2633	2609	1574	1779	11080	26060	8595	32.98	.89
K7530	2880	14695	2440	2657	1713	2070	20187	23576	8881	37.67	.83
K7531	2900	8838	1433	1032	470	684	5267	12456	3619	29.05	.69
K7532	2920	6008	910	552	288	247	761	8004	1997	24.94	1.16
K7533	2940	10975	1662	1144	597	716	6036	15094	4119	27.29	.83
K7534	2960	8977	1533	1293	674	627	4114	13103	4126	31.49	1.07
K7535	2980	7479	1904	1592	722	769	4302	12467	4988	40.01	.94
K7536	3000	6536	1234	1299	675	709	3627	10453	3917	37.47	.95

IKU

TABLE I c.

CONCENTRATION (ul Gas / kg Rock) OF C1 - C7 HYDROCARBONS (Ia + Ib).

IKU No.	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
K7537	3020	31115	3964	2903	1461	1258	10461	40702	9586	23.55	1.16
K7538	3040	3086	477	570	349	428	2484	4909	1823	37.14	.82
K7539	3060	7143	1251	1230	628	693	3998	10946	3803	34.74	.91
K7540	3080	9150	1770	1701	873	801	3374	14296	5146	35.99	1.09
K7541	3120	28591	3668	3304	1584	1407	5378	38554	9963	25.84	1.13
K7542	3140	41893	5418	5568	2901	2489	8622	58269	16376	28.10	1.17
K7543	3160	1919	343	523	322	378	3972	3485	1565	44.92	.85
K7544	3180	15188	3127	4188	2483	2792	12113	27778	12590	45.32	.89
K7545	3200	20214	4842	5918	2946	2948	16058	36868	16653	45.17	1.00

IKU

TABLE NO.: II

WELL NO.: 34/2-2

Sample	Depth	TOC		Lithology
K 7487	2020-40	0.62	80%	Claystone, silty, occasionally sandy, light grey/grey, sm.am. green and brownish, non-calcareous to calcareous, scattered black minute grains ?organic
				Sm.am. Pyrite; light grey Limestone; Glauconite
			20%	Cement
K 7488	2040-60	0.66	90%	Claystone, as above
			10%	Cement
K 7489	2060-80	1.21	100%	Claystone, as above
				Sm.am. Abundant Glauconite; light grey Limestone, brownish; Pyrite (Additives)
K 7490	2080-2100	0.93	92%	Claystone, as above
			3%	Glauconite
			5%	Additives
K 7491	2100-20	0.85	95%	Claystone, silty, grey/light grey, slightly calcareous to calcareous, occasionally pyritic
			5%	Glauconite
				Sm.am. Additives; light grey Limestone
K 7492	2120-40	0.85	95%	Claystone, as above
			3%	Additives/Cement
			2%	Glauconite
				Sm.am. Limestone, white
01/D/1/mk				

Sample	Depth	TOC	Lithology	
K 7493	2140-60	0.90	98%	Claystone, as above, occasionally artificial brown stained (?hydro-carbons)
			2%	Glauconite
K 7494	2160-80	0.77	95%	Claystone, grey, as above
			2%	Glauconite
			3%	Limestone, white
K 7495	2180-2200	0.68	50%	Claystone, as above
		0.45	50%	Limestone, white, partly pinkish, grading to light grey
K 7496	2200-20	0.66	60%	Claystone, as above
		0.23	40%	Limestone, white, occasionally brown stained at the surface
K 7497	2220-40	0.81	85%	Claystone, silty, grey, some light grey (slightly greenish), non-calcareous to some calcareous
			15%	Limestone, white to light grey, brown-grey, hard to yellow-brown (?partly sideritic)
K 7498	2240-60	0.66	85%	Claystone, as above
			15%	Limestone, as above
K 7499	2260-80	0.85	85%	Claystone, grey, as above
			15%	Limestone, white, yellowish brown (hard, ?sideritic)
K 7500	2280-2300	0.76	92%	Claystone, grey, non-calcareous to some calcareous
			8%	Limestone, as above

01/D/2/mk

KU

TABLE NO.: II

WELL NO.: 34/2-2

Sample	Depth	TOC	Lithology	
K 7501	2300-20	0.84	95%	Claystone, as above, some brown staining on the surface (?hydrocarbons)
			5%	Limestone, as above
K 7502	2320-40	1.09	100%	Claystone, as above
K 7503	2340-60	0.75	95%	Claystone, as above
			5%	Limestone, white
K 7504	2360-80	0.73	100%	Claystone, as above
				Sm.am. Limestone, white; Glauconite
K 7505	2380-2400	0.81	100%	Claystone, as above
K 7506	2400-20	0.84	100%	Claystone, as above
				Sm.am. Limestone; Glauconite
K 7507	2420-40	0.90	100%	Claystone, as above
K 7608	2440-60	0.86	100%	Claystone, as above
K 7509	2460-80	0.77	92%	Claystone, as above
			8%	Limestone, white and light yellow-brown ?Siderite
				Sm.am. Sandstone, fine, glauconitic
K 7510	2480-2500	0.81	92%	Claystone, as above
			8%	Limestone, white, some brownish, ?Siderite
				Sm.am. Glauconite
K 7511	2500-20	0.84	95%	Claystone, as above
			5%	Limestone and ?Siderite

01/D/3/mk

IKU

TABLE NO.: II

WELL NO.: 34/2-2

Sample	Depth	TOC		Lithology
K 7512	2520-40	0.95	93%	Claystone, as above, partly silty/ sandy with abundant laminae/lenses of very fine Sandstone/Siltstone (slightly glauconitic)
			7%	?Siderite and Limestone
K 7513	2540-60	0.84	85%	Claystone, as above
			12%	Sandstone, very fine to fine, some glauconitic, white to light grey
			3%	Limestone and Siderite
K 7514	2560-80	0.73	68%	Claystone, grey, as above
			25%	Sandstone, as above
			7%	?Siderite, yellow-brown and some light grey/white Limestone
K 7515	2580-2600	0.82	90%	Claystone, as above
			5%	Limestone/Siderite
			5%	Sandstone
K 7516	2600-20	0.85	78%	Claystone, as above
			15%	Sandstone, as above
			7%	?Siderite, light yellow-brown, hard, some white Limestone
K 7517	2620-40	0.62	73%	Claystone, as above
			20%	Sandstone, as above, some calcareous
			7%	?Siderite and Limestone
01/D/4/mk				

IKU

TABLE NO.: II

WELL NO.: 34/2-2

Sample	Depth	TOC	Lithology
K 7518	2640-60	1.03	10% Claystone, grey, with abundant light laminae and lenses of Silt/Sand that make up a large part of the material, non-calcareous to some calcareous 5% Sandstone 85% Nut shells (additive)
K 7519	2660-80	0.79	35% Claystone, silty/sandy, as above 15% Sandstone, as above 60% Nut shells
K 7520	2680-2700	0.85	75% Nut shells 20% Claystone, as above 5% Sandstone
K 7521	2700-20	1.72	70% Claystone, as above, some bio-turbation 30% Nut shells
K 7522	2720-40	1.06	70% Claystone, as above 10% Sandstone 20% Nut shells Sm.am. ?Siderite and white/light grey Limestone
K 7523	2740-60	0.90	73% Claystone, as above 7% Limestone/Siderite 20% Nut shells
K 7524	2760-80	1.35	85% Claystone, as above 5% Limestone, white 10% Nut shells
01/D/5/mk			

IKU

TABLE NO.: II

WELL NO.: 34/2-2

Sample	Depth	TOC	Lithology
K 7525	2780-2800	1.23	85% Claystone, as above 15% Nut shells Sm.am. ?Siderite and Limestone
K 7526	2800-20	0.71	85% Claystone, grey, with Silt/Sand-laminae 5% Sandstone 10% Nut shells
K 7527	2820-40	0.81	92% Claystone with Sand/Silt, laminae, grey, non-calcareous to some calcareous 8% Nut shells Sm.am. Limestone/?Siderite
K 7528	2840-60	0.89	100% Claystone, as above Sm.am. Sandstone; Limestone; Nut shells
K 7529	2960-80	0.83	100% Claystone, silty/sandy as above, obs. green Sm.am. Nut shells
K 7530	2880-2900	0.88	100% Claystone, grey, partly interlaminated with Silt/Sandstone, obs. green, non-calcareous to some calcareous Sm.am. Limestone/Siderite; secondary fibrous Calcite
K 7531	2900-2920	0.82	90% Claystone, as above 5% Sandstone 5% Limestone and ?Siderite
01/D/6/mk			

IKU

TABLE NO.: II

WELL NO.: 34/2-2

Sample	Depth	TOC		Lithology
K 7532	2920-40	0.91	88%	Claystone, silty, slightly sandy, grey, some greenish
			7%	Limestone/?Siderite
			5%	Sandstone
K 7533	2940-60	0.82	100%	Claystone, as above
				Sm.am. ?Siderite and Limestone; Gypsum
K 7534	2960-80	0.89	100%	Claystone, as above, some light grey, slightly calcareous to calcareous, obs. greenish
				Sm.am. Limestone/?Siderite; Gypsum
K 7535	2980-3000	0.71	85%	Claystone, as above, some greenish
			10%	Gypsum
			5%	Limestone, white
K 7536	3000-3020	0.81	95%	Claystone, as above
			5%	Limestone, white
K 7537	3020-3040	0.98	93%	Claystone, as above
			7%	Limestone, some ?Siderite
K 7538	3040-60	0.82	90%	Claystone, as above
			7%	Gypsum
			3%	Limestone
K 7539	3060-80	0.60	100%	Claystone, as above
				Sm.am. Sandstone; Limestone
K 7540	3080-3100	0.63	95%	Claystone, as above
			5%	Limestone, white
01/D/7/mk				

IKU

TABLE NO.: II

WELL NO.: 34/2-2

Sample	Depth	TOC		Lithology
K 7541	3100-20	0.69	100%	Claystone, as above
K 7542	3140	0.67	95%	Claystone, grey, some grading to light, dark and brownish, slightly calcareous to calcareous
			5%	Limestone, white
K 7543	3160		95%	Nut shells (additive)
		0.62	5%	Claystone,
K 7544	3180	0.65	75%	Claystone, as above
			20%	Limestone, white to grey
			5%	Sandstone, white
K 7545	3200	1.35	92%	Claystone, as above, partly with Sand/Silt-laminae, obs. dark grey
			8%	Limestone, as above

01/D/8/mk

IKU No.	Depth	Ethane	Propane	MC_3	nC_4	MC_4	nC_5	$Cy\ C_5$ + 2.3 DMC_4 2-MC_5	$3MC_5$	nC_6	$MCyC_5$	CyC_6 + $MCyC_6$	$3MC_6$	1cis-3-$DMCyC_5$	1tr-3-$DMCyC_5$	2.2-4 TMC_5	nC_7	Benzene	$MCyC_6$ +$ECyC_6$	nC_8	Toluene
K7494	2180	0.3	1.4	2.0	8.6	6.6	17.7	7.7	6.5	0.2	12.6	19.2	11.7	2.5	1.2	3.7	14.3	1.6	42.0	11.5	10.0
K7495	2200	10.2	33.2	52.5	212.0	148.0	391.0	169.0	142.0	343.0	268.0	418.0	256.0	56.1	28.1	87.8	362.0	20.1	1030.0	281.0	153.0
K7496	2220	0.4	1.6	2.4	11.7	9.7	27.2	12.3	10.7	27.4	20.9	31.1	21.5	4.8	2.2	6.9	29.8	6.9	74.8	0.2	14.9
K7497	2240	0.7	2.7	3.1	11.2	6.7	14.3	7.2	5.8	13.7	7.8	16.5	8.8	0.5	0.04	0.6	9.9	4.1	41.1	13.2	11.2
K7501	2320	1.0	1.0	1.0	3.3	1.9	3.8	2.1	1.7	4.0	2.8	4.6	3.2	1.3		1.2	4.9	2.4	11.4	4.5	5.8
K7503	2360	30.4	1.5	1.7	5.5	3.6	7.0	4.5	3.8	8.6	8.3	9.8	6.9	1.6	0.8	2.4	9.0	0.6	25.3	7.3	6.9
K7507	2440	1.7	3.1	3.8	17.0	11.1	31.3	13.3	10.9	28.2	21.6	26.2	17.1	4.4		10.6	26.4	2.9	61.9	19.1	1.7
K7509	2480	0.7	3.8	4.8	21.2	13.1	33.2	11.5	9.3	21.5	18.0	24.0	13.9	3.4		7.6	18.4	7.6	49.1	13.7	19.6
K7511	2520	1.0	6.8	9.8	37.3	24.6	58.9	24.7	20.2	45.4	34.8	48.7	31.0	7.4		16.7	39.4	1.9	110.0	280.0	34.7
K7513	2560	1.0	4.0	4.1	14.2	75.1	18.0	6.8	5.5	13.2	11.2	14.8	8.6	2.2		5.3	13.3	1.2	29.5	10.8	15.3
K7516	2620	0.8	3.5	3.2	9.5	4.5	9.9	3.9	3.1	6.5	7.1	8.6	4.5	1.3		3.2	5.8	0.6	17.3	4.2	9.8
K7518	2660	0.9	3.8	3.4	8.9	3.8	9.5	3.5	3.1	3.7	9.6	7.8	4.9	1.5		3.7	8.0	0.3	14.0	4.4	21.9
K7520	2700	0.8	1.1	1.0	3.4	1.9	5.0	2.9	2.7	7.8	7.5	10.7	6.1	1.8		4.8	9.6	0.2	27.5	8.5	11.1
K7523	2760	2.5	9.1	9.0	26.9	19.4	51.3	25.2	21.6	58.4	32.5	48.0	36.1	9.5		24.2	65.6	2.2	118.0	52.4	21.5
K7528	2860	2.6	10.3	8.5	19.5	6.6	13.4	4.1	3.2	7.1	6.4	8.3	4.0	1.1		2.8	5.5	3.5	15.5	3.9	8.7
K7530	2900	2.0	5.3	4.8	12.0	4.8	8.9	4.7	3.8	9.1	4.7	8.7	7.6	2.2		2.2	12.6	1.9	19.6	14.1	7.6
K7535	3000	1.1	3.9	2.1	5.4	5.0	5.9	0.8	0.6	1.2	0.8	1.5	0.9	0.2		0.5	1.0	0.4	3.2	0.8	2.2
K7545	3200	1.4	7.5	7.6	16.5	7.0	9.7	5.5	4.4	7.8	5.1	9.2	5.8	1.7		1.9	5.5	2.3	18.0	4.9	7.5

Table 111

GASOLINE RANGE HYDROCARBONS (HYDROGEN STRIPPING) $\frac{\text{ppb W/W}}{\text{100 ml } H_2}$

TABLE: IV

WEIGHT OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKU-No	DEPTH (m)	Rock Extr. (g)	EOM (mg)	Sat. (mg)	Aro. (mg)	HC (mg)	Non HC (mg)	TOC (%)
K-7489 K-7490	2060-2100	8.3	7.9	3.2	1.0	4.2	3.7	1.9
K-7495	2180	3.3	7.8	3.6	1.0	4.6	3.2	.6
K-7497	2220	6.2	11.2	5.4	1.3	6.7	4.5	.8
K-7499	2260	4.7	7.3	3.8	1.0	4.8	2.5	.8
K-7501	2300	9.4	12.2	6.5	1.3	7.8	4.4	.8
K-7506 K-7507	2400-2440	15.2	21.1	10.1	2.5	12.6	8.5	.8
K-7511 K-7512	2500-2540	19.0	31.2	17.0	3.4	20.4	10.8	.9
K-7521	2700	5.7	10.3	4.8	.8	5.6	4.7	.8
K-7522	2720	10.7	11.2	5.6	1.2	6.8	4.4	.6
K-7524 K-7525	2760-2800	3.9	3.5	1.3	.5	1.8	1.7	.8
K-7537	3020	3.2	4.0	1.2	.5	1.7	2.3	.9
K-7545	3200	10.1	9.4	4.9	1.0	5.9	3.5	1.2

TABLE: V

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm of rock)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
K-7489 K-7490	2060 – 2100	952	386	120	506	446
K-7495	2180	2364	1091	303	1394	970
K-7497	2220	1806	871	210	1081	726
K-7499	2260	1553	809	213	1021	532
K-7501	2300	1298	691	138	830	468
K-7506 K-7507	2400– 2440	1388	664	164	829	559
K-7511 K-7512	2500– 2540	1642	895	179	1074	568
K-7521	2700	1807	842	140	982	825
K-7522 K-7523	2720– 2760	1047	523	112	636	411
K-7524 K-7525	2760 – 2800	897	333	128	462	436
K-7537	3020	1250	375	156	531	719
K-7545	3200	931	485	99	584	347

IKU

T A B L E : VI

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
K-7489 K-7490	2060– 2100	50.1	20.3	6.3	26.6	23.5
K-7495	2180	393.9	181.8	50.5	232.3	161.6
K-7497	2220	225.8	108.9	26.2	135.1	90.7
K-7499	2260	194.1	101.1	26.6	127.7	66.5
K-7501	2300	162.2	86.4	17.3	103.7	58.5
K-7506 K-7507	2400– 2440	173.5	83.1	20.6	103.6	69.9
K-7511 K-7512	2500– 2540	182.5	99.4	19.9	119.3	63.2
K-7521	2700	225.9	105.3	17.5	122.8	103.1
K-7522 K-7523	2720– 2760	174.5	87.2	18.7	105.9	68.5
K-7524 K-7525	2760– 2800	112.2	41.7	16.0	57.7	54.5
K-7537	3020	138.9	41.7	17.4	59.0	79.9
K-7545	3200	77.6	40.4	8.3	48.7	28.9

TABLE: VII

COMPOSITION IN % OF THE MATERIAL EXTRACTED FROM THE ROCK

IKU-No	DEPTH (m)	Sat / EOM	Aro / EOM	HC / EOM	Sat / Aro	Non HC / EOM	HC / Non HC
K-7489 K-7490	2060– 2100	40.5	12.7	53.2	320.0	46.8	113.5
K-7495	2180	46.2	12.8	59.0	360.0	41.0	143.7
K-7497	2220	48.2	11.6	59.8	415.4	40.2	148.9
K-7499	2260	52.1	13.7	65.8	380.0	34.2	192.0
K-7501	2300	53.3	10.7	63.9	500.0	36.1	177.3
K-7506 K-7507	2400– 2440	47.9	11.8	59.7	404.0	40.3	148.2
K-7511 K-7512	2500 – 2540	54.5	10.9	65.4	500.0	34.6	188.9
K-7521	2700	46.6	7.8	54.4	600.0	45.6	119.1
K-7522 K-7523	2720– 2760	50.0	10.7	60.7	466.7	39.3	154.5
K-7524 K-7525	2760 – 2800	37.1	14.3	51.4	260.0	48.6	105.9
K-7537	3020	30.0	12.5	42.5	240.0	57.5	73.9
K-7545	3200	52.1	10.6	62.8	490.0	37.2	168.6

TABLE VIII

TABULATION OF DATAS FROM THE GASCHROMATOGRAMS

IKU No.	DEPTH (m)	PRISTANE / n-C17	PRISTANE / PHYTANE	CPI
K7489 K7490	2060 – 2100	.3	1.3	1.3
K7495	2180	.4	1.3	.9
K7497	2220	.3	1.0	.9
K7499	2260	.3	1.0	.9
K7501	2300	.3	1.1	1.0
K7506 K7507	2400 – 2440	.4	1.3	1.0
K7511 K7512	2500 – 2540	.4	1.2	.9
K7521	2700	.3	1.0	.8
K7522 K7523	2720 – 2760	.3	1.0	.9
K7524 K7525	2760 – 2800	.3	1.1	.9
K7537	3020	.4	1.2	1.1
K7545	3200	.4	1.6	1.0

IKU

VITRINITE REFLECTANCE MEASUREMENTS

TABLE NO.: IX

Well 34/2-2

Sample	Height	Vitrinite reflectance	Fluorescence in UV light	Exinite content
K 7489	2060-80	0.39 (20)	Yellow	Low
K 7491	2100-20	0.43 (10)	Yellow + Yellow/Orange	Low
K 7493	2140-60	0.45 (9)	Yellow + Yellow/Orange	Low
K 7497	2220-40	0.48 (5)		Low
K 7502	2320-40	0.44 (4)	Yellow/Orange	Low-Moderate
K 7506	2400-20	0.43 (9)	Yellow/Orange	Low
K 7508	2440-60	0.44 (5)	Yellow + Yellow/Orange	Moderate
K 7512	2520-40	0.46 (7)	Yellow + Yellow/Orange	Low-Moderate
K 7515	2580-600	0.50 (7)	Yellow	Low
K 7518	2640-60	0.49 (11)	Yellow + Yellow/Orange	Low-Moderate
K 7520	2680-700	0.48 (19)	Yellow	Low-Moderate
K 7522	2720-40	0.44 (9)	Yellow + Yellow/Orange	Low-Moderate
K 7523	2740-60	0.47 (15)	Yellow + Yellow/Orange	Moderate
K 7524	2760-80	0.49 (2)	Yellow + Yellow/Orange	Low
K 7525	2780-800	0.54 (7)	Yellow/Orange	Moderate
K 7528	2840-60	0.53 (10)	Yellow + Yellow/Orange	Low
K 7530	2880-900	0.57 (9)	Yellow + Yellow/Orange	Moderate
K 7532	2920-40	0.52 (6)	Yellow/Orange	Low
K 7537	3020-40	0.55 (8)	Yellow/Orange	Low
K 7545	3200	0.50 (8)	Yellow/Orange	Moderate

IKU

VISUAL KEROGEN ANALYSIS

TABLE NO.: X

WELL NO.: 34/2-2

Sample	Depth	Composition of residue	Particle size	Preservation-palynomorphs	Thermal maturation index	Remarks
K 7491	2100-20	WR!, He/Am, Cy	F-M	good	1	Pyrite, amorphous material as aggregates, nut shells. Black coal fragments.
K 7493	2140-60	Am, Cy/WR!, W, He, PR!, P	F-M	good	$^{1}/1+$ (2- ox)	As above, but cyst colours are more variable.
K 7495	2180-2000	* WR!, Cut, R?, P/Am, Cy	F-M	fair	$^{1}/1+$ (2- ox)	Ironoxide, Tertiary cysts in addition to the description above.
K 7497	2220-40	WR!, He/Am, Cy	F-M	good	($^{2-}/2$ ox)	Aggregates as 2100-20. Two generations of sapropel, the younger is"leaching"(?additives)
K 7505	2400-20	Am, Cy/WR!, W, P	F-M	good	$^{1+}/2-$	Aggregates, pyrite also inside cysts. Change in flora, rich, variably coloured.
K 7508	2440-60	Am, Cy/WR!, He	F-M	good	$^{1+}/2-$	Aggregates generally darker (grey). Palynomorphs are thin walled, variably coloured. Pyrite framboids adhere and may have been misinterpreted (in parts) as woody reworked remains

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	R!	reworked	L	large

IKU

VISUAL KEROGEN ANALYSIS

TABLE NO.: X

WELL NO.: 34/2-2

Sample	Depth	Composition of residue	Particle size	Preservation-palynomorphs	Thermal maturation index	Remarks
K 7510	2480-2500	Am, Cy/He, W, WR!	F	good	2-/2 ox?	Aggregates of amorphous/herbaceous/inorganic material embed larger crystals. Arbitrarily evaluated proportions.
K 7512	2520-40	WR!, W, He, P/Am, Cy	F-M	good	2-/2 ox?	
K 7515	2580-2600	Am, Cy/WR!, W, He, P	F-M	good	2-/2 ox?	Botryococcus (algae) abundant, pyrite aggregates.
K 7516	2600-20	Am, Cy/WR!, W, Cut, P	F-M	good to fair	(2/2+ ox)	Cyst colours and wall-thickness strongly variable. Aggregates.
K 7518	2640-60	* Am/He, W, WR!	F-M	-	(2 ox)	Nut shells dominate. Dark aggregates of amorphous, and sapropelized terrestrial remains (? cuticles)
K 7520	2680-2700	* He, W, WR!/Am	F-M	-	-	Mainly mud additives as K 7518. Aggregates in both samples may represent caved lithologies.

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	R!	reworked	L	large

IKU

VISUAL KEROGEN ANALYSIS

TABLE NO.: X

WELL NO.: 34/2-2

Sample	Depth	Composition of residue	Particle size	Preservation-palynomorphs	Thermal maturation index	Remarks
K 7522	2720-40	Am/He, W	F	-	-	Very poor residue, mud additives Botryococcus. Amorphous material as aggregates embedding terrestrial particles.
K 7524	2760-80	Am/He, W	F	-	-	
K 7525	2780-800	WR!, W, He/Am, Cy	F-M	fair to good	-	Reworked coaly dark particles and pyrite dominate. Mud additives.
K 7529	2860-80	Am, Cy/WR,	F-M	fair to good	-	Pyrite, fairly dark aggregates, ironoxide.
K 7533	2940-60	Am, Cy/WR!, Cut, P	F-M	fair to good	(1 caved) $^{2}/2+$ ox	Aggregates with an inorganic very closely integrated component.
K 7536	3000-20	Am, Cy/W, WR, He, P	F	fair to good	$^{2}/2+$ ox	Finely dispersed material and some aggregates. Ironoxide.

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	R!	reworked	L	large

IKU

VISUAL KEROGEN ANALYSIS

TABLE NO.: X

WELL NO.: 34/2-2

Sample	Depth	Composition of residue	Particle size	Preservation-palynomorphs	Thermal maturation index	Remarks
K 7537	3020-40	WR!, W, He, Cut/Am, Cy	F-M	fair to good	-	Resembles K 7525. Botryococcus. Fungi.
K 7545	2300	Am, Cy/He, W, Cut	F	fair	2 ?ox	50% pyrite framboids, nutshells Chasmatosporites. Bathonian/ Bajocian or older.

ABBREVATIONS

Am	amorphous	Cy	cysts, algae	W	woody material	F	fine
He	herbaceous	P	pollen grains	C	coal	M	medium
Cut	cuticles	S	spores	R!	reworked	L	large

TABLE XI

ROCK EVAL PYROLYSES

IKU No.	DEPTH (m)	S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1 / S1+S2	TEMP. max (C)
K7489	2060	.09	.81	3.31	1.21	67	274	.90	.10	412
K7490	2080	.18	.80	1.82	.93	86	196	.98	.18	410
K7491	2100	.18	.83	2.14	.85	98	252	1.01	.18	410
K7492	2120	.14	.52	1.71	.85	61	201	.66	.21	410
K7493	2140	.22	.69	1.85	.90	77	206	.91	.24	411
K7495	2180	1.29	.51	2.07	.45	113	460	1.80	.72	366
K7497	2220	1.07	.52	1.84	.81	64	227	1.59	.67	410
K7499	2260	.89	.51	1.27	.85	60	149	1.40	.64	377
K7501	2300	.67	.73	2.09	.84	87	249	1.40	.48	418
K7502	2320	.23	.60	2.12	1.09	55	194	.83	.28	414
K7503	2340	.51	.47	1.70	.75	63	227	.98	.52	412
K7505	2380	.26	.91	1.72	.81	112	212	1.17	.22	409
K7506	2400	.47	1.04	1.83	.84	124	218	1.51	.31	413
K7507	2420	.46	1.29	1.78	.90	143	198	1.75	.26	428
K7508	2440	.38	1.04	1.46	.86	121	170	1.42	.27	418
K7510	2480	.28	.85	1.42	.81	105	175	1.13	.25	422
K7511	2500	.49	1.20	1.88	.84	143	224	1.69	.29	422
K7512	2520	.57	1.73	1.39	.95	182	146	2.30	.25	426
K7513	2540	.41	1.21	1.21	.84	144	144	1.62	.25	426
K7515	2580	.32	1.01	1.37	.82	123	167	1.33	.24	425
K7516	2600	.21	1.03	1.56	.85	121	184	1.24	.17	427
K7518	2640	.12	1.14	.85	1.03	111	83	1.26	.10	431
K7519	2660	.10	.68	.75	.79	86	95	.78	.13	426
K7520	2680	.13	.81	.88	.85	95	104	.94	.14	428
K7521	2700	1.72	2.09	3.88	1.72	122	226	3.81	.45	424

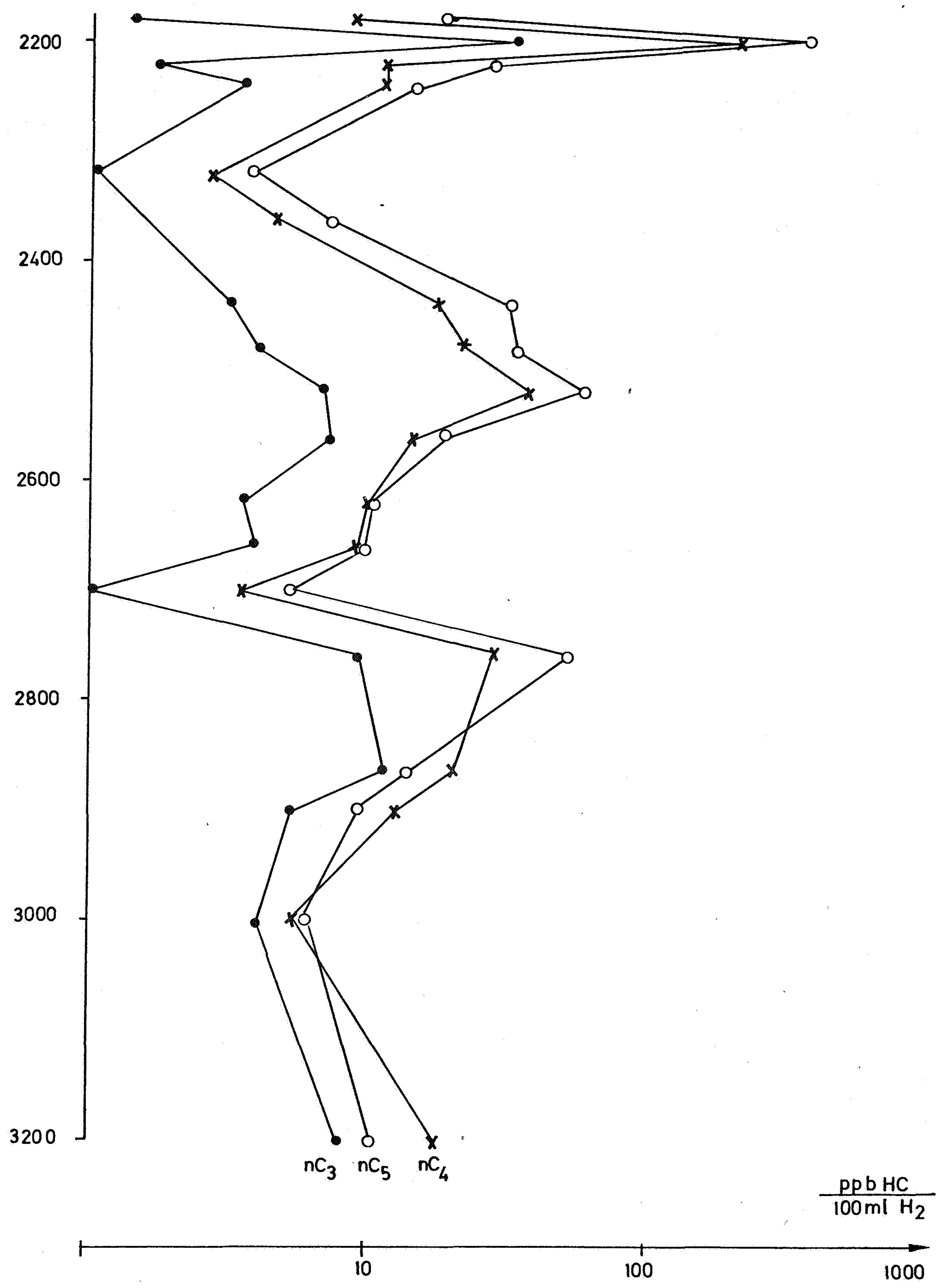
IKU

TABLE XI

ROCK EVAL PYROLYSES

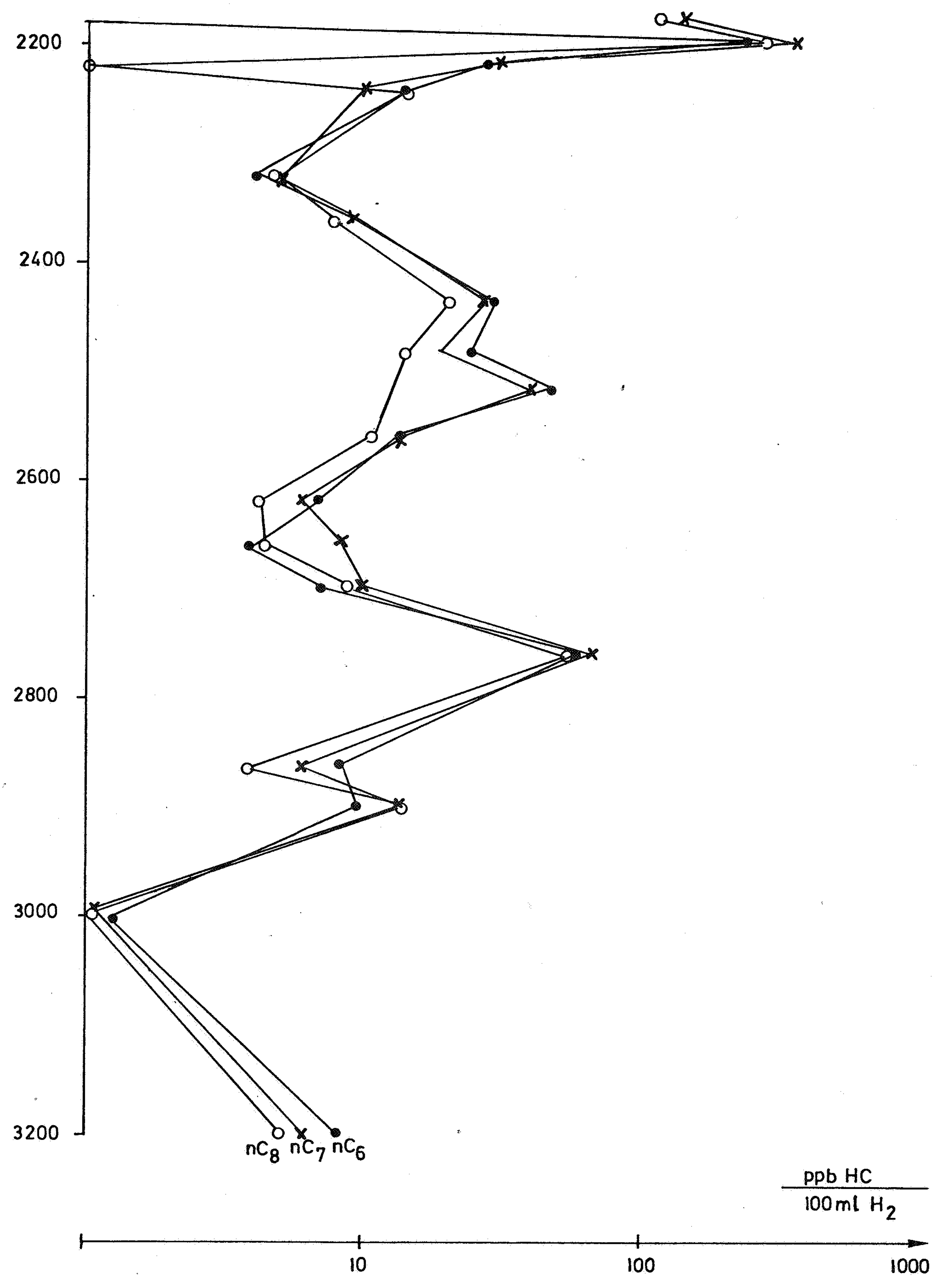
IKU No.	DEPTH (m)	S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1 / S1+S2	TEMP. max (C)
K7522	2720	.38	1.40	1.49	1.06	132	141	1.78	.21	424
K7523	2740	.32	.88	1.43	.90	98	159	1.20	.27	423
K7524	2780	.20	1.74	2.51	1.35	129	186	1.94	.10	418
K7525	2780	.15	1.42	2.36	1.23	115	192	1.57	.10	421
K7527	2820	.08	.43	1.27	.81	53	157	.51	.16	425
K7528	2840	.13	.75	1.45	.89	84	163	.88	.15	420
K7529	2880	.09	.91	.97	.83	110	117	1.00	.09	426
K7530	2880	.06	.49	1.28	.88	56	145	.55	.11	418
K7531	2900	.04	.71	1.00	.82	87	122	.75	.05	457
K7532	2920	.10	.89	1.09	.91	98	120	.99	.10	422
K7533	2940	.10	.83	1.13	.82	101	138	.93	.11	426
K7534	2960	.08	.76	1.38	.89	85	155	.84	.10	417
K7536	3000	.13	.88	1.12	.91	97	123	1.01	.13	422
K7537	3020	.16	1.29	1.51	.98	132	154	1.45	.11	423
K7538	3040	.12	.54	.95	.82	66	116	.66	.18	418
K7545	3200	.23	1.51	2.01	1.35	112	149	1.74	.13	421

Fig. 1



2200
2400
2600
2800
3000
3200
nC3
nC5
nC4
ppb HC / 100 ml H2
10
100
1000

Fig.2



2200
2400
2600
2800
3000
3200
nC_8
nC_7
nC_6
ppb HC
100ml H_2
10
100
1000

Fig. 3

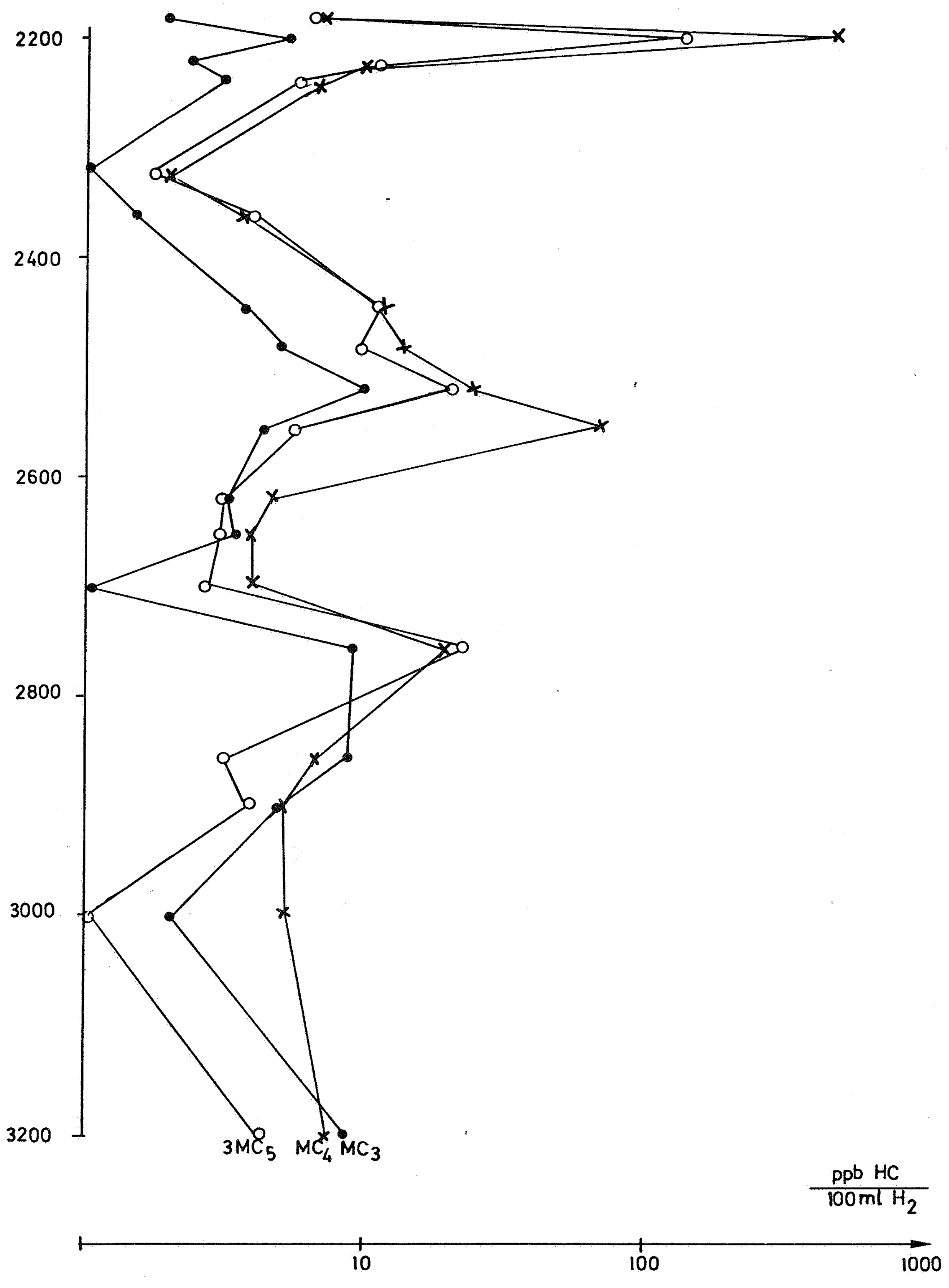
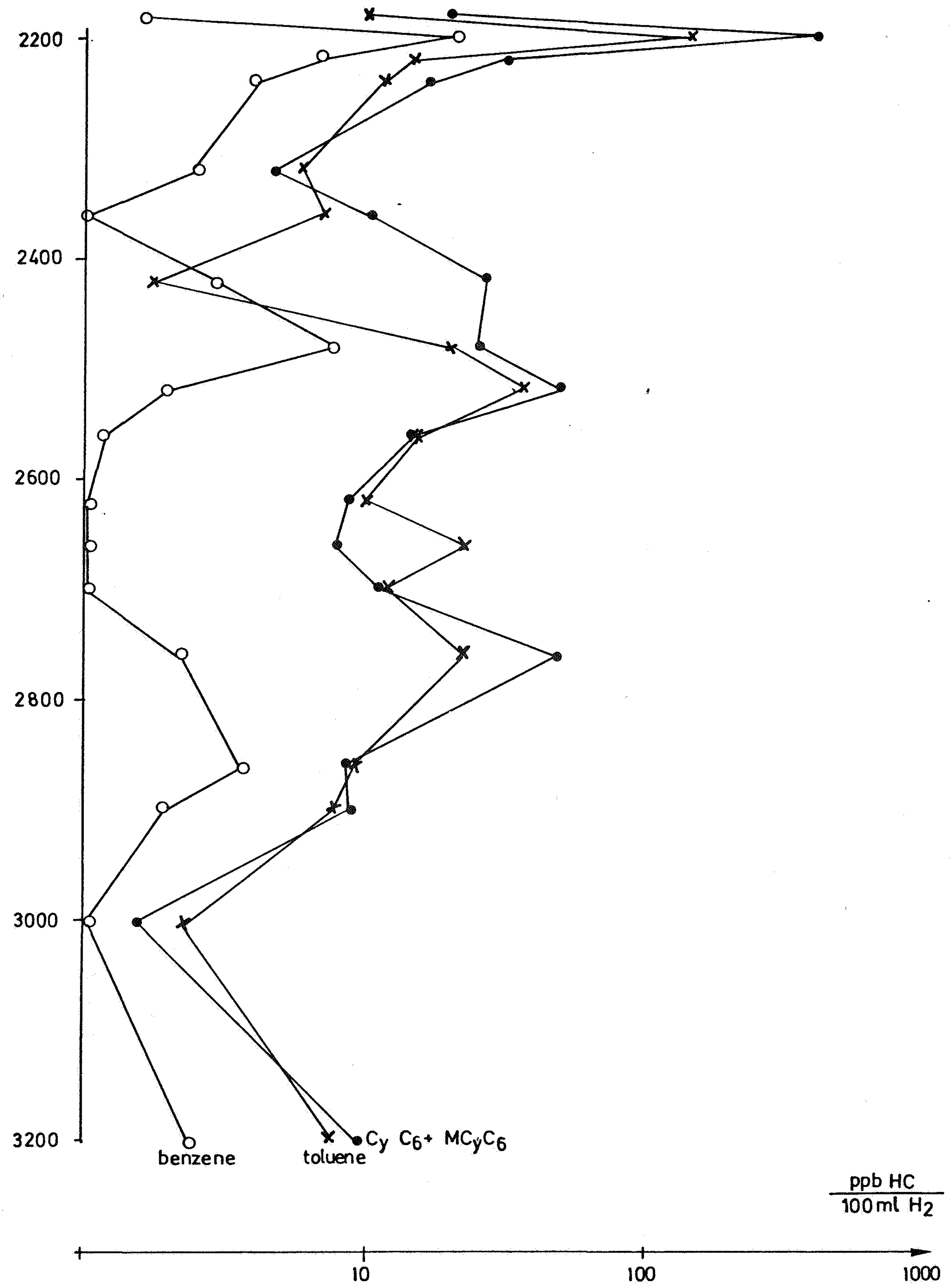
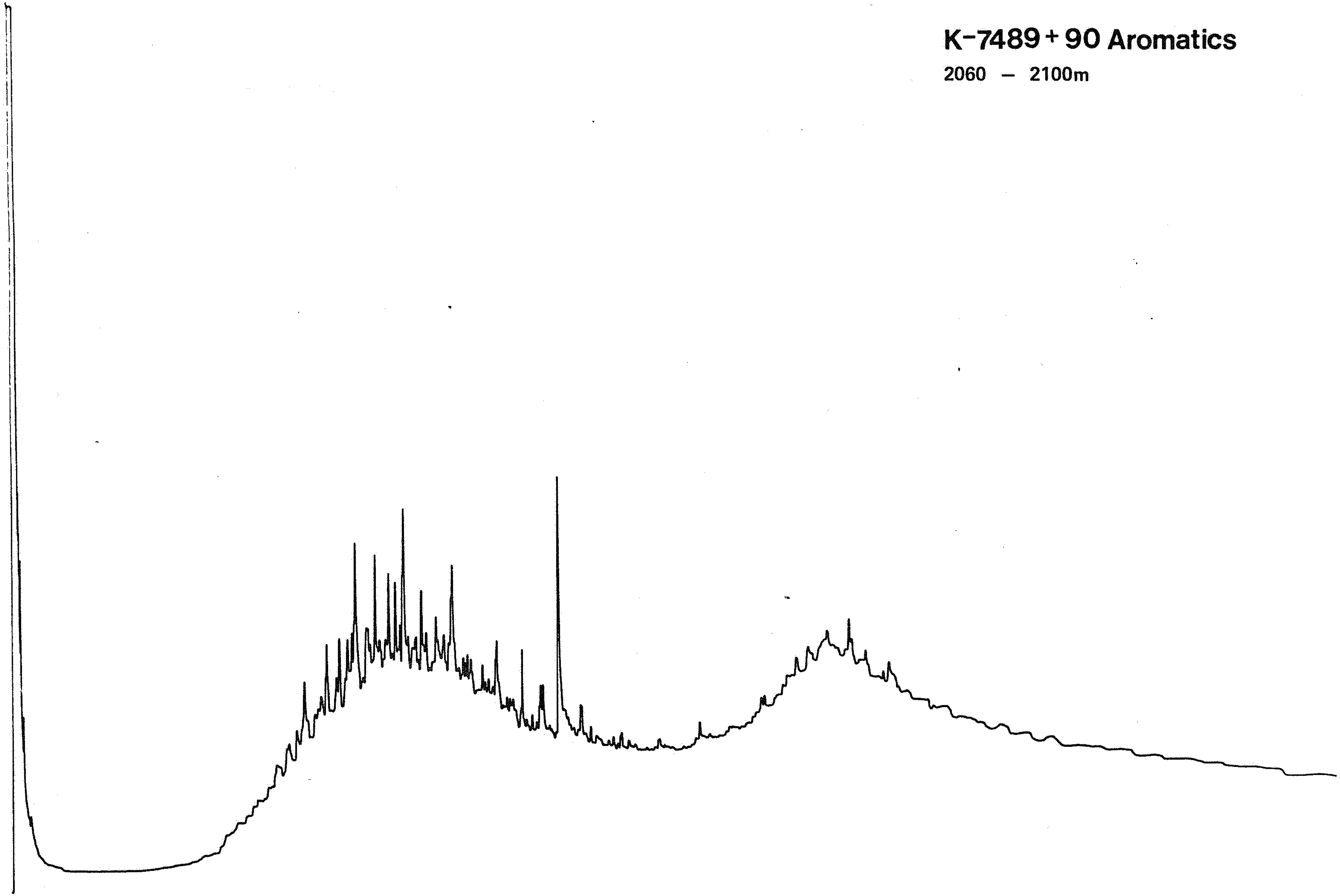

2200
2400
2600
2800
3000
3200
3MC5
MC4
MC3
ppb HC / 100ml H2
10
100
1000

Fig.4

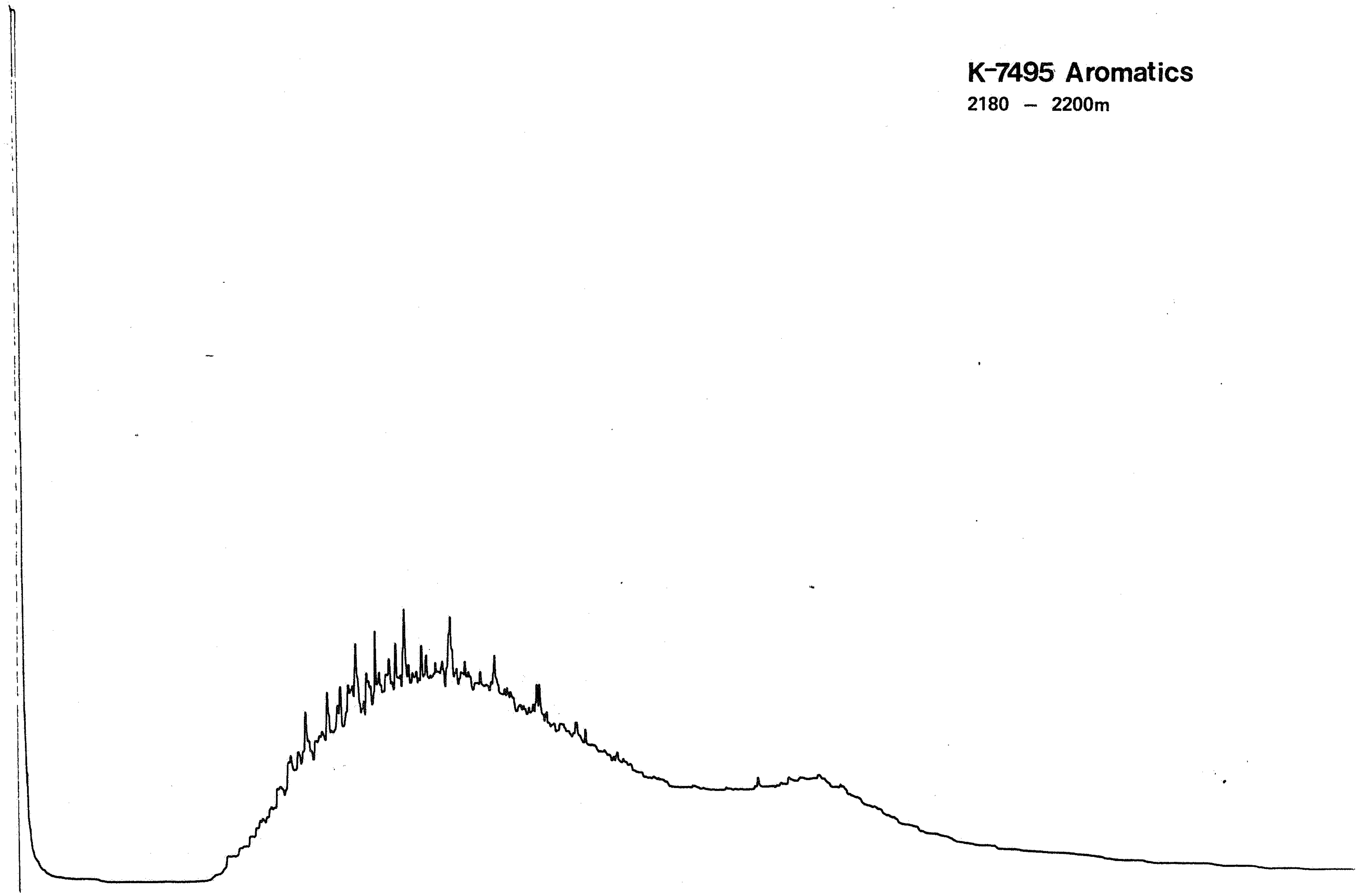


2200
2400
2600
2800
3000
3200
benzene
toluene
Cy C6+ MCyC6
ppb HC / 100 ml H2
10
100
1000



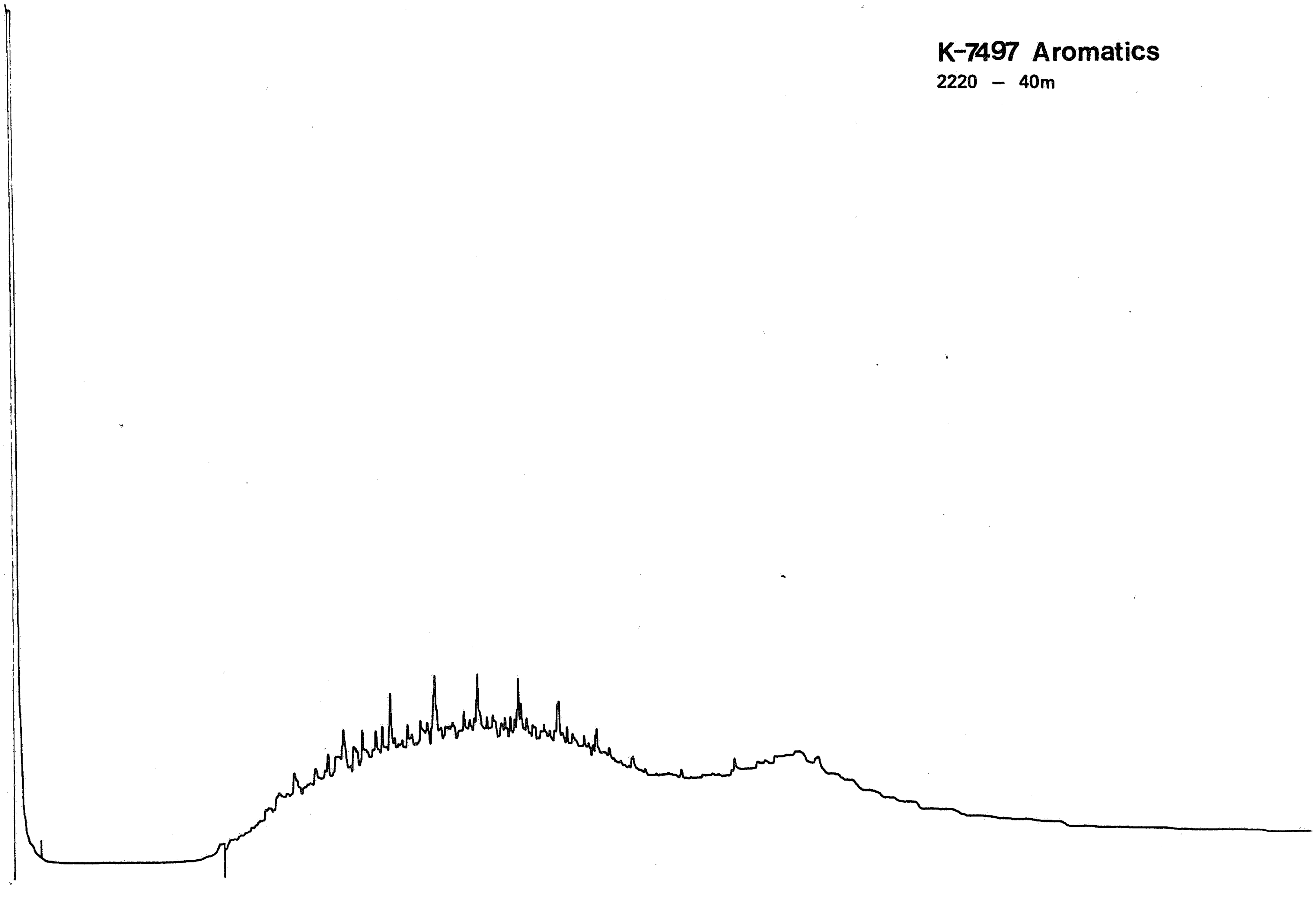
K-7489 + 90 Aromatics

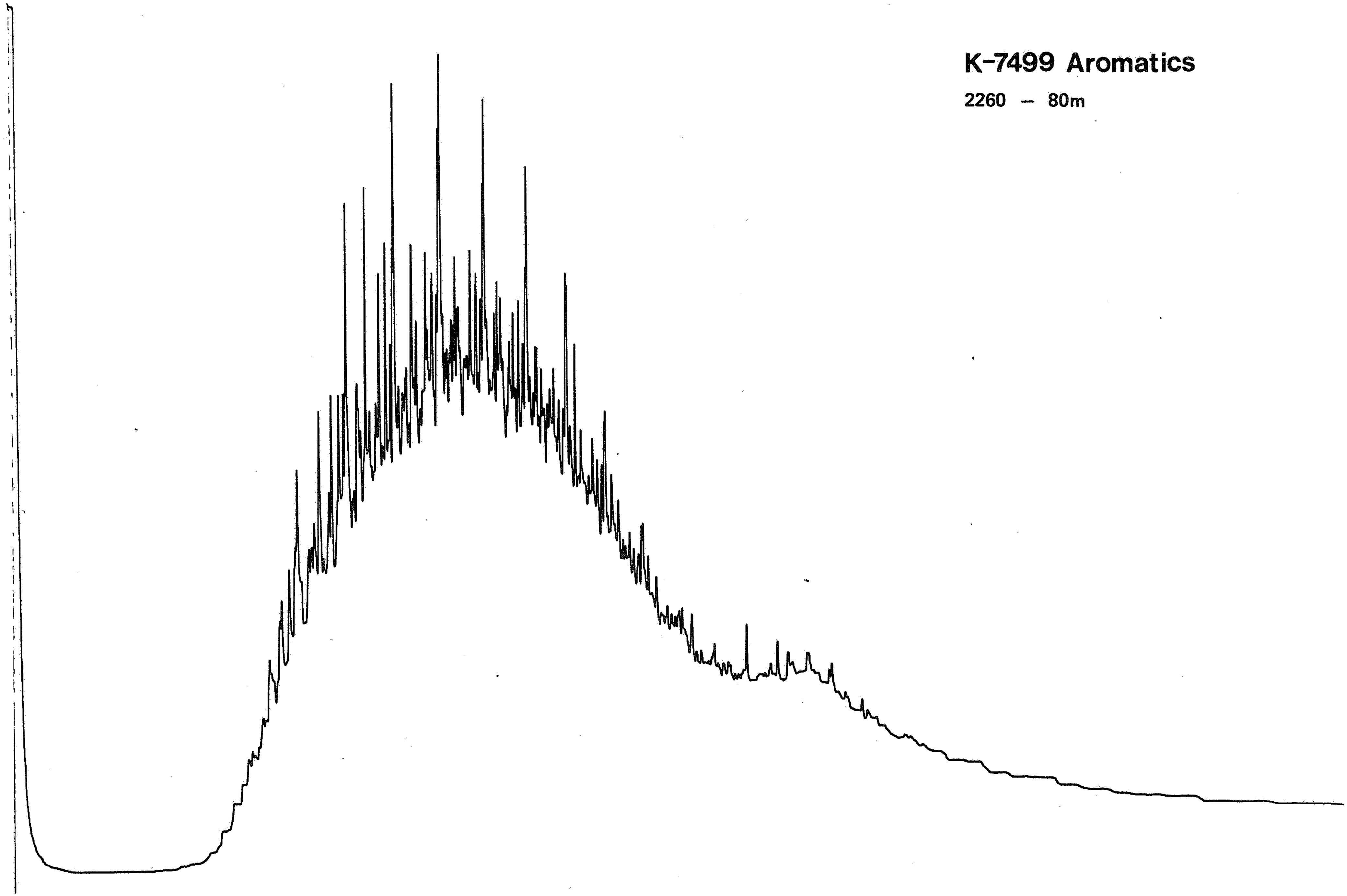
2060 – 2100m


K-7495 Aromatics
2180 – 2200m

K-7497 Aromatics

2220 – 40m



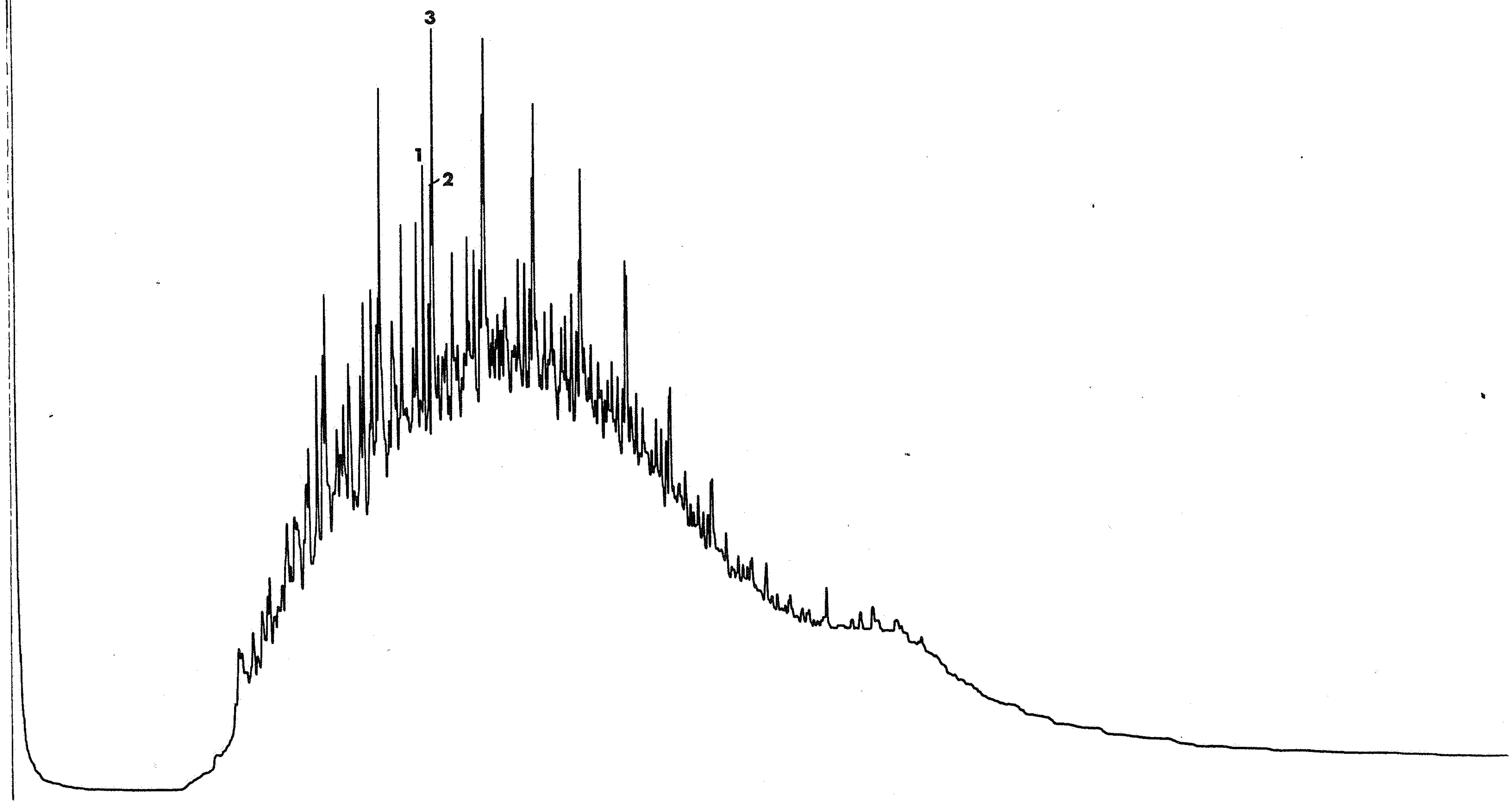


K-7499 Aromatics

2260 – 80m

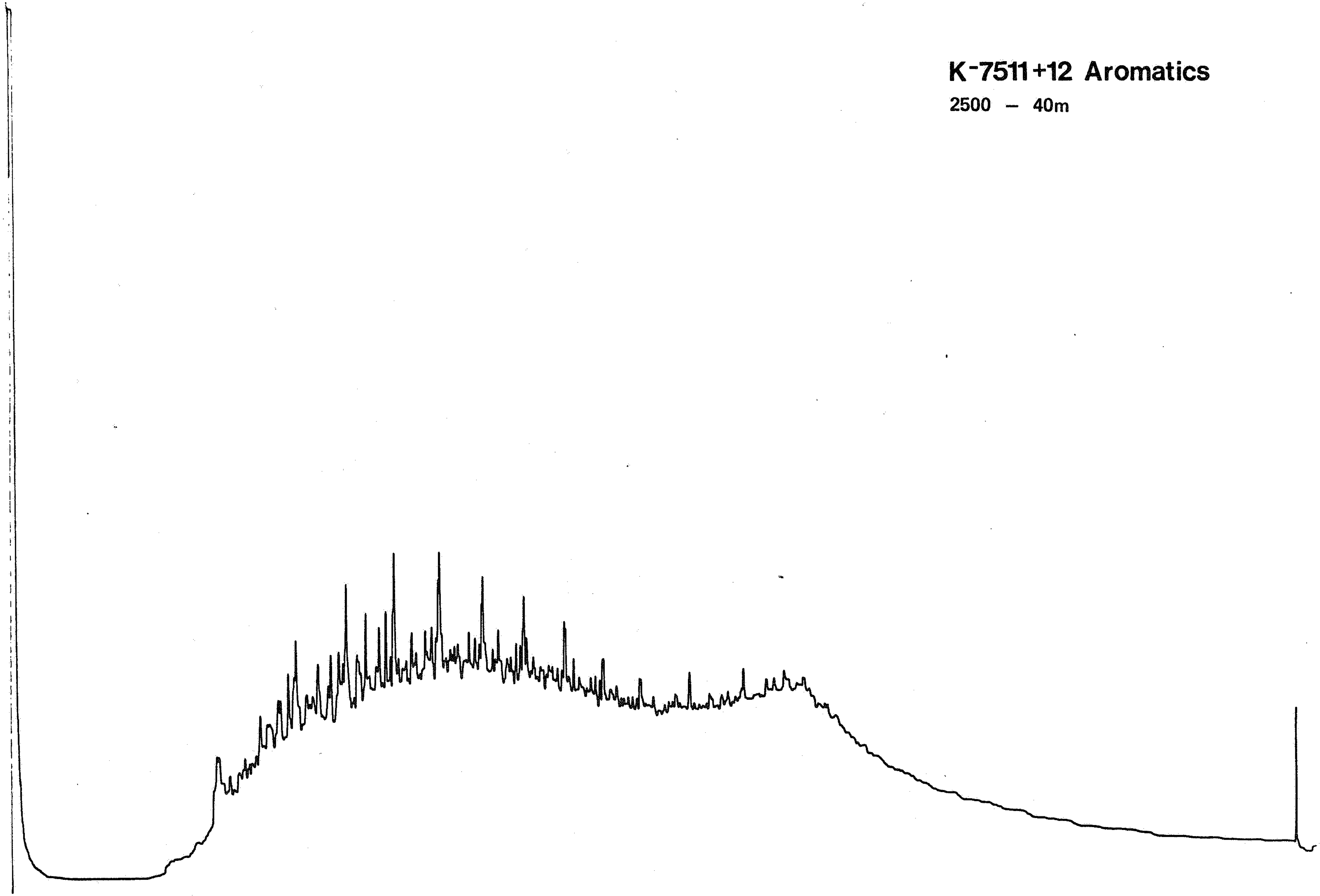
K-7501 Aromatics

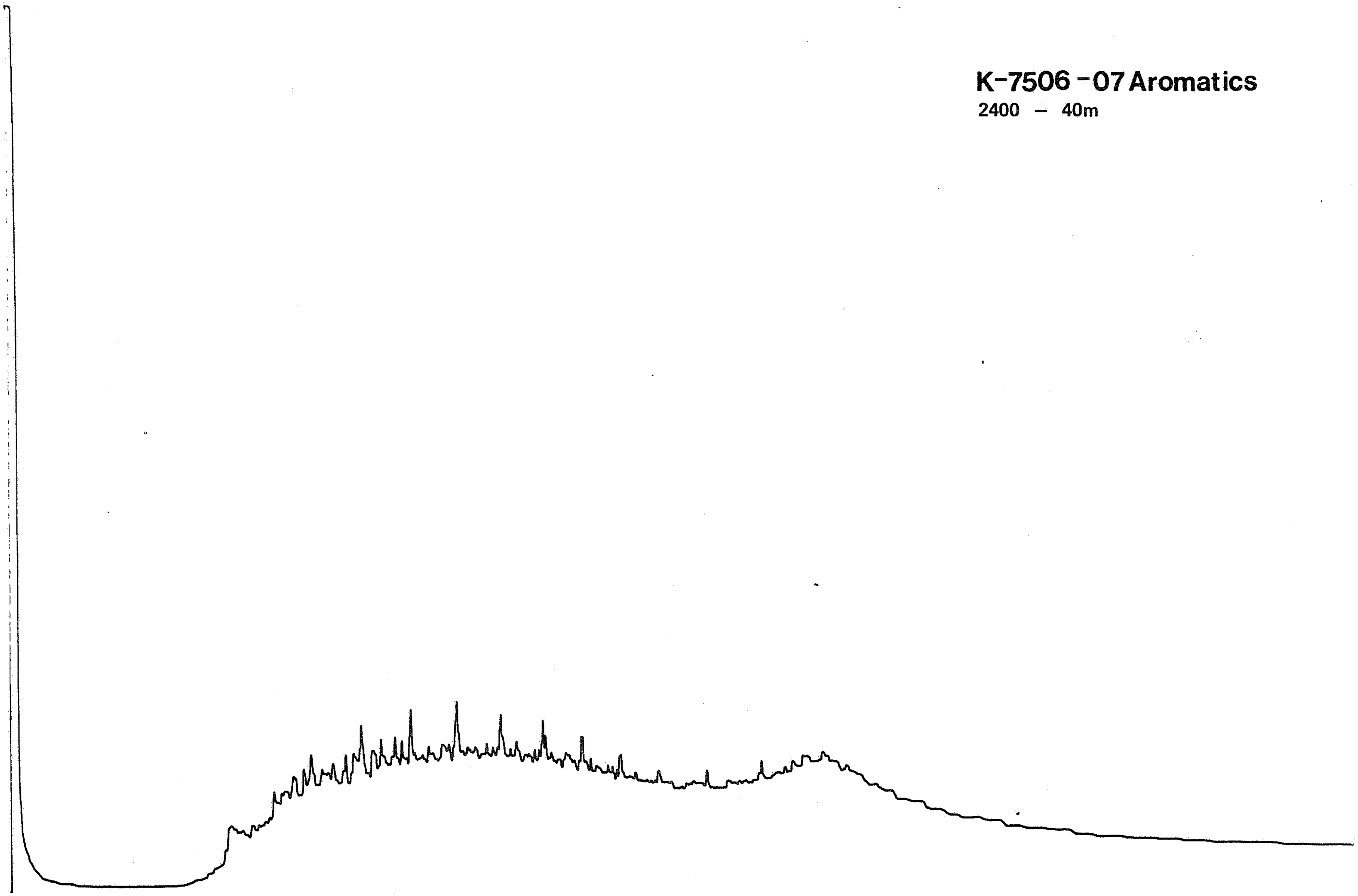
2300 – 20m



K⁻7511+12 Aromatics

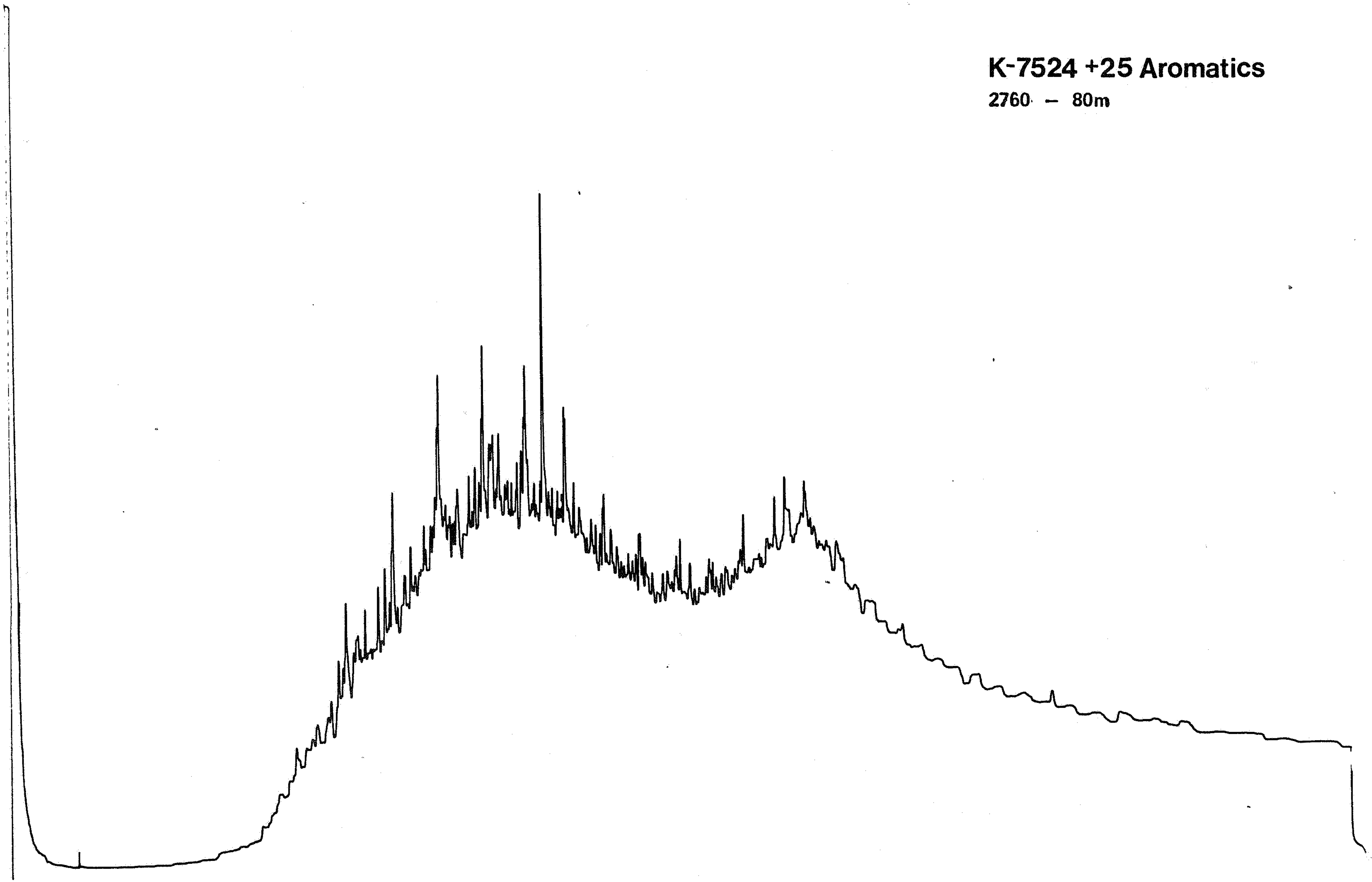
2500 – 40m

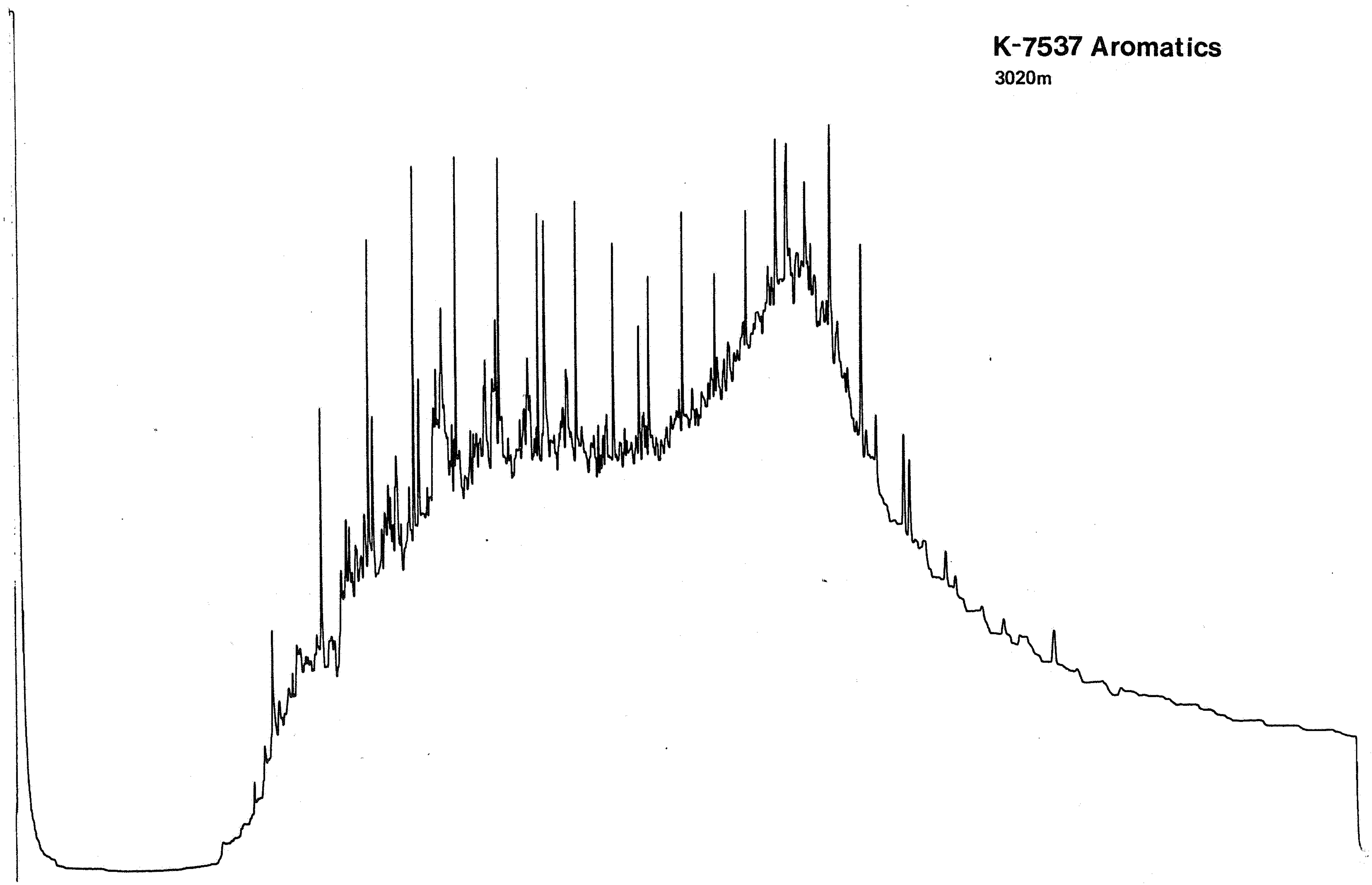



K-7506 -07 Aromatics
2400 – 40m

K-7524 +25 Aromatics

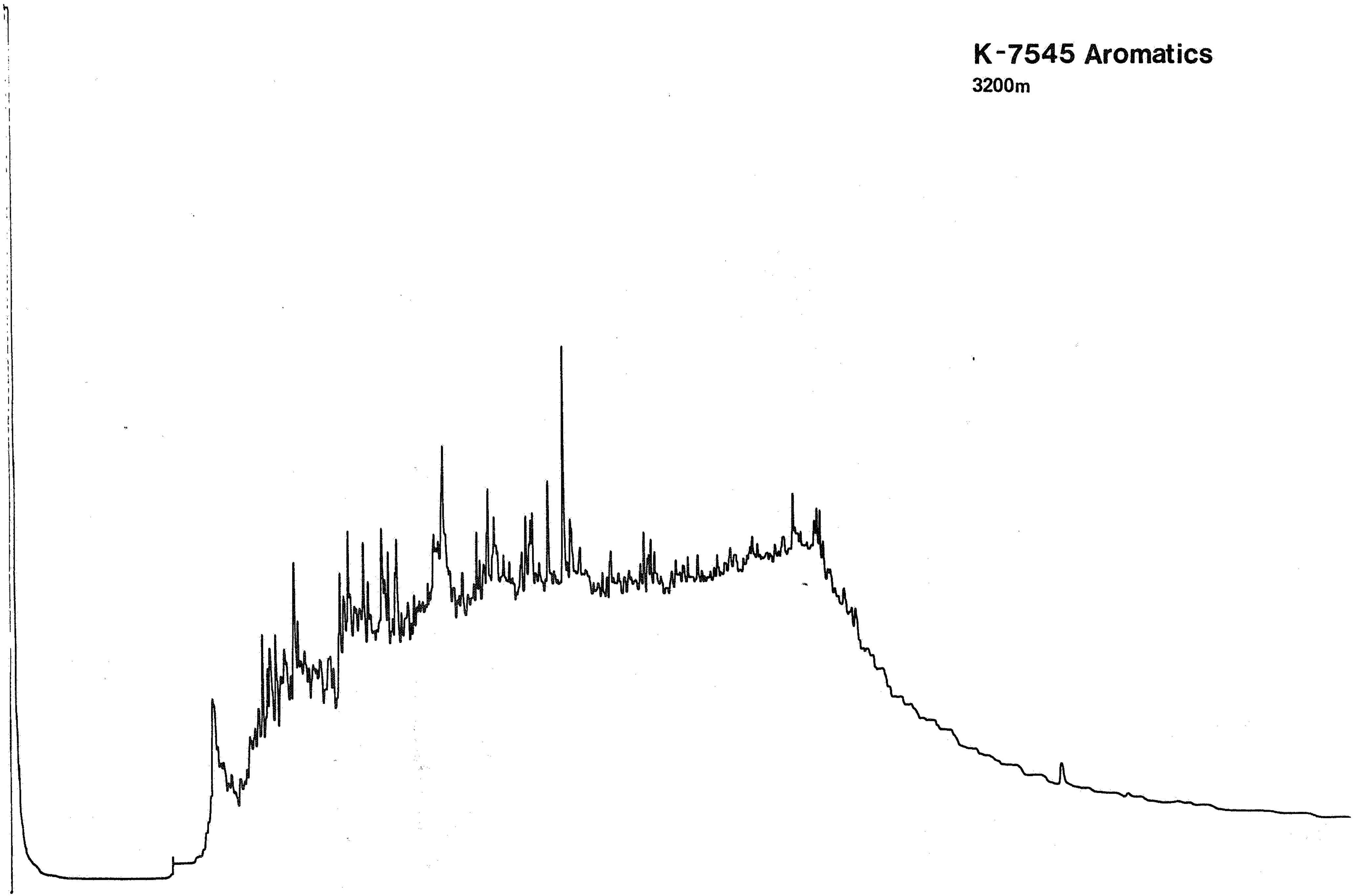
2760 – 80m



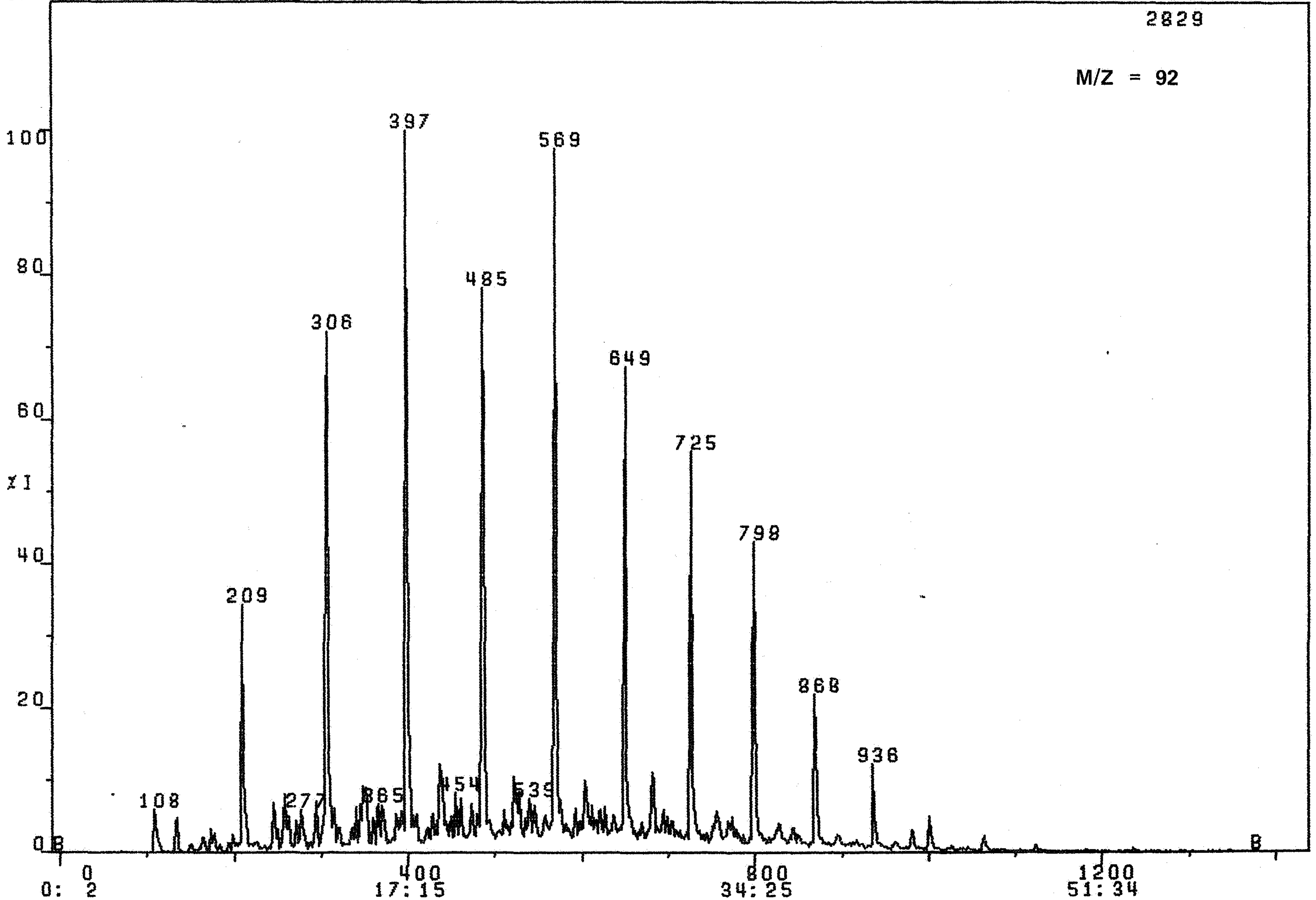

K-7537 Aromatics
3020m

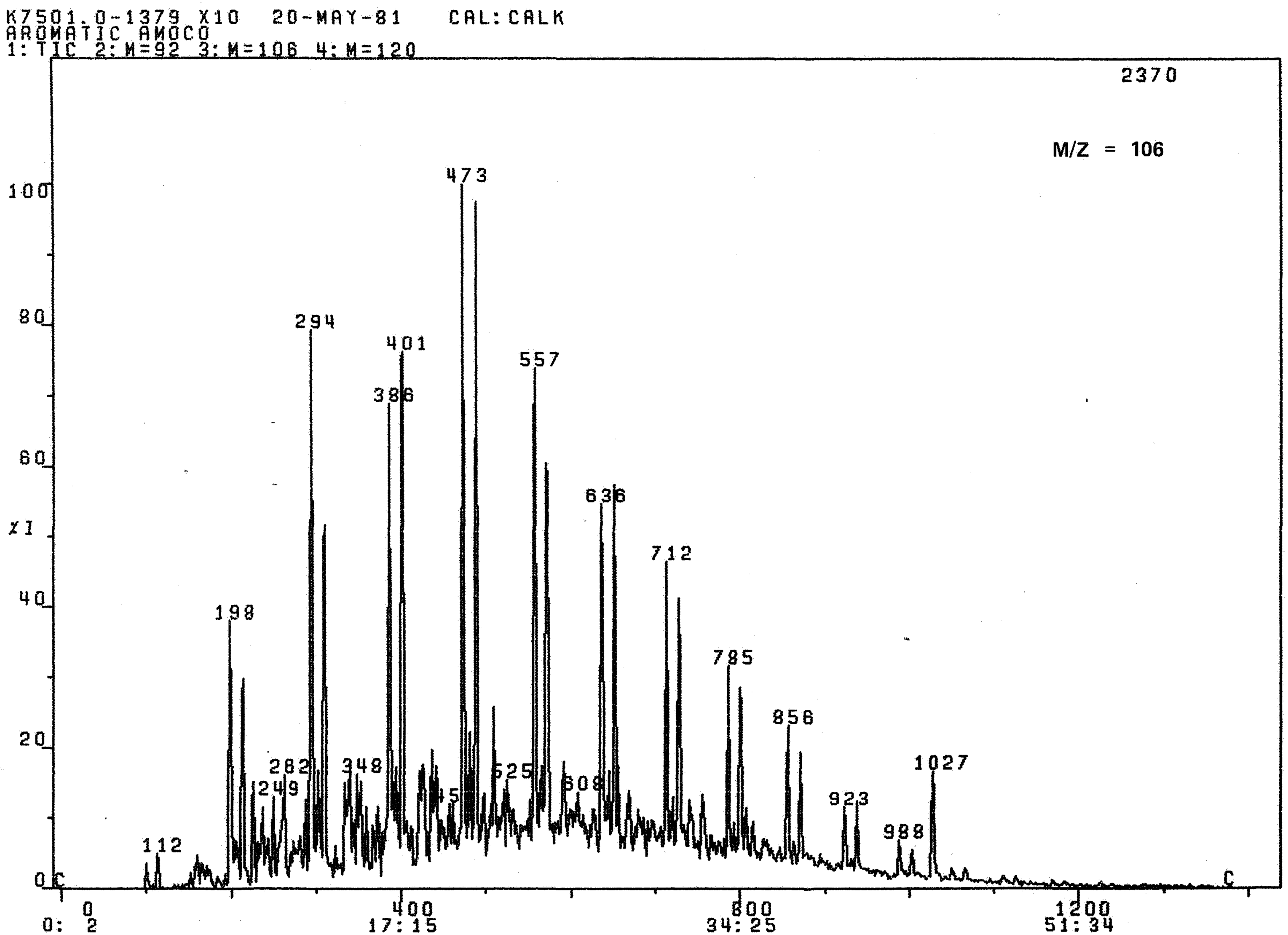
K-7545 Aromatics

3200m



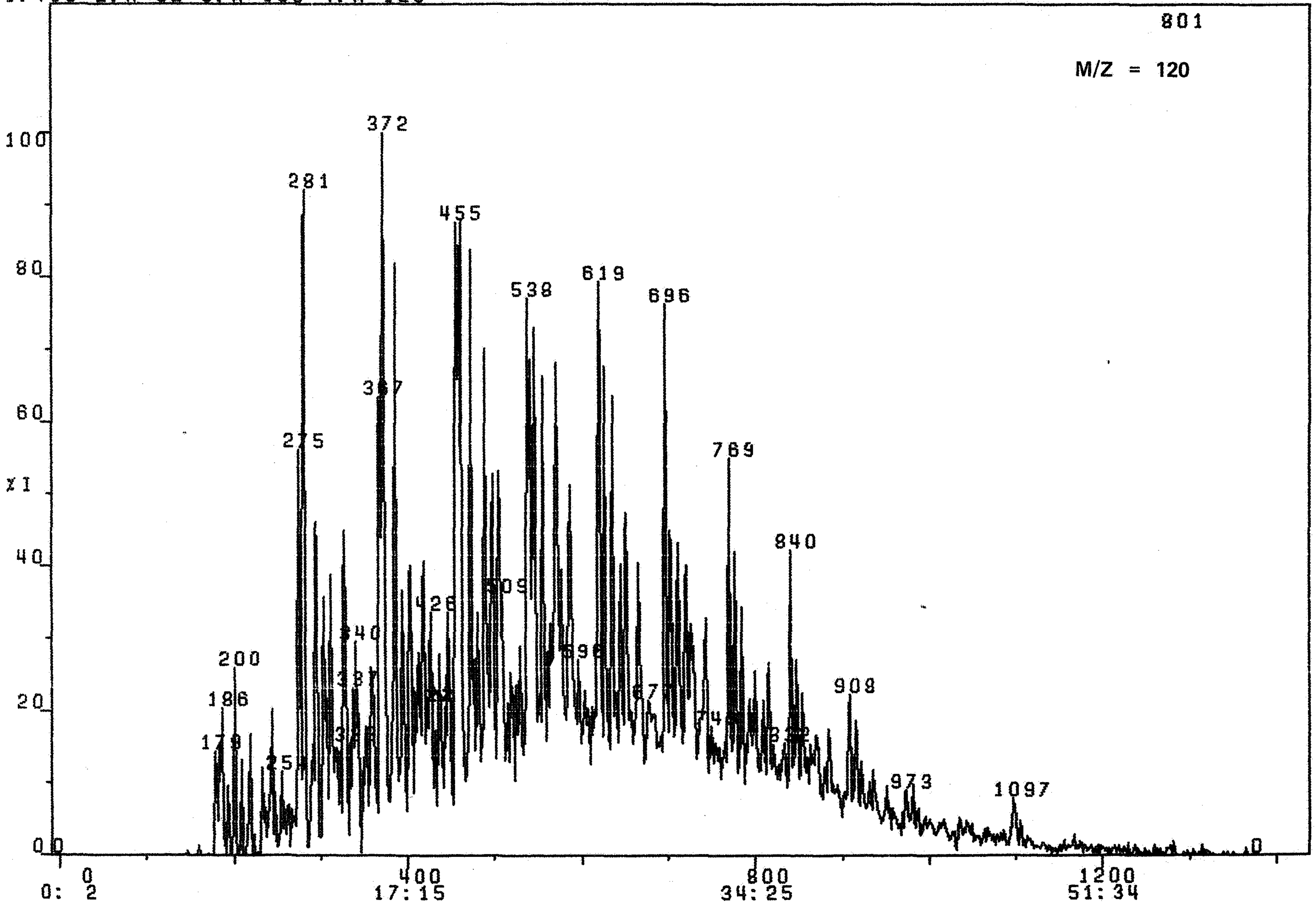
K7501.0-1379 X10 20-MAY-81 CAL:CALK
AROMATIC AMOCO
1: TIC 2: M=92 3: M=106 4: M=120

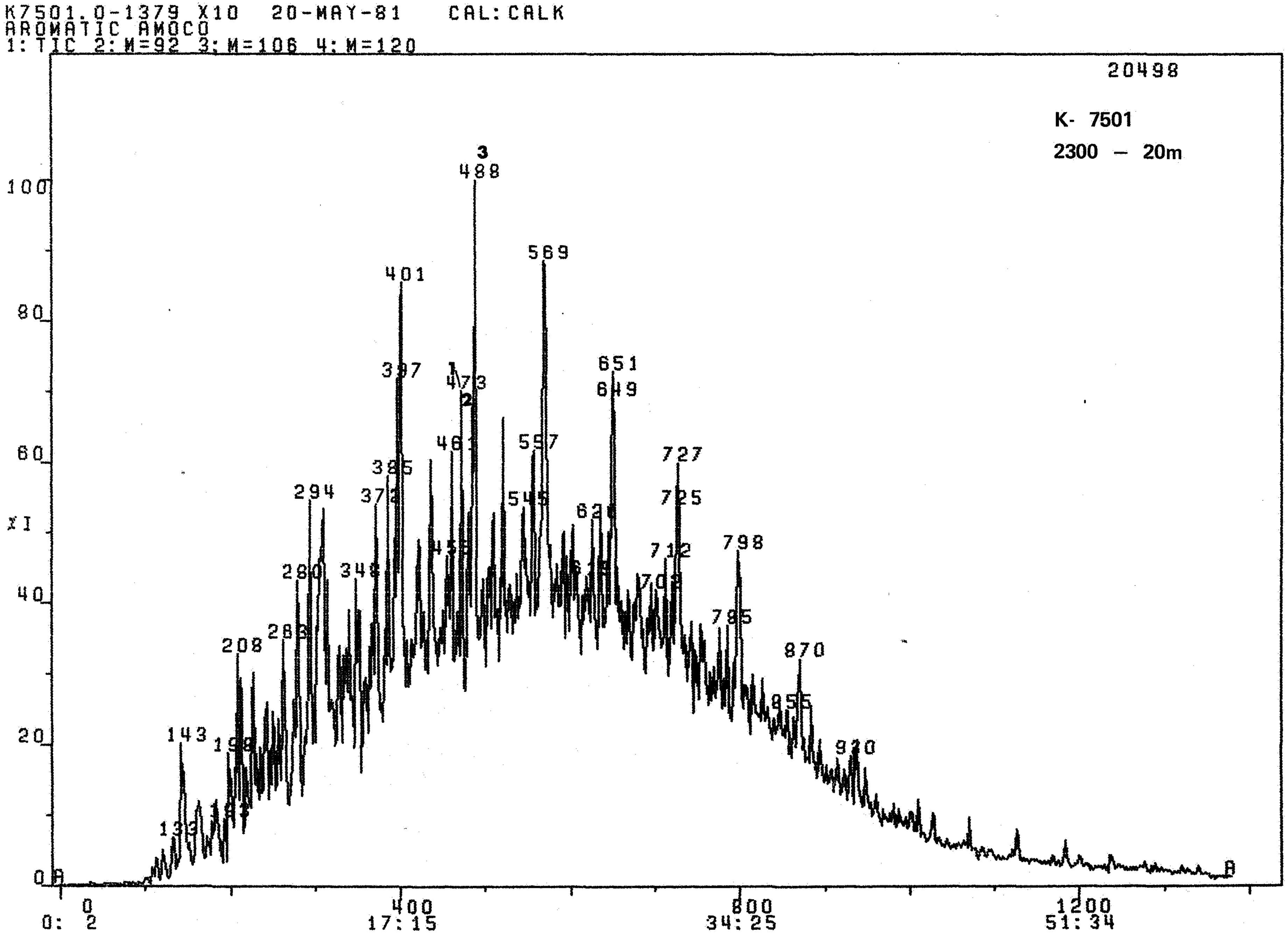


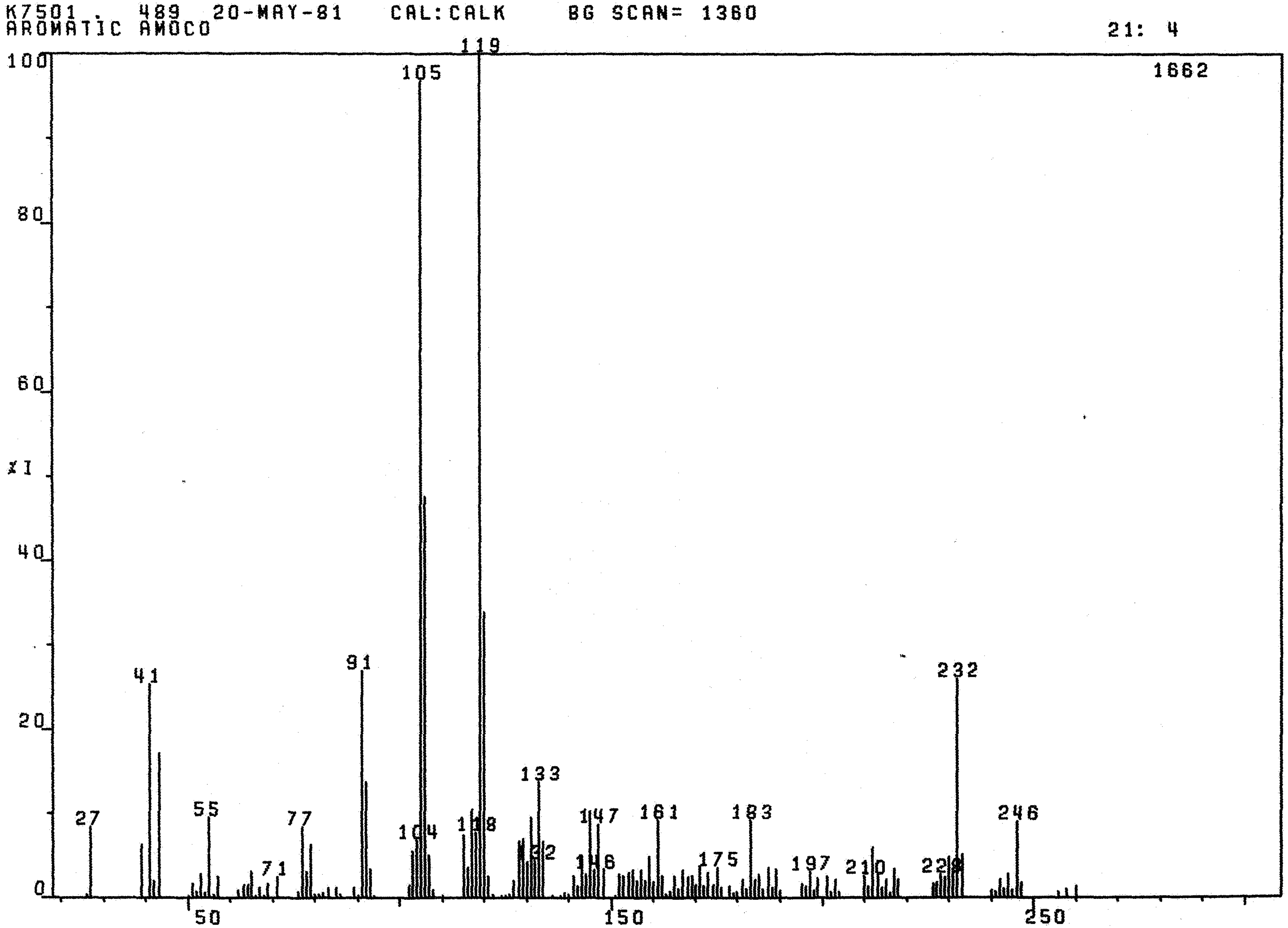


K7501.0-1379 X10 20-MAY-81 CAL:CALK
AROMATIC AMOCO
1:TIC 2:M=92 3:M=106 4:M=120
2370
M/Z = 106
100
80
60
40
20
0
X1
473
294
401
386
557
636
712
785
856
1027
923
988
198
282
249
348
525
608
112
0
0: 2
400
17:15
800
34:25
1200
51:34

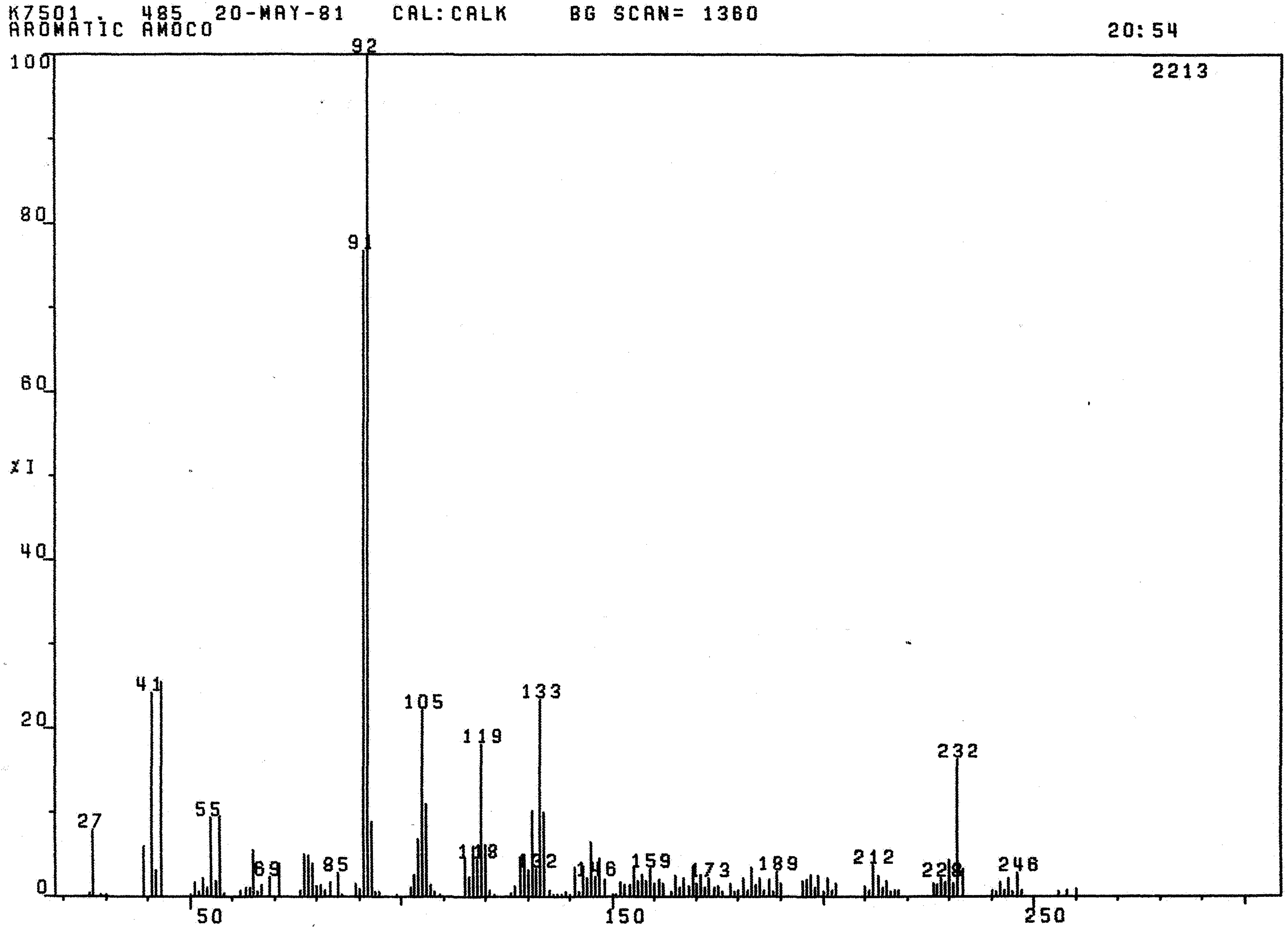
K7501.0-1379 X10 20-MAY-81 CAL:CALK
AROMATIC AMOCO
1:TIC 2:M=92 3:M=106 4:M=120




K7501.0-1379 X10 20-MAY-81 CAL: CALK
AROMATIC AMOCO
1: TIC 2: M=92 3: M=106 4: M=120
20498
K- 7501
2300 — 20m
100
80
60
40
20
0
XI
0
0: 2
400
17:15
800
34:25
1200
51:34
488
569
401
397
473
651
649
461
557
385
727
294
372
545
725
620
798
712
280
348
708
283
785
208
870
855
143
920
133



K7501 . 489 20-MAY-81 CAL:CALK BG SCAN= 1360
AROMATIC AMOCO
21: 4
1662
100
80
60
%I
40
20
0
50
150
250
27
41
55
71
77
91
104
105
118
119
132
133
146
147
161
175
183
197
210
229
232
246


K7501 . 485 20-MAY-81 CAL:CALK BG SCAN= 1360
AROMATIC AMOCO
20:54
2213
100
80
60
%I
40
20
0
92
91
41
105
133
119
232
27
55
118
132
146
159
173
189
212
229
246
69
85
50
150
250

K7501 . 474 20-MAY-81 CAL:CALK BG SCAN= 1360
AROMATIC AMOCO
20:25