



CONTINENTAL SHELF INSTITUTE

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SUMMARY/ SAMMENDRAG

The analysed sequence of the well was divided into 6 zones as follows:

- Zone A (355-1025m): This zone consists of fine to coarse sand. No analyses.
- Zone B (1025-2210m): Corresponds approximately to the cretaceous section. The whole zone is immature and has poor potential for oil or gas.
- Zone C (2210-2675m): This zone corresponds roughly to the upper Jurassic - immature to moderate mature - poor potential overall but rich 2285-2390m.
- Zone D (2675-2930m): Including middle Jurassic sandstone and lower Jurassic shale and sandstone. Moderate mature/mature overall potential poor to fair.
- Zone E (2930-3005m): Top part of the low Jurassic coal unit. Moderate mature. Poor to fair potential.
- Zone F (3005-3333m): Bottom part of the lower Jurassic coal unit and top Triassic. Moderate mature/mature with fair potential for gas (rich potential for gas 3148-3194m).

KEY WORDS/ STIKKORD

Trænebanken

6610/7-1

Source Rock

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EXPERIMENTAL AND DESCRIPTION OF INTERPRETATION LEVELS

Headspace Gas Analysis

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

Occluded Gas

An aliquot of the 1-2 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 1b.

The composite gas data are also plotted and shown in enclosure 1.

Total Organic Carbon (TOC)

Picked cuttings of the various lithologies in each sample was 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°C 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).

The results are shown in table 2 with the lithological description, also in enclosure 2.

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 Tables 3-6, and in enclosure 3.

Gas Chromatographic Analyses

The saturated and aromatic hydrocarbon fractions were each 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). Ratios determined from the saturated hydrocarbon gas chromatograms are shown in table 7, and in enclosure 4.

Vitrinite Reflectance

Vitrinite reflectance measurements of the samples, taken at various intervals, were done at IKU. The samples were mounted in Bakelite resin blocks; care being taken during the setting of the plastic to avoid temperatures in excess of 100°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. micro-photometer under oil immersion, R.I. 1.518 at a wavelength of 546 nm. 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 is given.

VITRINITE REFLECTANCE R.AVER. 546 NM	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10
1516										
% 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 orange colour and then fade rather than develop or 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 μ mesh).

O-slide contains palynodebris remaining after flotation (ZnBr_2) to remove heavy minerals.

X-slides contain oxidized residues, (oxidizing may be required to remove sapropel which embeds palynomorphs, or where high coalification prevents 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 dino-flagellates) and cuticles for paleodating and colour evaluation.

So far visual evaluation of kerogen has 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 μ and, if required, to make a more refined classification of the screened residues (particles $>15\mu$).

The colour evaluation is based on colour tones of spores and pollen (preferably) with supporting evidence from colour tones of other types of kerogen (woody material, cuticles and sapropel). These colours are dependant upon the maturity, but are also influenced by the paleo-environment (lithology of the rock, oxidation and decay processes). The colours and the estimated colour index of an individual sample may therefore differ 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).

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

Rock-Eval Pyrolysis

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.

Pyrolysis Gas Chromatography (Py-GC)

Py-GC

20-30 mg of thermoextracted whole rock sample was programmed pyrolysed in helium (260°C to 520°C at $35^{\circ}\text{C}/\text{min.}$) in a furnace type pyrolyzer. The outlet of the pyrolyzer was directly connected to a splitter (30:1) and a fused silica capillary column. The pyrolysis product was trapped in a cooled (liq. Nitrogen) U-shaped section at the front of the column.

The outlet of the splitter was directly connected to a FID detector and the course of the pyrolysis could be followed by the detector response of the bulk pyrolysis product (30:1) which was recorded as a broad peak. At the end of the pyrolysis the pyrolysis product was injected on to the capillary column at ambient temperature (by removing the nitrogen bath) and analysed under the GC conditions given below.

GC-conditions

Column: 25m OV-1, I.D. 0.3 mm, fused silica capillary column.

Carrier gas: Helium with inlet pressure 10 psi. Flow; ca. 1.5. ml/min.

Oven programme: 40° - 270°C at $4^{\circ}\text{C}/\text{min.}$

RESULTS AND DISCUSSION

Light Hydrocarbon Analysis and Lithology

On the basis of light hydrocarbon abundances and lithological variations the sequence analysed (355-3333m) was divided into 6 zones:

Zone A: 355-1025m

Zone B: 1025-2210m

Zone C: 2210-2675m

Zone D: 2675-2930m

Zone E: 2930-3005m

Zone F: 3005-3333m

Zone A; 355-1025m: The dominant lithologies in this zone are sand, varying from fine to coarse, and gravels. Reworked igneous and metamorphic fragments from gravels are present in varying amounts throughout the zone. Sand is the major lithology towards the base. Methane is the dominant light hydrocarbon present. (The abundance varies from poor to good). Most of this methane is probably biogenic. There is a small increase in wetness towards the base of the zone.

Zone B; 1025-2210m: This zone is characterised by a variety of claystones. At the top of the zone a brown-grey claystone is seen, this persists throughout the zone in varying amounts becoming more calcareous and micaceous with depth. A red-brown and a dark carbonaceous claystone are found in minor amounts through the zone. An influx of sandstone is seen in the sample from 1310-1325m. Darker more micaceous claystones appear below 1835m in larger amounts than above and a marl appears in a band between 1940m and 1985m. The dominant lithology is still grey claystone. The upper part of this zone (down to 1405m) shows a poor abundance of light hydrocarbons. This is entirely methane, probably largely biogenic (though as the amount increases with depth it could be partly catagenic). The lower part of the zone shows increased wetness and a more variable abundance of light hydrocarbons (poor to fair, good at the base). The sudden increases in abundance seen at 1760m, 1925m and 1985m to base, can be traced to an increased proportion of claystone in the sample at those depths. The isobutane/n-butane (IC_4/nC_4) ratios are variable but high indicating that the samples are immature.

Zone C; 2210-2675m: The lithology in this zone consists of a mixture of claystones and marls with minor limestone and siltstone. The dominant lithology at the top of the zone is a light grey marl. This passes into a dark grey sometimes carbonaceous claystone which persists in minor amounts to 2480m. A pale more micaceous claystone appears at 2360m and become the main lithology below 2390m. A buff limestone appears below this depth and continues to the base of the zone. In the upper part of the zone (down to 2270m) the light hydrocarbon abundances are poor and the wetness low. Below this depth the abundances increase to good. This is probably associated with the appearance of a dark organic rich (11.29%) claystone at 2285m. The wetness is high overall. The iC_4/nC_4 ratios show some variations but are fairly low indicating that the samples from this zone are immature to moderate mature.

Zone D; 2675-2930m: This zone starts with the appearance of a well cemented quartz sandstone (fine to coarse). A grey-brown claystone persists from the zone above in decreasing amounts but below 2780m the sandstone becomes the dominant lithology. It is poorly cemented and shows some hydrocarbon staining. This passes down into a fine well cemented sandstone which continues to the base of the zone. The light hydrocarbon abundance in this zone is fair with good abundances at the base. The iC_4/nC_4 ratios vary but indicate that the samples are immature to moderate mature. The wetness in C_1-C_4 and C_5+ ranges decreases with depth.

Zone E; 2930-3005m: The top of this zone is marked by the appearance of a grey-brown claystone with minor siltstone and sandstone. At the base of the zone the claystone is replaced by a poorly cemented sandstone. Some coal is present at the top of this zone (additive?). Only 2 samples from this zone have been analysed for light hydrocarbons. Both show a good abundance in C_1-C_4 and C_5+ ranges. They show moderate wetness and moderate iC_4/nC_4 ratios indicating moderate maturity.

Zone F; 3005-3333m: Sandstone is the dominant lithology through this zone except at the base. The sandstone is medium to very coarse grained and is poorly cemented throughout the zone. A dark grey and a light grey claystone are present in minor amounts below 3035m. A grey - red-brown claystone appears at 3230m and persists to the base of the zone where it becomes the dominant lithology. With the exception of the last 2 samples the light hydrocarbon abundances are good for this zone. The notice-

ably lower abundances at the base seem to reflect the amount of organic poor claystone present. The iC_4/nC_4 ratios indicate that the zone is moderately mature.

Total Organic Carbon

Where shales or claystones constitute greater than 10% of a sample they were analysed. Occasionally shales/claystones of different colours were picked and analysed separately. Similarly siltstones where prominent were picked and analysed separately. Limestones and shaly or silty sandstone were also picked and analysed when they comprised greater than 10% of a sample. Clear sands and sandstones were not analysed. Only a few red-brown and green claystones were measured since they are generally poor in organic carbon.

Zone A; 355-1025m: No TOC analyses were carried out in this zone because of the insuitable nature of the cuttings and as no staining or other carbonaceous matter was seen in them.

Zone B; 1025-2210m: The TOC of the major lithology in the zone, a grey, grey-green claystone, is variable: poor to fair. Samples A-5164, A-5774, A-5810 and A-5820-5834 (incl.) show fair TOC values. The remainder of the zone is poor. The dark grey claystone, which makes up varying proportions of the lithology (5-60%) throughout the zone, shows good TOC values.

Zone C; 2210-2675m: The light grey marl at the top of this zone shows fair TOC values likewise the limestone that appears with it. The dark grey to black claystone appearing below this is rich in organic carbon with values ranging from 11.29-4.19% TOC. The lighter grey claystone that appears with it shows lower TOC values and is rated as good (except the samples from 2585-2695m which are rated as rich).

Zone D; 2675-2930m: TOC values have only been taken from the grey claystone at the top of the zone. This is probably a continuation of the claystone from the zone above and shows the same good TOC rating.

Zone E; 2930-3005m: The claystone shows fair to good TOC values.

Zone F; 3005-3333m: Measurements were taken on the dark grey and the light grey claystones. The dark claystone shows rich TOC values and the light claystone is fair. Only one measurement was taken from the sandstone which showed it to contain a poor amount of organic carbon. The red-brown claystone which appears at the base of the zone shows very poor TOC values.

Extraction and Chromatographic Separation

20 cuttings samples and 3 core samples were extracted. The saturated fraction of the EOM was then separated for gas chromatographic analysis.

Zone A (6-1025m): No samples from this zone were extracted.

Zone B (1025-2210m): 7 samples were analysed from this zone, A-5764, A-5769, A-5799, A-5780, A-5810, A-5813 and A-5818. These samples show very variable abundances of EOM. Three samples show rich abundance: the claystone in A-5764, A-5780 and A-5813. These samples also stand out as having very high EOM abundances relative to organic carbon. These high values probably indicate the presence of non indigenous hydrocarbons either migrated or contaminants. The rest of the samples from this zone show poor to fair abundances of EOM. Only the poor abundance in sample A-5799 seems compatible with the results from py-gc and Rock-Eval which indicate hydrogen poor kerogens throughout this zone. The ratio of hydrocarbons to TOC is high (rich values) for samples A-5764, A-5780 and A-5818. Samples A-5799 and A-5769 show poor abundances of hydrocarbons relative to TOC. The remaining samples show rich values. The gas chromatograms from this zone are very variable in appearance which is interesting as the Rock-Eval and py-gc results are all very similar and indicate poor type III/IV kerogen. All the chromatograms contain the high molecular weight alkanes that would be expected from a dominantly terrestrial source but they also contain varying amounts of low and medium molecular weight alkanes suggesting the presence of migrated hydrocarbons.

The chromatogram from A-5764 shows a bimodal distribution of alkanes with a maxima at nC_{15} (Pristane is most abundant HC overall) and nC_{27} . There is a noticeable odd dominance at the high molecular weight end (CPI = 1.5) indicative of an immature source. The hump of lighter alkanes probably represents migrated hydrocarbons as there is no evidence of type II organic matter present in the kerogen from either Rock-Eval or Py-gc results. The gc from A-5769 is dominated by C_{25} - C_{31} alkanes with a maximum at nC_{29} . There is still some evidence of migrated hydrocarbons in the C_{15} - C_{20} range. The CPI is high:- 1.2. Sample A-5799 shows a very pronounced bimodal distribution with maxima

at nC_{16} and nC_{29} . The gc from A-5780 is dominated by low molecular weight hydrocarbons with a maximum at nC_{15} . There is a shoulder between nC_{25} and nC_{31} . The large amount of low molecular weight alkanes is not compatible with the type IV kerogen in this sample and indicates the presence of migrated hydrocarbons. Sample A-5810 is similar in appearance to A-5799 except that it contains rather more light alkanes. The maximum is at nC_{16} . Although the CPI as measured does not show it, there is a strong odd preference amongst the heavier alkanes especially C_{29} and C_{31} . The samples A-5813 and A-5818 are very similar in appearance, both show evidence of migrated hydrocarbons and both show maxima at nC_{17} with secondary maxima at nC_{27} .

Zone C (2210-2675m): 7 samples were extracted in zone C: A-5836, A-5841, A-5850 and A-5859. A-5861 (x2 lithologies) and A-5864. The sample at 2300m shows a rich abundance of EOM, the rest show good abundance with the exception of the claystone at 2225m which is poor. The abundances remains the same when they are normalised to TOC. The abundance is very high for sample A-5841. The composition of the EOM in terms of HC/g TOC is fair. The siltstone in A-5861 is particularly rich in hydrocarbons. Saturated and aromatic hydrocarbons are present in roughly equal amounts in all the samples except A-5836. In this sample aromatic hydrocarbons predominate. This may be a reflection of the hydrogen poor kerogen type. The gas chromatograms from this zone all show some evidence of migrated hydrocarbons. Sample A-5836 shows the saturated hydrocarbons extracted from a TOC poor claystone/marl. There is a strong bimodal distribution although higher molecular weight alkanes dominate, nC_{25} - nC_{33} . Py-gc and Rock-Eval results indicate this sample to contain a poor type III/IV kerogen. The lower molecular weight hydrocarbons seen are probably migrated hydrocarbons. There is a marked odd dominance in the lower alkanes indicating that the sample is immature.

Sample A-5841 is from a dark claystone. Rock-Eval and py-gc results show that this contains a type II/III kerogen and this is reflected in the chromatograms. Low molecular weight alkanes predominate with a maximum at nC_{15} . The most abundant hydrocarbons are pristane and phytane. There is a secondary maximum at nC_{29} . There is a small unresolved hump at the high molecular weight end and several peaks representing steranes and triterpanes. The alkane distribution indicates an input of terrestrial and marine organic matter with the latter dominating. The chromato-

gram for A-5850 is similar to that for A-5841 but shows a smoother distribution of alkanes (max. nC_{15}). Pristane is the most abundant hydrocarbon. There is a noticeable odd dominance in the higher molecular weight alkanes (CPI = 1.3). The decrease in nC_{25} - nC_{33} alkanes may indicate a lower input of terrestrial organic matter than at the top of the shale sequence. Sample A-5859 shows evidence of migrated hydrocarbons. Rock-Eval results indicate a type III/IV kerogen unlikely to produce the lighter alkanes seen in this chromatogram. There is a bimodal alkane distribution with maxima at nC_{15} and nC_{29} . The odd dominance in the range nC_{23} - nC_{31} indicates immaturity. The odd preference is much less prominent in the lower molecular weight hydrocarbons perhaps indicating a more mature source for these. Two lithologies were extracted from sample A-5861, the dominant claystone (gc A) and a siltstone (gc B). There is a bimodal alkane distribution in both chromatograms although the claystone contains a greater abundance of lower molecular weight alkanes.

Zone D (2675-2930m): 2 cuttings and 3 core samples from this zone were extracted: A-5869, A-5874, A-6419, A-6420 and A-6421 (the lower 3 are cores). A-5869 shows a good abundance of EOM and A-5874 shows a rich abundance. Both are rich when EOM values are normalised to TOC. Both show similar proportions of total hydrocarbons to TOC and similar aromaticity. The gas chromatograms from these samples show bimodal alkane distributions but lower molecular weight alkanes dominate in the sample from 2720m. Both show a marked odd dominance in the alkane range nC_{23} - nC_{31} . The CPI values for both are 1.3. Pristane/phytane and Pristane/ nC_{17} ratio values are high for both samples. 3 core samples were extracted. They show increasing abundance of EOM with depth relative to organic carbon. Saturated and aromatic hydrocarbons are present in roughly equal amounts, the amount of saturated hydrocarbons increasing slightly with depth.

The chromatograms from the core samples are very similar in appearance. Sample A-6419 contains more high molecular weight alkanes than the other two. All shows similar pristane/phytane and pristane/ nC_{17} ratios. All show maxima at nC_{17} with a relatively smooth alkane envelope. The CPI values are low as are the pristane/ nC_{17} ratios indicating a fairly mature source. These cores were noted to have a distinct oily smell and probably contain migrated light hydrocarbons. The hydrocarbon dis-

tribution in the cores is rather different from that found in claystone partings in the same zone.

Zone E (2930-3005m): Only one sample from this zone was extracted A-6394. The sample shows a rich abundance of EOM relative to the rock weight and TOC. Rock-Eval and py-gc indicate a type III kerogen in this sample considering this the sample shows a low aromaticity. The gc for this sample shows a high proportion of low molecular weight alkanes. A strong odd preference is evident in the C_{25} - C_{31} alkane range and the CPI value is fairly high, 1.3. The pristane/phytane ratio is high 5.5 as is the pristane/ nC_{17} ratio.

Zone F (3005-3533m): Two cuttings samples from this zone were extracted A-6399 and A-6417 both these samples were claystones. The upper sample shows a rich abundance of EOM by weight and when normalised to TOC. A large part of this is aromatic material. Rock-Eval data suggests a type II/III kerogen and the high aromaticity of the extract may indicate a high proportion of terrestrial material in the source. The saturated hydrocarbon gas chromatogram shows a predominance of heavy alkanes with a maximum at nC_{31} . There is a shoulder of lower molecular weight alkanes and a large amount of pristane is present. The pristane/phytane and pristane/ nC_{17} ratio values are high the latter indicating a fairly immature source (compatible with Rock-Eval results). Most of the saturated compounds are probably indigenous although there is the possibility of some low molecular weight migrated hydrocarbons. The lower sample (a TOC poor claystone associated with a red claystone). A-6417 shows a poor EOM abundance. The gc is dominated by high molecular weight alkanes with a maximum at nC_{31} . The CPI is high as are the pristane/phytane and pristane/ nC_{17} ratios. Most of the hydrocarbons are probably indigenous.

Generally the pristane/phytane ratios of the samples in this well seem to vary randomly. There are too many effects of kerogen type and different maturation levels for it to be possible to correlate the proportion of migrated hydrocarbons present with Pr/ph but there is a more systematic variation in Pr/ nC_{17} ratios. These are low in samples which seem to have large properties of migrated hydrocarbons. This is consistent with the hydrocarbons having migrated from a more mature

source (or it could be a migration effect). It is noticeable that the extracts from the sandstone cores (zone D) also show low Pr/nC_{17} ratios.

Rock-Eval Pyrolysis

50 cuttings samples, 8 sidewall cores and 3 core samples from the analysed sequence in this well were taken for Rock-Eval pyrolysis. The results are discussed below.

Zone A (355-1025m): No samples were pyrolysed from this zone.

Zone B (1025-2210m): The whole zone, this applies to the brown-grey, red-brown and dark grey claystones found, shows a very low HI and a low but more variable OI. The whole zone appears to contain a type IV and hydrogen poor type III kerogen mixture. Some samples show a very high oxygen index for example A-5755 (1040m). Oil and gas content values are low throughout the zone (indicating a poor potential for oil and gas). The production indices are fairly high, indicating the presence of migrated or contaminant hydrocarbons. Especially in samples A-5780, A-5710, A-5713 and A-5718. Most of the $T_{\max}$ values are very low (From 1325m downwards) indicating the presence of asphaltenes or bitumen. The $T_{\max}$ values at the top of the zone may not be affected and they indicate that the zone is immature.

Zone C (2210-2675m): 19 cutting samples and 6 sidewall core samples from this zone were analysed. The different lithologies present in this zone are reflected in the Rock-Eval results. The claystone/marl at the top of the zone shows OI and HI indicating a type IV kerogen. The grey claystone contains a rich type III organic matter with some type II kerogen contribution towards the top of the zone. The sidewall cores, all claystone/ shale in the interval 2278-2303m contain a hydrogen rich type II kerogen. The sample at 2278m is especially rich. The dark carbonaceous shale contains a rich type III kerogen. The buff limestone contains a hydrogen poor type III/IV kerogen. The oxygen indices for the limestone appear very high. This may be due to the effects of oxygen from the carbonate. The same may apply to the marl. The oil and gas contents are highest for the grey claystone (this is also seen in the sidewall core results) and the dark shale indicating these lithologies to have good to rich potential for oil and gas. The potential for the marl and limestone is poor. $T_{\max}$ values are fairly low indicating that the zone is immature at the top to moderate mature at the base. The samples at 2120m, 2225m and 2405m have very low $T_{\max}$ values probably due to the presence of asphaltenes or bitumen. Some of the samples show very high produc-

tion indices for example A-5848 (2405m) indicating the presence of bitumen either migrated or contaminant. The overall potential of the zone is poor with good to rich potential from 2285-2390m.

Zone D (2675-2930): Three cuttings samples and three core samples from this zone were analysed. This zone consists dominantly of sandstone though the Rock-Eval pyrolysis were carried out on the claystone present in the cuttings samples. Sample A-5866 from the top of the zone shows a type III kerogen but below this there is a decrease in hydrogen richness and the other two samples contain a type III/IV mixture. Three sandstone core samples were also pyrolysed. The 3 cores show decreasing HI with depth. Production indices are high in these samples indicating the presence of migrated hydrocarbons. The T_{max} value seems anomalously high for the top core A-6419 and very low in A-6421. The other values indicate that the zone is medium mature/mature. The zone shows an over all poor to fair potential for oil and gas.

Zone E (2930-3005m): 2 samples from this zone were analysed. Both from the grey-brown claystone. The HI and OI indicate that this contains are fairly poor type III kerogen becoming richer towards the base of the zone. OI and gas content values indicate that the source potential is poor to fair. The production indices are low and the T_{max} values indicate that the zone is immature to moderately mature.

Zone F (3005-3333m): 3 cuttings samples and 2 sidewall core samples were analysed. The dark shale encountered at 3050m contains a type III/II kerogen and shows good source potential. The claystone sample shows type III organic matter decreasing in hydrogen content with depth. Potential for the claystone is fair. T_{max} values are still fairly low indicating moderate maturity. The sidewall core samples also indicate the presence of type III kerogen. One sample is a coal, the other a claystone both show very similar HI and OI and both have a rich potential for gas.

Pyrolysis-GC

The numbered peaks on the pyrograms (if any) are alkene/alkane doublets the alkanes have the shorter retention time. T=Toluene, X=Xylenes (m+p)

Zone A: No samples in this zone were pyrolysed.

Zone B: All the samples pyrolysed in this zone show very little on the S_2 trace. Most show little or no alkene/alkane homology. The traces are dominated by aromatic compounds and low molecular weight hydrocarbons. The pyrograms indicate very poor type III and type IV kerogens in this zone.

Zone C: 7 samples from this zone were pyrolysed. With the exception of A-5799, A-5836 and A-5861 the samples in this zone are richer in type III and II organic matter. A-5850, A-5859 and A-5874 pyrograms are very similar in appearance. They show typical type III fingerprints. The traces are dominated by aromatic material but to show limited (C_8 - C_{20}) alkene/alkane homologies. The pyrogram for A-5841 indicates type II material. The alkene/alkane homology is better developed in this sample. This correlates well with the Rock-Eval results which show a type II kerogen in this sample.

Zone D: 2 samples from this zone were pyrolysed. A-5874 and A-5869 both show type II/III kerogen pyrograms. A-5869 appears to contain a more hydrogen rich kerogen. It has a well developed alkene/alkane homology extending to C_{27} . However there is still a large proportion of aromatic (terrestrial) material present.

Zones E&F: 3 samples from these zones have been pyrolysed, A-6394, A-6399 and A-6417. A-6394 shows a type III/II fingerprint. The alkene/alkane homology extends from C_8 to C_{25} . The sample below this shows a type II pyrogram. The alkane range is C_8 - C_{30} and this pyrogram shows less aromatic material than those for the other 2 sample. The lowest sample A-6417 shows a very poor type III to type IV trace.

Examination in Reflected Light

Twenty five whole-rock samples were examined in reflected light. In the majority of cases the samples had low organic contents (as indicated by TOC measurements) and this material generally gave Rock-Eval Pyrolysis results indicative of type IV and III/IV material - dominantly reworked vitrinite together with inertinite. Visual examination in reflected light confirms particularly the presence of inertinite and the generally low organic contents. Where there is more organic material present this is usually observed as bitumen. The low organic contents and large-scale reworking have led to few measurements per sample (and several samples where no material is considered representative) and only below about 3000m are the samples consistently of a better quality.

The maturity would seem to range from immature to within the oil window though at the lower maturity end of the oil window range.

The samples are described below and tabulated elsewhere. Histograms of the individual sample results are provided.

Sample A-5755, 1025-1040m: Claystone, No Determination Possible

The sample has a low organic content and this is observed as bitumen wisps together with occasional particles of reworked vitrinite ($R_o = 0.6-0.7\%$). There is a trace of green fluorescence from unidentified fragments.

Sample A-5764, 1160-1175m: Claystone, No Determination Possible

The sample is very similar to A-5755 but this one contains more bitumen staining together with spores. There are not many spores but they are clear and well preserved (indicating low maturity?). Possible green fluorescence is observed but it is not clear if this is from spores or minerals.

Sample A-5785, 1465-1480m: Claystone, $R_o = 0.48(2)$

Again this is a poor sample with a low organic content. The organic material is dominantly bitumen and bitumen staining. There is some inertinite and an occasional spore. Only two possible primary vitrinite fragments were observed and their reflectance seems high. Reworking or contamination is suspected. There is a trace of dull green fluorescence from spores and minerals.

Sample A-5804, 1745-1760m: Claystone, No Determination Possible

There is a very low organic content all of which appears to be degraded reworked vitrinite and inertinite. There is a poor polish and the sample has a general low maturity aspect. Green fluorescence is observed from unidentified fragments.

Sample A-5813, 1865-1880m: Claystone (plus sandstone?), $R_o = 0.38(2)$ and $0.53(2)$

There is a low to moderate organic content. This is dominantly inertinite followed by reworked vitrinite. There are no good vitrinite stringers. There are only four possible primary vitrinite fragments and of these the highest are probably reworked. Green fluorescence is observed dominantly from minerals but possibly from spores too.

Sample A-5820, 1970-1985m: Claystone (sandy?), $R_o = 0.43(6)$

There is a low organic content and this is dominantly inertinite plus reworked vitrinite with a low content of primary vitrinite. The vitrinite occurs as particles or ragged sub-wisps. A trace of green and green/yellow fluorescence is observed from a few spores.

Sample A-5825, 2045-2060m: Claystone (plus limestone?), No Determination Possible

The sample is almost barren containing only inertinite and a trace of bitumen. Only yellow/orange mineral fluorescence is observed.

Sample A-5841, 2285-2300m: Claystone, $R_o = 0.47(12)$

The sample is very rich in bitumen and pyrite. There is very little other material - only a trace of inertinite and vitrinite. There is a rich content of spores fluorescing green/yellow and a low content of yellow/orange spores.

Sample A-5846, 2360-2375m: Claystone, $R_o = 0.45(15)$

There is a moderate organic content. This is dominantly bitumen (especially in more carbonate rich areas) and inertinite. Some clean vitrinite is observed but some of this may be bitumen. Yellow/orange fluorescence is observed from spores.

Sample A-5850A, 2420-2435m: Claystone, $R_o = 0.51(17)$ and $0.78(1)$

This is a very mixed sample. Some clasts are very inertinite rich and some are very bitumen and pyrite rich. The mixture but variation of litho-

logies makes caving or contamination a possibility. Light orange and mid orange fluorescence is observed.

Sample A-5850B, 2420-2435m: Claystone, $R_o = 0.50(11)$

There is a low to moderate organic content. This is dominantly inertinite and reworked vitrinite. There is some degraded vitrinite and bitumen but very little clean primary vitrinite. Green/yellow, yellow/orange and light orange fluorescence is observed.

Sample A-5853, 2465-2480m: Claystone, $R_o = 0.91(4)$

There is a very low organic content. This is dominantly inertinite. There is a trace only of bitumen/vitrinite and possible primary vitrinite. Green/yellow, yellow/orange and light orange fluorescence is observed.

Sample A-5861, 2585-2600m: Mixed claystones, $R_o = 0.46(6)$ and $0.60(2)$
Overall = $0.49(8)$

The sample is very variable. One claystone is very rich in bitumen and pyrite but contains very little vitrinite. The others are inertinite rich. Yellow/orange and light orange fluorescence is observed.

Sample A-5864, 2630-2645m: Claystone (sandy?), $R_o = 0.39(3)$ and $0.51(3)$
Overall = $0.45(6)$

There is a moderate organic content. This is variable but is dominantly bitumen and inertinite with each dominant in different areas or separate clasts. The mixed lithologies could indicate some caving. Green/yellow, yellow/orange and light orange fluorescence is observed.

Sample A-5866, 2660-2675m: Claystone, $R_o = 0.39(4)$ and $0.55(3)$
Overall = $0.45(7)$

There is a low to moderate organic content. This is very variable. There is an occasional clast rich in bitumen and pyrite. The others are very dominantly inertinite and reworked vitrinite. There is only a trace of possible primary vitrinite. Light orange fluorescence is observed from spores.

Sample A-5869, 2705-2720m: Claystone, $R_o = 0.51(8)$

The sample has a low to moderate organic content. This is very variable containing dominantly inertinite together with some reworked vitrinite and a low content of primary vitrinite. One very bitumen rich lithology is probably caved. Light orange and mid orange fluorescence is observed.

Sample A-5874, 2780-2795m: Sandstone, No Determination Possible

The organic content is very low and consists only of bitumen and reworked vitrinite. Light orange fluorescence is observed from unidentified fragments.

Sample A-6390, 2900-2915m: Sandstone, $R_o = 0.45(8)$ and $0.88(3)$

There is a low organic content. This is dominantly bitumen. There is some high reflectance reworked vitrinite but a low content of primary vitrinite. Only mineral fluorescence is observed.

Sample A-6392, 2930-2945m: Claystone (sandy), $R_o = 0.45(12)$

There is a low to moderate organic content. This is very dominantly inertinite followed by reworked vitrinite. Bitumen staining is difficult to assess because of the presence of iron staining. Distinction of organic components is difficult. Light orange fluorescence is observed.

Sample A-6397, 3005-3020m: Sandstone, $R_o = 0.68(1)$

The sample is almost barren. There is a trace of inertinite and bitumen staining but only one fragment of possible primary vitrinite is observed and this is probably contaminant. A trace of mid orange fluorescence is observed.

Sample A-6399, 3035-3050m: Mixed claystone, $R_o = 0.68(20)$ and $0.92(1)$

The organic material is very variable within apparently different lithologies. One lithology is very bitumen rich and contains most of the vitrinite. Caving or contamination is suspected. The sample is good if the lithology is in-situ. Mid-orange fluorescence is observed.

Sample A-6407, 3155-3170m: Coal, $R_o = 0.71(21)$

The sample is a normal well-banded coal with a good mixture of macerals. Mid-orange to dark orange fluorescence is observed from spores and resin.

Sample A-6410, 3200-3215m: Claystone, $R_o = 0.66(17)$

The silty element of this sample has a very low organic content which is composed totally of inertinite. The claystone is very bitumen rich and contains some good vitrinite although most occurs as particles. The claystone is very similar to some lithologies above. The value may be low. Mid-orange to dark orange fluorescence is seen from bitumen or cuticular type material.

Sample A-6417, 3305-3320m: Claystone, No Determination Possible

The sample is oxidised and almost barren of organic material. Fluorescence is seen from minerals only.

Analysis in Transmitted Light

The acid insoluble organic matter of well 6610/7-1 was investigated on the basis of 25 samples. The material represents selected lithologies from cuttings samples between 1025m and 3320m.

The material present throughout the well is immediately notable for the dominance of terrestrially derived fragments. This is mainly in the form of woody material (dominantly inertinite and reworked vitrinite) though spores and pollen are variably present in most samples.

Where amorphous (or sapropelic) material is observed in larger quantities this is generally thought to be derived from terrestrial material (due to a combination of its colour, form and the close association of much woody material) and is consequently not rated with as high a source potential for oil as might be suspected. Dependent upon the degree of sapropelisation/vagueness of composition of these aggregates they are variably classed under "Amorphous material, sapropel", or "Undifferentiated disperse herbaceous material" (the latter having slightly more structured material discernable) for the purpose of the visual display of relative proportions - see Maturation Chart.

A strong lithology/environmental control is seen with the similarity of samples A-5874, A-6390 and A-6397 (sandstones) and A-6417 (an oxidised claystone). All of these samples have poor residues, high in minerals and containing fine grained dispersed material with few palynomorphs preserved.

The richest samples in terms of amount of material, form of material (amorphous aggregates being considered good) and colour (deep red/brown considered most favourable) coincide well with those samples having high Petroleum Potentials (and higher Hydrogen Indices).

In terms of maturity as assessed by palynomorph colours, the sequence begins immature (TAI = 1/1+) reaching moderate maturity at about 2000m (TAI = 2-, 2-/2). From this stage changes are slow and are masked by a broad range of values often in the same sample (due to caving?) however from about 2500m the sequence is moderately mature to mature and oil window maturity is reached at about 3000m (TAI = 2, 2/2+).

Details of the samples are tabulated elsewhere together with brief remarks.

CONCLUSIONS

The maturity of the analysed sequence from the well 6610/7-1 is mainly based on vitrinite reflectance, spore fluorescence, spore colouration and T_{max} values from Rock-Eval pyrolysis. The richness of the samples is based on TOC and Rock-Eval pyrolysis with additional evidence being supplied from the abundance of light hydrocarbons. Source rock quality is based mainly on pyrolysis, both Rock-Eval and pyrolysis gas chromatography and on visual kerogen examination.

Zone A (355-1025m): The dominant lithologies in this zone are fine to coarse sands and gravels of mixed origins. No analyses were carried out in these zones due to the unsuitable nature of the samples. From the lithological description none appears to contain any carbonaceous matter or show any visible hydrocarbon staining.

Zone B (1025-2210m): This zone corresponds approximately to the cretaceous section in this well (the top cretaceous has been set (Statoil) at 1335m and the base at 2271m). The zone contains a variety of claystones. TOC values for these samples range from poor to good but Rock-Eval results indicate that the dominant kerogen type in this zone is a hydrogen poor type III/IV with poor potential for oil or gas. This correlates with the observations from the visual kerogen analyses which indicate dominantly terrestrial organic matter with large amounts of inertinite (type IV). Pyrolysis gc results also indicate very hydrogen poor kerogens. Vitrinite reflectance, TAI and fluorescence indicate that this zone is immature to moderate mature. The Rock-Eval T_{max} indicates that it is immature. It is possible that the T_{max} values have been affected to some extent by migrated hydrocarbons (some values are very low indicating the presence of bitumen or asphaltenes). The presence of migrated hydrocarbons in this zone is also indicated in the gas chromatograms of the saturated fractions. Here large amounts of low molecular weight alkanes are seen which is unlikely from such hydrogen poor kerogens. The samples showing the low molecular weight alkanes also show high production indices in the Rock-Eval results incompatible with their low maturity.

Zone C (2210-2675m): This zone corresponds quite well with the upper Jurassic in this well (Top 2271 top middle Jurassic sandstone 2657.5). The top of the Kimmeridge equivalent in this well is probably marked

by the appearance of the TOC rich (11.9%) claystone at 2285m. Above this the zone consists of grey marl with increasing amounts of carbonaceous claystone (it has been found in other areas that a TOC-rich, dark claystone occurs just above the Kimmeridge shales. This may be the case in this well also). A paler claystone becomes the dominant lithology below 2390m. This shows good to rich TOC values. Rock-Eval pyrolysis and py-gc results indicate predominantly type III/II and II/III mixtures of kerogen. (The visual kerogen results compare well with the pyrolysis and extraction data. Most samples show mixed but dominantly terrestrial residues. However the top Kimmeridge sample A-5841 shows a rich amorphous residue). The overall potential of the zone is poor with good to rich potential from (2285-2390m). Vitrinite reflectance, fluorescence and T_{max} (Rock-Eval) indicate that this zone is immature to moderately mature. There is evidence, in the saturated hydrocarbon gas chromatograms, in some samples of the presence of migrated or contaminant hydrocarbons.

Zone D (2675-2930m): The top of this zone roughly corresponds to the top of the middle Jurassic sandstone unit and it includes the lower Jurassic shale and sandstone units. The top of the zone is marked by the appearance of a well cemented quartz sandstone. TOC values of the claystone appearing around 2675m show a good abundance of organic carbon. These claystones probably represent part of the lower Jurassic shale. Rock-Eval pyrolysis indicates the claystone to contain type III and type III/IV kerogen. Visual kerogen observations are in agreement with this showing predominantly terrestrial material with increasing amounts of inertinite (type IV) down the zone. 3 core samples were also pyrolysed. The Rock-Eval results from these indicates presence of migrated hydrocarbons. This is also evident from the fluorescence and smell of the cores (middle Jurassic sandstone). The overall potential of this zone is poor to fair for oil and gas. Vitrinite reflectance, fluorescence and TAI values indicate that the zone is moderate mature to mature. Rock-Eval T_{max} gives a lower maturity but these values may be artificially low due to the presence of migrated hydrocarbons.

Zone E (2930-3005m): This zone coincides roughly with the top part of the lower Jurassic coal unit (top given as 2854m). The top of the zone is marked by a grey-brown claystone. The lithology is variable through the zone: siltstone, minor sandstone and some coal. The claystone samples analysed show fair to good contents of organic carbon. Rock-Eval

and pyrolysis-gc results indicate that the claystone contains a type III kerogen with poor to fair source potential. The organic residue is dominantly terrestrial. The $T_{\max}$ values indicate that the zone is immature to moderate mature but the vitrinite reflectance, fluorescence and TAI indicate moderate maturity.

Zone F (3005-3333m): This zone covers the base of the Jurassic coal unit and the top of the Triassic which is indicated by the appearance of a TOC (0.08%) poor claystone at 3230m. All Rock-Eval, py-gc and extractions were carried out on lower Jurassic samples. The results indicate a type III kerogen in the claystones decreasing in hydrogen content towards the base. Sidewall core samples also show type III kerogen. The zone shows fair potential for gas with rich gas potential between 3148m and 3194m. Vitrinite reflectance and TAI (where it could be determined) indicate that the zone is mature ($T_{\max}$ - moderate mature/mature).

TABLE I a.

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

I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4
I	no.	m/ft							C1-C4	C2-C4	NESS	-----
I											(%)	nC4
I												
I	A 5715	445	11667						11667		0.00	
I	A 5720	520	754						754		0.00	
I	A 5726	610	9315						9315		0.00	
I	A 5732	700	7391	8					7400	8	0.11	
I	A 5738	790	513						513		0.00	
I	A 5743	860	843						843		0.00	
I	A 5748	935	13						13		0.00	
I	A 5755	1040										
I	A 5759	1100										
I	A 5764	1175	42						42		0.00	
I	A 5769	1250	49						49		0.00	
I	A 5774	1325	40						40		0.00	
I	A 5780	1405	3586						3586		0.00	
I	A 5785	1480	301						301		0.00	
I	A 5792	1585	441	21					461	21	4.45	
I	A 5797	1660	17						17		0.00	
I	A 5799	1685	405						405		0.00	
I	A 5802	1730	114						114		0.00	
I	A 5804	1760	2590	14					2604	14	0.53	
I	A 5808	1805										
I	A 5810	1835	32						32		0.00	
I	A 5813	1880	667	37	35	28			767	100	13.09	
I	A 5816	1925	1401	83	95	74			1653	252	15.24	
I												

DATE : 5 - 7 - 83.

TABLE I a.

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

I	I	I	I	I	I	I	I	I	I	I	I	I
I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4
I	no.	m/ft							C1-C4	C2-C4	NESS	-----
I											(%)	nC4
I												
I	A 5818	1955	356						356		0.00	
I	A 5820	1985	3884	245	316	240		268	4684	800	17.08	
I	A 5823	2030	2198	232	343	290			3063	865	28.24	
I	A 5825	2060	8451	895	1239	931		29	11516	3064	26.61	
I	A 5829	2120	24	11					35	11	31.15	
I	A 5831	2150										
I	A 5834	2195										
I	A 5836	2225	525	37	93	101		265	755	230	30.48	
I	A 5839	2270	302	39	154	82	115	162	691	390	56.36	0.71
I	A 5841	2300	9300	1107	2289	652	1210	2333	14559	5258	36.12	0.54
I	A 5846	2375	3452	507	1090	485	522	750	6057	2604	43.00	0.93
I	A 5848	2405	1802	281	750	343	470	1282	3645	1844	50.58	0.73
I	A 5850	2435	13828	2045	3460	1261	1496	2205	22090	8262	37.40	0.84
I	A 5853	2480	3493	707	1447	376	444	958	6468	2974	45.99	0.85
I	A 5855	2510	9601	1887	2547	410	476	499	14922	5321	35.66	0.86
I	A 5857	2540	4280	1156	2103	451	554	881	8545	4264	49.91	0.81
I	A 5859	2570	589	423	763	121	164	320	2059	1470	71.38	0.74
I	A 5861	2600	2537	599	1265	276	401	762	5077	2540	50.03	0.69
I	A 5864	2645	6263	1172	3513	889	1487	1095	13324	7061	53.00	0.60
I	A 5866	2675	289	90	211	66	99	241	755	466	61.69	0.66
I	A 5869	2720	1007	221	641	236	362	738	2467	1460	59.19	0.65
I	A 5871	2750	1881	597	1549	444	797	1175	5268	3388	64.30	0.56
I	A 5874	2795	6731	1138	1079	192	310	352	9450	2719	28.77	0.62
I												

DATE : 5 - 7 - 83.

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

DATE : 5 - 7 - 83.

TABLE I b.

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

I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4
I	no.	m/ft							C1-C4	C2-C4	NESS	-----
I											(%)	nC4
I												
I	A 5715	445	91						91		0.00	
I	A 5720	520	241						241		0.00	
I	A 5726	610	466	5					471	5	1.09	
I	A 5732	700	459	5	3				467	8	1.68	
I	A 5738	790	148	4	16				168	20	11.89	
I	A 5743	860	280	6					286	6	2.14	
I	A 5748	935	528	7					535	7	1.31	
I	A 5755	1040	55						55		0.00	
I	A 5759	1100	12						12		0.00	
I	A 5764	1175	21						21		0.00	
I	A 5769	1250	45						45		0.00	
I	A 5774	1325	65						65		0.00	
I	A 5780	1405	133						133		0.00	
I	A 5785	1480	58	13	7				78	20	25.98	
I	A 5792	1585	42	8	5				55	14	24.96	
I	A 5797	1660	32						32		0.00	
I	A 5799	1685	39	8					47	8	16.79	
I	A 5802	1730	17						17		0.00	
I	A 5804	1760	50	8	5				63	13	20.81	
I	A 5808	1805	26						26		0.00	
I	A 5810	1835	27	7					34	7	19.68	
I	A 5813	1880	41	11	11	9			72	30	42.61	
I	A 5816	1925	37	8	6			11	51	14	26.87	
I												

DATE : 5 - 7 - 83.

TABLE I b.

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

I									SUM	SUM	WET-	iC4
I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	C1-C4	C2-C4	NESS	-----
I	no.	m/ft									(%)	nC4
I												
I	A 5818	1955	60	13	14	12	9	24	106	47	44.08	1.37
I												
I	A 5820	1985	25	11	15	17	12	40	79	55	69.07	1.51
I												
I	A 5823	2030	52	13	13	8		41	85	33	38.83	
I												
I	A 5825	2060	71	20	34	35	27	74	187	116	62.11	1.31
I												
I	A 5829	2120	46						46		0.00	
I												
I	A 5831	2150	15					41	15		0.00	
I												
I	A 5834	2195	49					57	49		0.00	
I												
I	A 5836	2225	122		13			126	135	13	9.37	
I												
I	A 5839	2270	26	4			4	36	34	8	22.85	0.00
I												
I	A 5841	2300	4455	2900	10123	3876	8629	12662	29982	25527	85.14	0.45
I												
I	A 5846	2375	196	100	551	292	778	1910	1917	1722	89.80	0.37
I												
I	A 5848	2405	455	212	861	440	1085	3405	3053	2598	85.10	0.41
I												
I	A 5850	2435	179	166	807	345	806	656	2303	2125	92.25	0.43
I												
I	A 5853	2480	470	463	1395	481		639	2809	2339	83.26	
I												
I	A 5855	2510	682	498	1662	806	528		4176	3494	83.68	1.53
I												
I	A 5857	2540	350	366	1402	315	864	1523	3297	2947	89.38	0.36
I												
I	A 5859	2570	144	266	1036	223	532	572	2200	2056	93.47	0.42
I												
I	A 5861	2600	253	307	1297	329	763	960	2949	2696	91.44	0.43
I												
I	A 5864	2645	237	250	1570	441	1310	1468	3807	3570	93.77	0.34
I												
I	A 5866	2675	308	379	1688	594	1504	2683	4473	4165	93.11	0.40
I												
I	A 5869	2720	574	752	4093	1821	4348	7267	11587	11014	95.05	0.42
I												
I	A 5871	2750	298	452	2402	921	2500	3225	6573	6275	95.47	0.37
I												
I	A 5874	2795	5262	4522	5218	746	2299	3440	18048	12786	70.84	0.32
I												

DATE : 5 - 7 - 83.

TABLE I b.

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

I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS (%)	iC4 ----- nC4
I	no.	m/ft										
I	A 5876	2825	292	383	1037	273	794	1402	2779	2487	89.48	0.34
I	A 6385	2840	577	569	1133	193	585	544	3058	2481	81.12	0.33
I	A 6387	2870	41130	14416	7442	912	1498	742	65399	24269	37.11	0.61
I	A 6390	2915	18593	6260	3786	566	1035	859	30240	11647	38.52	0.55
I	A 6392	2945	62304	26095	15592	1918	2086	996	107994	45690	42.31	0.92
I	A 6394	2975	54701	23847	15155	1857	2367	1045	97928	43227	44.14	0.78
I	A 6397	3020	15782	9341	8420	1125	2182	1035	36849	21067	57.17	0.52
I	A 6399	3050	52717	21657	14390	1637	2646	1001	93048	40330	43.34	0.62
I	A 6402	3095	111824	44930	29894	3485	4350	1203	194482	82658	42.50	0.80
I	A 6405	3140	23893	8356	4227	474	872	566	37823	13929	36.83	0.54
I	A 6407	3170	70607	26920	12024	958	1292	420	111800	41193	36.85	0.74
I	A 6410	3215	21286	4779	2737	336	892	641	30030	8744	29.12	0.38
I	A 6412	3245	12064	2314	1474	241	624	817	16717	4653	27.84	0.39
I	A 6415	3290	1064	469	289	45	135	321	2001	938	46.84	0.33
I	A 6417	3320	351	141	107	15	45	125	658	308	46.71	0.33

DATE : 5 - 7 - 83.

TABLE I c.

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

I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS (%)	iC4 ----- nC4
I	no.	m/ft										
I	A 5715	445	11757						11757		0.00	
I	A 5720	520	995						995		0.00	
I	A 5726	610	9781	5					9786	5	0.05	
I	A 5732	700	7850	13	3				7866	16	0.21	
I	A 5738	790	661	4	16				681	20	2.93	
I	A 5743	860	1122	6					1128	6	0.54	
I	A 5748	935	541	7					548	7	1.27	
I	A 5755	1040	55						55		0.00	
I	A 5759	1100	12						12		0.00	
I	A 5764	1175	63						63		0.00	
I	A 5769	1250	94						94		0.00	
I	A 5774	1325	105						105		0.00	
I	A 5780	1405	3719						3719		0.00	
I	A 5785	1480	359	13	7				379	20	5.37	
I	A 5792	1585	482	29	5				517	34	6.65	
I	A 5797	1660	49						49		0.00	
I	A 5799	1685	444	8					452	8	1.74	
I	A 5802	1730	131						131		0.00	
I	A 5804	1760	2639	22	5				2666	27	1.01	
I	A 5808	1805	26						26		0.00	
I	A 5810	1835	60	7					66	7	10.15	
I	A 5813	1880	708	47	46	37			839	131	15.60	
I	A 5816	1925	1438	91	101	74		11	1704	266	15.59	

DATE : 5 - 7 - 83.

TABLE I c.

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

I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS (%)	iC4 ----- nC4
I	no.	m/ft										
I	A 5818	1955	415	13	14	12	9	24	462	47	10.15	1.37
I	A 5820	1985	3908	256	330	257	12	307	4763	855	17.95	22.22
I	A 5823	2030	2250	245	356	297		41	3148	898	28.52	
I	A 5825	2060	8522	915	1273	966	27	103	11703	3180	27.18	35.97
I	A 5829	2120	70	11					81	11	13.52	
I	A 5831	2150	15					41	15		0.00	
I	A 5834	2195	49					57	49		0.00	
I	A 5836	2225	647	37	106	101		391	890	243	27.28	
I	A 5839	2270	327	43	154	82	119	198	725	397	54.81	0.69
I	A 5841	2300	13755	4007	12412	4528	9839	14995	44540	30786	69.12	0.46
I	A 5846	2375	3648	607	1642	777	1301	2660	7974	4326	54.25	0.60
I	A 5848	2405	2256	492	1611	783	1555	4688	6698	4442	66.31	0.50
I	A 5850	2435	14006	2211	4267	1606	2302	2861	24393	10387	42.58	0.70
I	A 5853	2480	3963	1170	2843	857	444	1596	9277	5313	57.28	1.93
I	A 5855	2510	10282	2386	4209	1216	1004	499	19097	8815	46.16	1.21
I	A 5857	2540	4631	1522	3505	766	1418	2403	11841	7211	60.90	0.54
I	A 5859	2570	733	688	1799	344	695	893	4259	3526	82.79	0.50
I	A 5861	2600	2789	906	2562	605	1164	1721	8026	5236	65.25	0.52
I	A 5864	2645	6500	1422	5083	1330	2797	2563	17131	10631	62.06	0.48
I	A 5866	2675	597	469	1899	660	1603	2924	5228	4631	88.58	0.41
I	A 5869	2720	1580	974	4734	2057	4709	8004	14054	12474	88.76	0.44
I	A 5871	2750	2178	1049	3951	1365	3297	4400	11841	9663	81.60	0.41
I	A 5874	2795	11993	5660	6297	938	2609	3792	27497	15504	56.38	0.36

DATE : 5 - 7 - 83.

TABLE I c.

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

I	I	I	I	I	I	I	I	I	I	I	I	I
	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
	no.	m/ft										
I	A 5876	2825	1861	1062	2135	553	1212	2018	6823	4962	72.72	0.46
I	A 6385	2840	3370	1575	2487	519	1007	1055	8957	5587	62.38	0.52
I	A 6387	2870	59777	20450	9738	1292	1824	976	93081	33304	35.78	0.71
I	A 6390	2915	24615	7117	4181	647	1093	922	37654	13039	34.63	0.59
I	A 6392	2945	94185	37486	20149	2693	2579	1304	157093	62908	40.04	1.04
I	A 6394	2975	63311	27403	17229	2272	2663	1231	112878	49567	43.91	0.85
I	A 6397	3020	35075	13677	11574	1730	2875	1628	64931	29857	45.98	0.60
I	A 6399	3050	55405	21885	14497	1651	2660	1016	96098	40693	42.35	0.62
I	A 6402	3095	130673	48956	31748	3738	4636	1397	219751	89078	40.54	0.81
I	A 6405	3140	31274	9070	4475	503	904	594	46226	14952	32.35	0.56
I	A 6407	3170	114119	35548	15223	1366	1769	1036	168025	53906	32.08	0.77
I	A 6410	3215	24183	5095	2895	336	924	761	33434	9251	27.67	0.36
I	A 6412	3245	19779	2809	1806	317	745	1162	25457	5678	22.30	0.43
I	A 6415	3290	1513	541	348	60	160	474	2623	1109	42.30	0.37
I	A 6417	3320	520	163	134	22	55	281	895	374	41.84	0.41

DATE : 5 - 7 - 83.



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5710	355-370		100% Casing cement Sm.am. Various rock fragments
A-5715	430-445		80% Sand, very fine to very coarse, occ. gravel, angular to subrounded 20% Rock fragments, mainly from metamorphic and plutonic rocks, a few fragments are however, found to be of sedimentary origin Sm.am. Pyrite; Mica; Hornblende; Casing cement
A-5720	505-520		40% Sand, as above 55% Rock fragments, including metamorphic, plutonic and sedimentary rocks 5% Shale fragments Sm.am. As above
A-5726	595-610		80% Sand, fine to very coarse, often with goethite coating. In addition to quartz it also includes different other meta- morphitic and plutonic minerals. Angular but occ. subrounded. 20% Rock fragments including both metamorphic, plutonic and sedimentary rocks Sm.am. Glauconite; Shell fragments
A-5732	685-700		50% Sand, as above 50% Rock fragments, as above Sm.am. Pyrite; Glauconite; Various metamorphic minerals, Shell fragments



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5738	775-90		30% Sand, fine to very coarse, angular, occ. rounded, as above 65% Rock fragments, as above 5% Shell fragments Sm.am. As above
A-5743	845-60		30% Sand, fine to very coarse, angular to rounded, mainly Quartz, but other minerals of metamorphic and plutonic origin do exist 60% Rock fragments, mainly of metamorphic and plutonic origin Sm.am. Shell fragments; Glauconite; Pyrite
A-5748	920-35		80% Sand, better sorted than above, mainly very coarse, but occ. coarse or gravelly, angular to rounded. Stained brown by ?goethite 20% Rock fragments Sm.am. Casing cement; Glauconite
A-5755	1025-40	0.32	100% Claystone, light grey, occ. light greenish, yellowish and brownish grey, rich in microfossils, spicules and mica. Occ. sandy Sm.am. Chalk; Limestone laminae; Ironstone
A-5759	1085-1100	0.39	90% Claystone, grey, greenish grey, olive; brownish grey
		0.17	10% Claystone, reddish brown, often with white calcite spots Sm.am. Claystone, dark grey to black, carbonaceous, often silty; Glauconite (trace); Pyrite (trace)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5764	1160-75	0.90	15% Claystone, dark grey, silty, carbonaceous
		0.81	80% Claystone, light grey, light brownish grey, grey
			5% Dolostone, grey, angular, hard Sm.am. Pyrite; Coal; Sandstone, very fine to fine, immature
A-5769	1235-50	0.44	85% Claystone, light grey, light brownish and greenish grey, occ. white, noncalcareous
		1.16	15% Claystone, grey, brownish grey, often silty, occ. sandy
			Sm.am. Limestone, white to buff; Sandstone, as above, occ. pyrite cemented, occ. very coarse grains; Pyrite; Coal, dark grey, clayey
A-5774	1310-50	0.75	40% Claystone, grey to light grey, light brownish light greenish grey, occ. sandy
			60% Sandstone/Sand, very coarse to medium, loose, subangular to subrounded, often with green and brown staining
			Sm.am. Glauconite; Limestone



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5780	1390-1405	0.46	90% Claystone, mainly light brownish grey, silty, occ. sandy and glauconitic, slightly calcareous 2% Sandstone, white with abundant glauconite, calcite cemented 8% Sand, medium to very coarse, subangular to subrounded with green and brown staining of the grains Sm.am. Limestone, white; Glauconite; Mica (muscovite)
A-5785	1465-80	0.44	95% Claystone, grey, occ. micromicaceous slightly calcareous 5% Sand, coarse with brown and green staining, as above Sm.am. Siderite, sphaerosiderite; Chalk; Mica (both Muscovite and Biotite, ?additive); Pyrite
A-5792	1570-85	0.61	95% Claystone, as above 2% Sand, as above 3% Siderite, brown Sm.am. Glauconite; Mica (?additive)
A-5794	1600-75	0.59	100% Claystone, grey, as above, occ. subfissile Sm.am. Sand, as above; Siderite, as above; Calcite, white to buff; Glauconite; Mica



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5797	1645-60	0.61	90% Claystone, grey, as above 2% Claystone, reddish brown, silty and sandy 8% Sandstone, grey, sandy and silty, sand grains are very fine grained Sm.am. Ironoxide flakes; Glauconite; Limestone
A-5799	1670-85	0.39	90% Claystone, grey, as above, occ. sandy 8% Claystone, calcareous; Marl, occ. sandy and silty, occ. glauconitic 2% Limestone, white to light brown Sm.am. Claystone, reddish brown; Claystone, purple; Sand, very coarse; Pyrite; Glauconite
A-5802	1715-30	0.51 1.08	60% Claystone, grey, as above 40% Claystone/Marl, sandy, rich in calcareous fossile fragments, occ. sandy and silty, glauconitic Sm.am. Claystone, green; Pyrite; Siderite; Limestone; Sand, coarse; Mica
A-5804	1745-60	0.59	95% Claystone, grey, micromicaceous, non or slightly calcareous 5% Siderite, brownish grey, angular fragments Sm.am. Shell fragments, calcitic; Pyrite; Chalk, white
A-5808	1790-1805	0.87 0.70	60% Claystone, grey, as above, occ. greenish grey 40% Claystone, dark grey, micromicaceous, carbonaceous, often silty Sm.am. Claystone, reddish brown; Chalk, white; Glauconite; Siderite, as above



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5810	1820-35	1.46	90% Claystone, grey, greenish grey, brownish grey, often micromicaceous 5% Claystone, greyish red, reddish brown 5% Marl, glauconitic Sm.am. Claystone, dark grey, carbonaceous; Siderite; Glauconite
A-5813	1865-80	0.54	45% Claystone, grey, greenish grey, brownish grey, micromicaceous, often silty
		1.40	50% Claystone, dark grey, micromicaceous, carbonaceous 5% Claystone, reddish brown, dull red, micromicaceous Sm.am. Pyrite (abundant sphaerical masses); Siderite, brownish grey; Glauconite
A-5816	1910-25	0.67	95% Claystone, grey, micromicaceous 5% Marl, rich in dark mica Sm.am. Claystone, reddish brown, dull red Claystone, dark grey, silty, carbonaceous; Calcite; Shell fragments; Pyrite
A-5818	1940-55	0.54	60% Claystone, grey, as above
		0.39	40% Marl, sandy, grey, as above, rich in shell fragments Sm.am. Claystone, dark grey, carbonaceous; Pyrite; Siderite; Limestone, light brown; Glauconite



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5820	1970-85	0.80	95% Claystone, grey, occ. greenish and brownish grey, as above, often very calcareous, due to shell debris, occ. micromicaceous 5% Marl, sandy, as above Sm.am. Claystone, dark grey, dark brownish grey; Claystone, reddish brown; Limestone; Shell fragments; Pyrite
A-5823	2015-30	0.71	90% Claystone, grey, occ. light grey, light greenish grey, light brownish grey, occ. glauconitic, occ. silty, occ. very micromicaceous 5% Siderite, brownish grey 5% Sandstone, very fine to fine, well cemented, Calcite cement Sm.am. Chalk, white to light brown; Iron-oxide laminae; Claystone, greyish red; Pyrite; Glauconite
A-5825	2045-60	0.74	95% Claystone, grey, etc., as above 5% Siderite Sm.am. Wood fragments, pyritized and coalified; Shell fragments; Forams; Pyrite; Coal
A-5829	2105-20	0.68	85% Cement (from casing) 15% Claystone, grey, often micromicaceous, silty, occ. dark grey, carbonaceous Sm.am. Siderite; Pyrite; Ironoxide plates; additives



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5831	2135-50		90% Casing cement 10% Additives, including lignosulfonate, fiber etc. Sm.am. Claystone, as above
a-5834	2180-95		90% Casing cement 15% Additives, as above 5% Various lithologies including Claystone, grey Siltstone and Sand, medium to very coarse (?additive)
A-5836	2210-25	0.42	70% Claystone/Marl, grey to light brown, buff, light grey calcareous, occ. micaceous 5% Limestone, off white to buff, ?Sideritic 5% Siltstone, grey, calcareous 5% Sandstone, very fine to fine, occ. coarse 10% Casing cement 5% Additives Sm.am. Pyrite; Mica
A-5839	2255-70	0.31 0.41	80% Claystone/Marl, grey to light grey 10% Limestone, off white, light brown, sideritic 10% Additives (lignosulfonate?) Sm.am. Casing cement; Pyrite; Mica
A-6423	2278	14.40	S.W.C.
A-6424	2283	6.17	S.W.C.



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5841	2285-2300	11.29	100% Claystone/Shale, dark grey, brownish grey to black, carbonaceous, micromica- ceous, fissile of subfissile Sm.am. Chalk, white; Marl, grey; Pyrite (trace)
A-6425 (swc)	2290	6.17	
A-6426 (swc)	2303	9.11	
A-6426 (swc)	2325	4.65	
A-5846	2360-2375	1.03	45% Claystone, grey, micromicaceous, partly silty, generally lighter than above
		4.19	10% Shale/Claystone, dark grey, as above 5% Siderite, slightly calcitic, brown, brownish grey
		0.76	30% Limestone, crystalline, off-white 10% Additives, mainly Lignite Sm.am. Chalk, white; Sand, fine to coarse; Pyrite
A-5848	2390-2405	1.01	60% Claystone, grey, brownish grey, calcareous
		6.35	10% Claystone/Shale, dark grey, micaceous, silty
		0.95	20% Limestone, buff to off-white, in part ?sideritic 10% Additives (lignite) Sm.am. Pyrite



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5850	2420-2435	0.93	65% Claystone, grey, brownish grey, as above
		6.41	20% Claystone/Shale, dark grey, dark brownish grey, silty, micaceous, carbonaceous
		1.47	10% Limestone, off-white to brown, in part sideritic
			5% Additives (lignite) Sm.am. Pyrite
A-5853	2465-2480	1.04	35% Claystone, light grey, grey, brownish grey, micromicaceous, occ. pyritic, silty
			5% Claystone/Shale, dark grey
			5% Limestone, light brown, buff.
			5% Siltstone, white, light grey
			50% Additive (lignite) Sm.am. Pyrite
A-6428 (swc)	2480	2.30	
A-5855	2495-2510	1.21	30% Claystone, grey, light grey, silty, very micromicaceous, occ. non-micaceous
			5% Siltstone, light grey to white
			5% Sandstone, very fine to fine
			5% Limestone, white to buff., occ. containing clastic grains
			55% Additives (lignite)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5857	2525-2540	1.38	75% Claystones, light grey to grey, light brownish grey, silty, micromicaceous 5% Claystone, dark grey, micromicaceous 5% Limestone, off-white to light brown 2% Siltstone, white to light brown 3% Sandstone, very fine to fine, white 10% Additives (mainly lignite) Sm.am. Pyrite
A-5859	2555-2570	1.09	25% Claystone, grey, light brownish grey, often silty, micromicaceous 5% Claystone, dark grey Siltstone, light grey to white, micaceous 20% Sandstone, very fine to fine, well cemented
		0.79	10% Limestone, light brown, light brownish grey, ?sideritic 40% Additives (mainly lignite) Sm.am. Pyrite
A-5861	2585-2600	3.57	65% Claystone, grey, light grey, brownish grey, micromicaceous, in part silty
		0.99	10% Siltstone, light grey, light brown 5% Sandstone, very fine to fine, well cemented 20% Additive (mainly lignite) Sm.am. Limestone, as above; Pyrite



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-5864	2630-2645	2.17	80% Claystone, grey, etc. as above 5% Siltstone, as above 5% Sandstone, as above 10% Additives (mainly lignite) Sm.am. Pyrite; Limestone, ?sideritic; Claystone, dark grey
A-5866	2660-2675	1.28	80% Claystone, grey etc., as above 5% Claystone, dark grey 5% Siltstone 5% Limestone, off-white, brown 5% Additives (mainly lignite) Sm.am. Pyrite
A-6419 (core)	2661.60	0.29	
A-6420 (core)	2668.05	0.33	
A-5869	2705-2720	1.05	55% Claystone, grey, occ. brownish grey, silty, with silt laminae, micro- micaceous 5% Claystone, dark grey 20% Sandstone, mainly quartz, well cemented, very fine to coarse 20% Additive (mainly lignite) Sm.am. Oolites; Limestone, light brown; Pyrite; Siltstone, light brown, light grey
A-6421 (core)	2706.00 - 2706.05	0.12	



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-6422 (core)	2778.45 - 2778.50	0.98	
A-5871	2735-2750	1.13	40% Sandstone, fine to very coarse, mainly quartz 40% Claystone, grey, brownish grey, micromicaceous 5% Siltstone, white to light brown 5% Limestone, light brown 10% Additives (mainly lignite) Sm.am. Pyrite
A-5874	2780-2795		95% Sandstone, poorly cemented, medium to very coarse, some hydrocarbon staining, angular to subangular 5% Claystone, grey, as above 5% Additives (mainly lignite) Sm.am. Mica (additive); ?Coal; Chalk
A-5876	2810-2825		80% Sandstone, very fine to fine, well cemented, calcite cemented, calcite cement, grains are angular to subangular 10% Sandstone, medium to very coarse, poorly cemented, as in the previous sample 5% Claystone, grey, as above 5% Siltstone, white, similar to the fine grained sandstone Sm.am. Pyrite; Limestone



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-6385	2825-2840		95% Sandstone/Sand, very fine to fine, occ. up to very coarse, white, well cemented, both silica, kaolinitic and calcite cement 3% Claystone, grey, micromicaceous, silty 2% Siltstone, white, often sandy and clayey Sm.am. Coal; Pyrite
A-6387	2855-2870		90% Sandstone, as above 6% Siltstone, as above 2% Claystone, grey, brownish grey, micromicaceous 2% Coal, black Sm.am. Pyrite; Mica
A-6390	2900-2915		90% Sandstone, very fine to fine, occ. ranging up to coarse 5% Siltstone, grey, brownish grey 5% Claystone, grey, silty, micromicaceous Sm.am. Coal, black; Mica; Pyrite
A-6392	2930-2945	0.94	75% Claystone, grey, brownish grey, occ. silty 5% Siltstone, light grey, light brown 5% Sandstone, very up to fine to fine, occ. very coarse 15% Coal, black Sm.am. Pyrite



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-6394	2960-2975	1.33	75% Sandstone/Sand, moderate to poorly cemented, medium to very coarse 20% Claystone, grey, brownish grey, dark brownish grey, light grey, silty, micro-micaceous 5% Siltstone, as above Sm.am. Mica; Sphaerosiderite
A-6397	3005-3020		95% Sandstone/Sand, moderate to poorly sorted 3% Claystone, as above, with coalified plant fossils, occ. dark grey 2% Coal Sm.am. Mica
A-6399	3035-3050	5.96 0.89	70% Sand/Sandstone, medium to very coarse, loose 10% Claystone/Shale, dark grey, dark brownish grey, carbonaceous 10% Claystone, grey, light grey 10% Coal, black Sm.am. Mica
A-6402	3080-3095		95% Sand, medium to coarse, loose, with some hydrocarbon staining, calcite cement (?diesel) 3% Claystone/Shale, dark grey, dark brownish grey 1% Claystone, grey to light grey 1% Coal Sm.am. Mica



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-6405	3125-3140		95% Sand/Sandstone, medium to very coarse, occ. gravelly, angular to subangular grains, moderately to poorly cemented, some hydrocarbon staining (diesel) 4% Claystone, grey to light grey, silty, micaceous 1% Coal, as above Sm.am. Claystone/Shale, dark grey, dark brownish grey
A-6429 (swc)	3148	37.38	
A-6407	3155-3170		85% Sand/Sandstone, medium to very coarse, angular to subangular, mainly quartz 5% Claystone, grey, light grey, silty, micromicaceous, as above 5% Claystone, dark grey, dark brownish grey 5% Coal, black Sm.am. Mica; Chalk, white; Limestone, brownish grey (?sideritic)
A-6054 (swc)	3193.40	5.60	



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-6410	3200-3215		93% Sand/Sandstone, medium to very coarse, angular to subangular, moderate to poor cementing, silica cement observed some hydrocarbon staining (?diesel) 5% Claystone/Shale, dark grey, dark brownish grey 2% Coal Sm.am. Claystone, light grey; Pyrite; Mica
A-6412	3230-3245	0.08	85% Sand/Sandstone, medium to very coarse, poor to moderate cementing 10% Claystone, greyish red, reddish brown, occ. silty 5% Claystone/Shale, dark grey, dark brownish grey 2% Claystone, light grey, grey 5% Coal, black Sm.am. Mica; Chalk; Pyrite (trace)
A-6415	3275-3290	0.07	70% Sand/Sandstone, medium to very coarse, poor to moderate cementing 18% Claystone, reddish brown, greyish red 5% Claystone, grey, brownish grey, greenish grey 2% Coal (additive) Sm.am. Mica; Chalk



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
A-6417	3305-3320		70% Claystone, reddish brown, greyish red, micromicaceous, calcareous
		0.51	10% Claystone, light grey, greenish grey, brownish grey, occ. waxy
		0.11	20% Sand/Sandstone, medium to coarse
			Sm.am. Claystone, dark grey, dark brownish grey; Chalk, white; Pyrite; Coal (?additive)



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 6610/7-1

Sample	Depth (m)	TOC	Lithology
Core A-6419	2661.60 - 2661.64	0.24	Sandstone, light grey, fine grained, non-calcareous with minor, irregular, shaly wisps and partings <u>UV</u> dry - Sandstone next to shale partings shows weak white fluorescence DCM - white cut
A-6420	2668.05 - 2668.12	0.33	As above <u>UV</u> dry - some white fluorescence in patches on broken surfaces DCM - white cut, streaming
A-6421	2706.00 - 2706.05	0.05	Coarse, ill sorted, polymict sandstone with high proportion of angular quartz clasts Passing into light grey fine Sandstone as above, No visible hydrocarbon staining, slight smell of hydrocarbons <u>UV</u> dry - no fluorescence DCM - white cut

T A B L E : 3.

CONCENTRATION OF EDM AND CHROMATOGRAPHIC FRACTIONS

I	IKU-No	DEPTH	Rock Extr.	EDM	Sat.	Aro.	HC	Non HC	TOC
I		(m)	(g)	(mg)	(mg)	(mg)	(mg)	(mg)	(%)
I									
I	A 5764	1175	11.2	12.8	1.9	1.6	3.5	9.3	0.67
I		clst							
I	A 5769	1250	6.4	0.7	0.2	0.3	0.5	0.2	0.93
I		clst							
I	A 5780	1405	4.4	7.2	0.6	0.7	1.3	5.9	0.78
I		clst							
I	A 5799	1685	13.1	0.7	0.3	0.3	0.6	0.1	0.77
I		clst							
I	A 5808	1805	2.6	1.0	0.0	0.4	0.4	0.6	0.80
I		clst							
I	A 5810	1835	5.6	1.0	0.6	0.3	0.9	0.1	0.94
I		clst							
I	A 5813	1880	5.0	7.3	0.2	0.3	0.5	6.8	0.78
I		clst							
I	A 5818	1955	4.5	2.9	0.4	1.6	2.0	0.9	1.13
I		clst							
I	A 5836	2225	6.9	0.6	0.2	0.4	0.6	0.0	0.49
I		clst							
I	A 5841	2300	2.7	17.5	3.8	1.1	4.9	12.6	5.77
I		clst/shale							
I	A 5850	2435	3.4	2.6	0.8	1.0	1.8	0.8	2.17
I		clst/shale							
I	A 5859	2570	5.4	3.1	1.0	0.7	1.7	1.4	1.49
I		clst							
I	A 5861	2600	2.0	1.4	0.7	0.4	1.1	0.3	0.91
I		siltst							
I	A 5861	2600	9.1	5.0	1.2	1.4	2.6	2.4	1.45
I		clst							
I	A 5864	2645	3.8	1.6	0.4	0.4	0.8	0.8	1.59
I		clst							
I	A 5869	2720	20.3	15.0	3.5	3.8	7.3	7.7	1.29
I		clst							
I	A 5874	2795	10.9	36.6	1.4	4.8	6.2	30.4	2.54
I		clst							
I	A 6394	2975	4.4	8.6	2.0	0.8	2.8	5.8	1.75
I		clst							
I	A 6399	3050	1.4	25.7	1.9	4.2	6.1	19.6	23.19.
I		clst							
I	A 6417	3320	7.2	3.7	0.5	1.4	1.9	1.8	0.87
I		clst							

DATE : 31 - 7 - 83.

T A B L E : 3.

CONCENTRATION OF EDM AND CHROMATOGRAPHIC FRACTIONS

I	IKU-No	DEPTH	Rock Extr.	EDM	Sat.	Aro.	HC	Non HC	TOC
I		(m)	(g)	(mg)	(mg)	(mg)	(mg)	(mg)	(%)
I									
I									
I									
I	A 6419	2661.60	20.1	15.0	3.5	2.9	6.4	8.6	0.24
I		-.64							
I	A 6420	2668.05	20.2	54.2	18.9	13.4	32.3	21.9	0.33
I		-.12							
I	A 6421	2706.00	18.7	34.4	11.5	8.0	19.5	14.9	0.05
I		-.05							

DATE : 1 - 8 - 83.

T A B L E : 4.

WEIGHT OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm OF rock)

I	I	I	I	I	I	I	I	I	I
I	IKU-No	DEPTH	EOM	Sat.	Aro.	HC	Non	I	I
I		(m)					HC		I
I									I
I									I
I	A 5764	1175	1143	170	143	313	830		I
I	A 5769	1250	109	31	47	78	31		I
I	A 5780	1405	1622	135	158	293	1329		I
I	A 5799	1685	54	23	23	46	8		I
I	A 5808	1805	391	0	156	157	234		I
I	A 5810	1835	180	108	54	162	18		I
I	A 5813	1880	1454	40	60	100	1355		I
I	A 5818	1955	646	89	356	445	200		I
I	A 5836	2225	87	29	58	87	0		I
I	A 5841	2300	6481	1407	407	1815	4667		I
I	A 5850	2435	760	234	292	526	234		I
I	A 5859	2570	570	184	129	313	257		I
I	A 5861	2600	693	347	198	545	149		I
I	A 5861	2600	546	131	153	284	262		I
I	A 5864	2645	424	106	106	212	212		I
I	A 5869	2720	737	172	187	359	379		I
I	A 5874	2795	3352	128	440	568	2784		I
I	A 6394	2975	1972	459	183	642	1330		I
I	A 6399	3050	18357	1357	3000	4357	14000		I
I	A 6417	3320	515	70	195	264	250		I

DATE : 31 - 7 - 83.

T A B L E : 4.

WEIGHT OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm OF rock).

I	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
I	IKU-No	:	DEPTH	:	EOM	:	Sat.	:	Aro.	:	HC	:	Non	HC	I
I	:	:	:	:	:	:	:	:	:	:	:	:	:	:	I
I	:	:	(m)	:	:	:	:	:	:	:	:	:	:	:	I
I	:	:	:	:	:	:	:	:	:	:	:	:	:	:	I
I	:	:	:	:	:	:	:	:	:	:	:	:	:	:	I
I	A 6419	:	2661.60	:	747	:	174	:	144	:	319	:	428	:	I
I	:	:	-.64	:	:	:	:	:	:	:	:	:	:	:	I
I	A 6420	:	2668.05	:	2688	:	938	:	665	:	1602	:	1086	:	I
I	:	:	-.12	:	:	:	:	:	:	:	:	:	:	:	I
I	A 6421	:	2706.00	:	1843	:	616	:	428	:	1044	:	798	:	I
I	:	:	-.05	:	:	:	:	:	:	:	:	:	:	:	I

DATE : 1 - 8 - 83.

TABLE : 5.

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
A 5764	1175	170.6	25.3	21.3	46.6	123.9
A 5769	1250	11.7	3.3	5.0	8.4	3.3
A 5780	1405	207.9	17.3	20.2	37.5	170.4
A 5799	1685	7.0	3.0	3.0	6.0	1.0
A 5808	1805	48.8	10.0	19.5	19.6	29.2
A 5810	1835	19.1	11.5	5.7	17.2	1.9
A 5813	1880	186.4	5.1	7.7	12.8	173.7
A 5818	1955	57.2	7.9	31.5	39.4	17.7
A 5836	2225	17.8	5.9	11.8	17.8	0.0
A 5841	2300	112.3	24.4	7.1	31.5	80.9
A 5850	2435	35.0	10.8	13.5	24.3	10.8
A 5859	2570	38.2	12.3	8.6	21.0	17.3
A 5861	2600	76.2	38.1	21.8	59.8	16.3
A 5861	2600	37.7	9.0	10.6	19.6	18.1
A 5864	2645	26.7	6.7	6.7	13.3	13.3
A 5869	2720	57.2	13.3	14.5	27.8	29.3
A 5874	2795	132.0	5.0	17.3	22.4	109.6
A 6394	2975	112.7	26.2	10.5	36.7	76.0
A 6399	3050	79.2	5.9	12.9	18.8	60.4
A 6417	3320	59.1	8.0	22.4	30.4	28.8

DATE : 31 - 7 - 83.

T A B L E : 5.

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

I	:	:	:	:	:	:	:	:	:	:	:	:	:	:
I	IKU-No	:	DEPTH	:	EOM	:	Sat.	:	Aro.	:	HC	:	Non	I
I	:	:	:	:	:	:	:	:	:	:	:	:	HC	I
I	:	:	:	:	:	:	:	:	:	:	:	:	:	I
I	:	:	(m)	:	:	:	:	:	:	:	:	:	:	I
I	=====													I
I	:	:	:	:	:	:	:	:	:	:	:	:	:	I
I	A 6419	:	2661.60	:	311.1	:	72.6	:	60.1	:	132.7	:	178.4	I
I	:	:	-.64	:	:	:	:	:	:	:	:	:	:	I
I	A 6420	:	2668.05	:	814.7	:	284.1	:	201.4	:	485.5	:	329.2	I
I	:	:	-.12	:	:	:	:	:	:	:	:	:	:	I
I	A 6421	:	2706.00	:	3685.1	:	1231.9	:	857.0	:	2088.9	:	1596.1	I
I	:	:	-.05	:	:	:	:	:	:	:	:	:	:	I
I	=====													I

DATE : 1 - 8 - 83.

T A B L E : 6.

COMPOSITION IN % OF MATERIAL EXTRACTED FROM THE ROCK

I	I	I	I	I	I	I	I	I	I
	IKU-No	DEPTH	Sat	Aro	HC	SAT	Non HC	HC	
			---	---	---	---	---	---	
		(m)	EOM	EOM	EOM	Aro	EOM	Non HC	
I	I	I	I	I	I	I	I	I	I
I	A 5764	1175	14.8	12.5	27.3	118.8	72.7	37.6	
I	A 5769	1250	28.6	42.9	71.4	66.7	28.6	250.0	
I	A 5780	1405	8.3	9.7	18.1	85.7	81.9	22.0	
I	A 5799	1685	42.9	42.9	85.7	100.0	14.3	600.0	
I	A 5808	1805	0.1	40.0	40.1	0.3	59.9	66.9	
I	A 5810	1835	60.0	30.0	90.0	200.0	10.0	900.0	
I	A 5813	1880	2.7	4.1	6.8	66.7	93.2	7.4	
I	A 5818	1955	13.8	55.2	69.0	25.0	31.0	222.2	
I	A 5836	2225	33.3	66.7	100.0	50.0	0.0	-	
I	A 5841	2300	21.7	6.3	28.0	345.5	72.0	38.9	
I	A 5850	2435	30.8	38.5	69.2	80.0	30.8	225.0	
I	A 5859	2570	32.3	22.6	54.8	142.9	45.2	121.4	
I	A 5861	2600	50.0	28.6	78.6	175.0	21.4	366.7	
I	A 5861	2600	24.0	28.0	52.0	85.7	48.0	108.3	
I	A 5864	2645	25.0	25.0	50.0	100.0	50.0	100.0	
I	A 5869	2720	23.3	25.3	48.7	92.1	51.3	94.8	
I	A 5874	2795	3.8	13.1	16.9	29.2	83.1	20.4	
I	A 6394	2975	23.3	9.3	32.6	250.0	67.4	48.3	
I	A 6399	3050	7.4	16.3	23.7	45.2	76.3	31.1	
I	A 6417	3320	13.5	37.8	51.4	35.7	48.6	105.6	

DATE : 31 - 7 - 83.

T A B L E : 6.

COMPOSITION IN % OF MATERIAL EXTRACTED FROM THE ROCK

I	IKU-No	DEPTH	Sat	Aro	HC	SAT	Non HC	HC
I		(m)	EDM	EDM	EDM	Aro	EDM	Non HC
I	A 6419	2661.60	23.3	19.3	42.7	120.7	57.3	74.4
I		-.64						
I	A 6420	2668.05	34.9	24.7	59.6	141.0	40.4	147.5
I		-.12						
I	A 6421	2706.00	33.4	23.3	56.7	143.8	43.3	130.9
I		-.05						

DATE : 1 - 8 - 83.

T A B L E 7

TABULATION OF DATAS FROM THE GASCHROMATOGRAMS

IKU No.	DEPTH (m)	PRISTANE n-C17	PRISTANE PHYTANE	CPI
A 5764	1175 clst	2.2	2.9	1.5
A 5769	1250 clst	0.6	1.1	1.2
A 5780	1405 clst	0.7	2.0	1.1
A 5799	1685 clst	0.5	1.7	1.3
A 5808	1805 clst			
A 5810	1835 clst	0.6	1.8	0.8
A 5813	1880 clst	0.5	0.6	1.2
A 5818	1955 clst	0.8	1.7	0.9
A 5836	2225 clst	0.7	1.7	1.0
A 5841	2300 clst/shale	2.6	1.1	1.1
A 5850	2435 clst/shale	2.2	2.4	1.3
A 5859	2570 clst	1.6	2.5	0.8
A 5861	2600 siltst	1.0	1.6	1.1
A 5861	2600 clst	1.6	2.2	1.4
A 5864	2645 clst	0.8	1.6	0.9
A 5869	2720 clst	1.5	2.1	1.3
A 5874	2795 clst	1.4	2.6	1.3
A 6394	2975 clst	2.0	5.5	1.3
A 6399	3050 clst	2.7	6.3	1.2
A 6417	3320 clst	2.3	4.6	1.3

DATE : 31 - 7 - 83.

T A B L E 7

TABULATION OF DATAS FROM THE GASCHROMATOGRAMS

I		:	DEPTH	:	PRISTANE	:	PRISTANE	:		I
I	IKU No.	:		:		:		:	CPI	I
I		:	(m)	:	n-C17	:	PHYTANE	:		I
I		:		:		:		:		I
I	A 6419	:	2661.60	:	0.5	:	2.5	:	1.1	I
I		:	-1.64	:		:		:		I
I	A 6420	:	2668.05	:	0.8	:	1.2	:	0.8	I
I		:	-1.12	:		:		:		I
I	A 6421	:	2706.00	:	0.7	:	1.1	:	1.0	I
I		:	-1.05	:		:		:		I

DATE : 1 - 8 - 83.

TABLE 8.

TABULATION OF MATURITY DATA

I	IKU No.	DEPTH (m/ft)	VITRINITE REFLECTANCE Ro(%) and Counts		MATURATION INDEX (TAI)	FLUOR- ESCENCE
I						
I	A 5755	1040	N.D.P.		1/1+	1 ?
I			clst	-		
I	A 5764	1175	N.D.P.		1/1+	1 ?
I			clst	- lt gy		
I	A 5785	1480	0.48(2)		1+ 1+/2-	1 ?
I			clst	-		
I	A 5804	1760	N.D.P.		1+ 1+/2-	1 ?
I			clst	-		
I	A 5813	1880	0.38(2) 0.53(2)		2- ?	1
I			clst	- dk gy		
I	A 5820	1985	0.43(6)		1+/2- 2-	1/2
I			clst	- gy		
I	A 5825	2060	0.43(8)		2- 2-/2	2
I			clst	- gy		
I	A 5836	2225	N.D.P.		2- ?	0
I			clst/marl	-		
I	A 5841	2300	0.47(12)		2- 2-/2	2,4
I			clst/shale	-		
I	A 5846	2375	0.45(15)		2- 2-/2	4
I			clst	-		
I	A 5850	2435	0.51(17) 0.78(1)		1+/2- 2-	5/6
I			clst	-	2-/2	
I	A 5850	2435	0.50(11)		2-/2 2	2,4,5
I			clst	-		
I	A 5853	2480	0.41(4)		2-/2 2	2,4,5
I			clst	-		
I	A 5861	2600	0.46(6) 0.60(2)		2-/2 2	4/5
I			clst	-		
I	A 5864	2645	0.39(3) 0.51(3)		2-/2 2	2,4,5
I			clst	-		
I	A 5866	2675	0.39(4) 0.55(3)		2-/2 2	5
I			clst	-		
I	A 5869	2720	0.51(8)		1+/2- 2-	5/6
I			clst	-	2-/2 2	
I	A 5874	2795	N.D.P.		2-/2 2	5
I			sst	-		
I	A 6390	2915	0.45(8) 0.88(3)		2-/2 2	0
I			sst	-	2/2+	
I	A 6392	2945	0.45(12)		2-/2 2	5
I			clst	- brn		
I	A 6397	3020	0.68(1)		N.D.P.	6
I			sst	-		
I	A 6399	3050	0.68(20) 0.92(1)		2 2/2+	6
I			clst/shale	- dk gy		
I	A 6407	3170	0.71(21)		2+	6/7
I			coal	-		

DATE : 1 - 8 - 83.

TABLE 8.

TABULATION OF MATURITY DATA

I	:	DEPTH	:	VITRINITE REFLECTANCE	:	MATURATION	:	FLUOR-
I	IKU No.	:	:	:	:	INDEX	:	ESCENCE
I	:	(m/ft)	:	Ro(%) and Counts	:	(TAI)	:	:
I	:	:	:	:	:	:	:	:
I	A 6410	3215	:	0.66(17)	:	2/2+	:	6/7
I	:	:	:	clst	:	- dk gr	:	:
I	A 6417	3320	:	N.D.P.	:	N.D.P.	:	0
I	:	:	:	clst	:	- red brn	:	:

DATE : 1 - 8 - 83.

T A B L E 8.

TABULATION OF MATURITY DATA

I	:	DEPTH	:	VITRINITE REFLECTANCE	:	MATURATION	:	FLUOR-
I	:	IKU No.	:		:	INDEX	:	ESCENCE
I	:	(m/ft)	:	Ro(%) and Counts	:	(TAI)	:	
I	:		:		:		:	
I	:		:		:		:	
I	:	A 6423	:	2278	:	0.46(17)	:	N.A.
I	:		:		:		:	1/2
I	:	A 6424	:	2283	:	0.56(16)	:	N.A.
I	:		:		:		:	2
I	:	A 6425	:	2290	:	0.50(13)	:	N.A.
I	:		:		:		:	2
I	:	A 6426	:	2303	:	0.42(15)	:	N.A.
I	:		:		:		:	4
I	:	A 6427	:	2325	:	0.55(14)	:	N.A.
I	:		:		:		:	0
I	:	A 6428	:	2480	:	0.57(12)	:	N.A.
I	:		:		:		:	0
I	:	A 6422	:	2778.50	:	0.63(1) 0.91(3)	:	N.A.
I	:		:		:		:	4
I	:	A 6429	:	3148	:	0.66(19)	:	N.A.
I	:		:		:		:	5/6
I	:	A 6054	:	3193.40	:	0.62(25)	:	N.A.
I	:		:		:		:	5/6

DATE : 5 - 8 - 83.

TABLE 9.

ROCK EVAL PYROLYSES

IKU No.	DEPTH m/ft		S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1 S1+S2	TEMP. MAX (C)
A 5755	1040	: Clst	0.09 lt - gy	0.07	1.27	0.32	22	397	0.16	0.56	435
A 5764	1175	: Clst	0.11 dk - gy	0.28	0.61	0.90	31	68	0.39	0.28	407
A 5764	1175	: Clst	0.09 lt - gy	0.31	0.56	0.81	38	69	0.40	0.22	414
A 5769	1250	: Clst	0.10 gy - brn - gy	0.53	0.54	1.16	46	47	0.63	0.16	418
A 5774	1325	: Clst	0.07 gy - lt - gy	0.12	1.11	0.75	16	148	0.19	0.37	373
A 5780	1405	: Clst	0.08 lt - brn - gy	0.06	0.59	0.46	13	128	0.14	0.57	279
A 5792	1585	: Clst	0.07 gy	0.11	0.49	0.61	18	80	0.18	0.39	368
A 5794	1615	: Clst	0.12 gy	0.21	0.51	0.59	36	86	0.33	0.36	361
A 5797	1660	: Clst	0.09 gy	0.08	0.37	0.61	13	61	0.17	0.53	279
A 5799	1685	: Clst	0.08 gy	0.10	0.41	0.39	26	105	0.18	0.44	315
A 5802	1730	: Clst	0.36 gy	0.18	0.36	1.08	17	33	0.54	0.67	269
A 5804	1760	: Clst	0.12 gy	0.04	0.26	0.59	7	44	0.16	0.75	246
A 5808	1805	: Clst	0.13 gy	0.09	0.50	0.80	11	63	0.22	0.59	245
A 5808	1805	: Clst	0.07 dk - gy	0.08	0.28	0.70	11	40	0.15	0.47	241
A 5810	1835	: Clst	0.09 gn - gy	0.06	0.59	1.46	4	40	0.15	0.60	243
A 5813	1880	: Clst	0.11 dk - gy	0.14	0.42	1.40	10	30	0.25	0.44	279
A 5813	1880	: Clst	0.05 gy - gn - gy	0.10	0.49	0.54	19	91	0.15	0.33	300
A 5816	1925	: Clst	0.05 gy	0.06	0.39	0.67	9	58	0.11	0.45	279
A 5818	1955	: Clst	0.08 gy	0.09	0.40	0.54	17	74	0.17	0.47	312
A 5818	1955	: Marl	0.07 gy	0.06	0.74	0.39	15	190	0.13	0.54	241
A 5820	1985	: Clst	0.11 gy	0.10	0.64	0.80	12	80	0.21	0.52	279
A 5823	2030	: Clst	0.09 gy	0.10	0.75	0.71	14	106	0.19	0.47	279
A 5825	2060	: Clst	0.10 gy	0.13	0.65	0.74	18	88	0.23	0.43	327

DATE : 17 - 7 - 83.

TABLE 9.

ROCK EVAL PYROLYSES

IKU No.	DEPTH m/ft	:	S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT S1+S2	PROD. INDEX S1 S1+S2	TEMP. MAX (C)
=====											
A 5829	2120	:	0.12	0.07	1.08	0.68	10	159	0.19	0.63	253
		:	Clst	gy							
A 5836	2225	:	0.13	0.16	0.62	0.42	38	148	0.29	0.45	299
		:	Clst/Marl								
A 5841	2300	:	4.25	42.40	1.32	11.29	376	12	46.65	0.09	414
		:	Clst								
A 5846	2375	:	0.16	1.15	0.90	1.03	112	87	1.31	0.12	438
		:	Clst	gy							
A 5846	2375	:	0.51	8.68	0.92	4.19	207	22	9.19	0.06	428
		:	Sh								
A 5846	2375	:	0.15	0.57	4.95	0.76	75	651	0.72	0.21	445
		:	Ls								
A 5848	2405	:	0.10	0.67	0.34	1.01	66	34	0.77	0.13	439
		:	Clst	gy							
A 5848	2405	:	1.11	15.77	1.44	6.35	248	23	16.88	0.07	428
		:	Sh	dk - gy							
A 5848	2405	:	0.60	0.00	5.36	0.95	0	564	0.60	1.00	227
		:	Ls								
A 5850	2435	:	0.08	0.65	0.30	0.93	70	32	0.73	0.11	430
		:	Clst	gy - brn - gy							
A 5850	2435	:	0.82	17.53	0.84	6.41	273	13	18.35	0.04	426
		:	Sh								
A 5850	2435	:	0.48	1.53	6.31	1.47	104	429	2.01	0.24	409
		:	Ls								
A 5853	2480	:	0.17	0.88	0.42	1.04	85	40	1.05	0.16	433
		:	Clst	lt - gy							
A 5855	2510	:	0.21	1.17	0.35	1.21	97	29	1.38	0.15	435
		:	Clst	gy							
A 5857	2540	:	0.21	1.40	0.31	1.38	101	22	1.61	0.13	429
		:	Clst	lt - gy - gy							
A 5859	2570	:	0.08	0.68	0.18	1.09	62	17	0.76	0.11	440
		:	Clst	gy							
A 5861	2600	:	0.28	5.98	0.37	3.57	168	10	6.26	0.04	432
		:	Clst	gy							
A 5861	2600	:	0.10	0.88	0.21	0.99	89	21	0.98	0.10	437
		:	Sltst	lt - gy - brn							
A 5864	2645	:	0.17	2.44	0.47	2.17	112	22	2.61	0.07	432
		:	Clst	gy							
A 5866	2675	:	0.13	1.41	0.22	1.28	110	17	1.54	0.08	422
		:	Clst	gy							
A 5869	2720	:	0.16	0.80	0.30	1.05	76	29	0.96	0.17	433
		:	Clst	gy							
A 5871	2750	:	0.13	1.08	0.27	1.13	96	24	1.21	0.11	437
		:	Clst	gy - brn - gy							
A 6392	2945	:	0.09	0.80	0.19	0.94	85	20	0.89	0.10	427
		:	Clst	gy - brn - gy							
=====											

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TABLE 9.

ROCK EVAL PYROLYSES

IKU No.	DEPTH m/ft		S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT	PROD. INDEX S1	TEMP. MAX (C)
A 6394	2975	: Clst gy - brn - gy	0.13	1.41	0.21	1.13	125	19	1.54	0.08	434
A 6399	3050	: Sh	0.88	17.48	0.33	5.96	293	6	18.36	0.05	423
A 6399	3050	: Clst gy - lt - gy	0.09	0.89	0.15	0.89	100	17	0.98	0.09	432
A 6417	3320	: Clst lt - gy	0.07	0.34	0.09	0.51	67	18	0.41	0.17	431

DATE : 17 - 7 - 83.

TABLE - 9.

ROCK EVAL PYROLYSES

IKU No.	DEPTH m/ft		S1	S2	S3	TOC (%)	HYDR. INDEX	OXYGEN INDEX	OIL OF GAS CONTENT	PROD. INDEX S1	TEMP. MAX (C)
									S1+S2	S1+S2	
A 6423	2278	: 5.57	81.25	0.53	14.40	564	4	86.82	0.06	413	
		: SWC									
A 6424	2283	: 2.79	23.85	1.66	6.17	387	27	26.64	0.10	408	
		: SWC									
A 6425	2290	: 0.99	17.12	1.04	6.17	277	17	18.11	0.05	415	
		: SWC									
A 6426	2303	: 0.74	30.09	0.97	9.11	330	11	31.03	0.03	416	
		: SWC									
A 6427	2325	: 0.19	2.25	1.02	4.65	48	22	2.44	0.08	429	
		: SWC									
A 6428	2480	: 0.09	0.96	0.65	2.30	42	28	1.05	0.09	434	
		: SWC									
A 6419	2661.60	: 1.34	0.85	0.26	0.29	293	90	2.19	0.61	476	
	-.64	: Core									
A 6420	2668.05	: 1.10	0.39	0.26	0.33	118	79	1.49	0.74	433	
	-.12	: Core									
A 6421	2706.00	: 0.19	0.07	0.21	0.12	58	175	0.26	0.73	327	
	-.05	: Core									
A 6422	2778.45	: 0.19	2.81	0.30	0.98	287	31	3.00	0.06	431	
	-.50	: Core									
A 6429	3148	: 2.46	73.86	1.03	37.38	198	3	76.32	0.03	438	
		: SWC									
A 6054	3193.40	: 0.67	10.57	0.39	5.60	189	7	11.24	0.06	431	
		: SWC									

DATE : 30 - 6 - 83.



Visual Kerogen Analysis

TABLE NO.: 10.
WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-6410	3200-15	Am/He, W, C, WR!, P, S	F-M-L	Fair-Good	2/2+	Rich residue consisting of variably sapropelised (terrestrial?) material plus fresh inertinite and vitrinite. Low content of palynomorphs.
A-6417	3305-20		Fine	-	N.D.P.	Poor residue high in minerals (similar to A-5874, A-6390 and A-6397 but more disperse). Disperse undifferentiated material (sapropel and inorganic mixture?) with inertinite fragments and pyrite. Insufficient palynomorphs for TAI assessment.

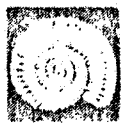
ABBREVIATIONS

Am Amorphous
He Herbaceous
Cut Cuticles

Cy Cysts, algae
P Pollen grains
S Spores

W Woody material
C Coal
R! Reworked

F Fine
M Medium
L Large

**IKU**

Visual Kerogen Analysis

TABLE NO.: 10.

WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5755	1025-40	Am, He, WR!, Cy, P, S	F-M	Good	1/1+	Pale grey "amorphous" (fine grained, indistinct) material probably of terrestrial origin. Vitrinite rare and pale.
A-5764	1160-75	Am, He, WR!, S, P, Cy	M	Good	1/1+	Coarser fragments, larger masses (grey/brown - terrestrial?). Spores and pollen moderately abundant. More pyritic.
A-5785	1465-80	He/Am, W, S, P, Cut?	F-M	Fair to good	1+, 1+/2-	Some dense amorphous masses grey/brown + probably terrestrial due to inclusion of or association with terrestrial material. Some bleached vitrinite.

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**IKU****Visual Kerogen Analysis**

TABLE NO.: 10.
WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5804	1745-60	WR!,C,He/Am,P,S	F-M	Fair to good	1+, 1+/2-	Very terrestrially dominated. Small residue, fine fragments with larger "clumps". Inertinite or reworked vitrinite dominant. Fewer palynomorphs and very variable colours (implies reworked?).
A-5813	1865-80	WR!,C,He,Cy,S,P	F-M	Poor-fair	2-?	Small, fine grained residue. Some clumps of grey/brown undifferentiated (terrestrial source?) material. Oxidised slide shows complete dominance of inertinite or reworked vitrinite. TAI tentative. Vitrinite pale.

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**IKU**

Visual Kerogen Analysis

TABLE NO.: 10.
WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5820	1970-85	WR!, C, He, Cy, S, P	F-M	Poor-fair	1+/2-, 2-	Similar to A-5813, possibly slightly more palynomorphs but these are varied and may include contamination (reworked, caved).
A-5825	2045-60	He/Am, WR!, W, Cy, P, S, Cut?	F-M	Poor-fair	2-, 2-/2	Increase in amorphous material (dk brown-grey terrestrial?) but the oxidised residue reveals a dominance of terrestrial material mainly inertinite, reworked vitrinite and primary vitrinite. Possible degraded cuticles.

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Visual Kerogen Analysis

TABLE NO.: 10.
WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5836	2210-25	Am/He,WR!,C,Cy,S,P	F-M	Poor	2-?	Mixed organic/inorganic aggregates together with terrestrial material dominate. (High inertinite and reworked vitrinite content). Very few palynomorphs. Dinoflagellates dominate over pollen and spores. TAI tentative.
A-5841	2285-2300	Am,W,WR!,Cut,S,P	M-L	Poor-fair-good	2-, 2-/2	Much richer residue of dense, rich brown amorphous aggregates together with large terrestrial fragments. Spores and pollen moderately abundant. Appears very terrestrial.

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**IKU**

Visual Kerogen Analysis

TABLE NO.: 10.
WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5846	2360-75	Am,W,C,S,P,Cut	F-M-L	Fair	2-, 2-/2	Amorphous aggregates, less dense than above and of greyer brown, clearly less rich potential or more depleted. Oxidised slide reveals moderate palynomorph content - spores + pollen, no dinoflagellates but high inertinite.
A-5850 A Clst	2420-35	Am/He,C,WR!,W,P,S	F-M	Fair	1+/2-, 2-, 2-/2	Fine grained indistinct amorphous material (grey-brown) some as aggregates. Occasional vitrinite + inertinite recognisable. High content framboidal pyrite.

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**IKU**

Visual Kerogen Analysis

TABLE NO.: 10.
WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5850 B Shale	2420-35	Am/He,W,WR!,P,S	M	Poor-fair	2-/2, 2	Similar to A-5841 but not as rich, deep brown colour. Very dominantly woody material (inertinite and vitrinite) with spores and pollen variable. Potential appears intermediate between A-5848 and A-5841.
A-5853	2465-80	Am/He,W,WR!,P,S	M	Fair	2-/2, 2	Amorphous aggregates containing inertinite and vitrinite. Occasional loose inertinite fragments and spores/-pollen.

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**IKU****Visual Kerogen Analysis****TABLE NO.:** 10.**WELL NO.:** 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5861	2585-2600	Am/He,WR!,W,P,S	M	Poor-fair	2-/2, <u>2</u>	Similar to above but aggregates less well defined and less dense. More palynomorphs. Inertinite/reworked vitrinite very abundant in oxidised slide.
A-5864	2630-45	Am/He,W,WR!,PS	M	Fair-good	2-/2, <u>2</u>	As above but more amorphous and larger woody fragments. Richer?
A-5866	2660-75	He/Am,W,WR!,P,S	M-L	Fair-good	2-/2, <u>2</u>	Large blocks of variably sapropelised woody material almost opaque in a matrix of finer grained dispersed herbaceous material, vitrinite and palynomorphs.

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**IKU****Visual Kerogen Analysis****TABLE NO.:** 10.**WELL NO.:** 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5869	2705-20	W,WR!,P,S,He/Am	F-M-L	Fair	1+/2-, 2-, 2-/2, 2	Lighter coloured (greyer) less dense, more dispersed, amorphous material with small woody fragments (vitrinite and inertinite) and sapropelic masses. Oxidised slide reveals rich palynomorph population and high inertinite/reworked vitrinite. Very mixed TAI implies cavings present?

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Visual Kerogen Analysis

TABLE NO.: 10.
WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-5874	2780-95	Am/He,W,WR!,P,S	F-M	Poor	2-/2, 2	Dark grey to black aggregates of sapropelised terrestrial material plus occasional identifiable vitrinite and inertinite/reworked vitrinite fragments. Fewer palynomorphs. Percentages difficult to estimate.
A-6390	2900-15	W,WR!,Am/He,S,P	F-M	Poor	2-/2, 2, 2/2+	Poor residue - much mineral remains (from lithology or drilling mud?). Dominantly inertinite or reworked vitrinite together with thick bitumen/vitrinite fragments. Low to moderate palynomorph content - quite varied colour.

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Visual Kerogen Analysis

TABLE NO.: 10.

WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-6392	2930-45	Am/He,WR!,W,S,P	F-M	Fair	2-/2, 2	Fine grained amorphous/ sapropelic material of probable terrestrial origin together with larger fragments of inertinite and vitrinite. Oxidised slide shows high content of palynomorphs.
A-6397	3005-20	WR!, C, W, Am/He	F-M	-	N.D.P.	As A-5874 and A-6390 but more dense (inertinite?) fragments - Insufficient palynomorphs for TAI assessment.

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**IKU**

Visual Kerogen Analysis

TABLE NO.: 10.

WELL NO.: 6610/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
A-6399	3035-50	Am/He, W, WR!, S, P	F-M-L	Fair	2, 2/2+	Dense amorphous/sapropelised terrestrial material aggregates together with recognisable vitrinite and inertinite fragments. Low content recognisable palynomorphs.
A-6407	3155-70	C, W, S	M-L	Good	2+	Coal - large dense coal fragments (vitrinite) plus very rare spores. Spores dark and imply maturity. Little material for TAI assessment and some lower maturity material is present.

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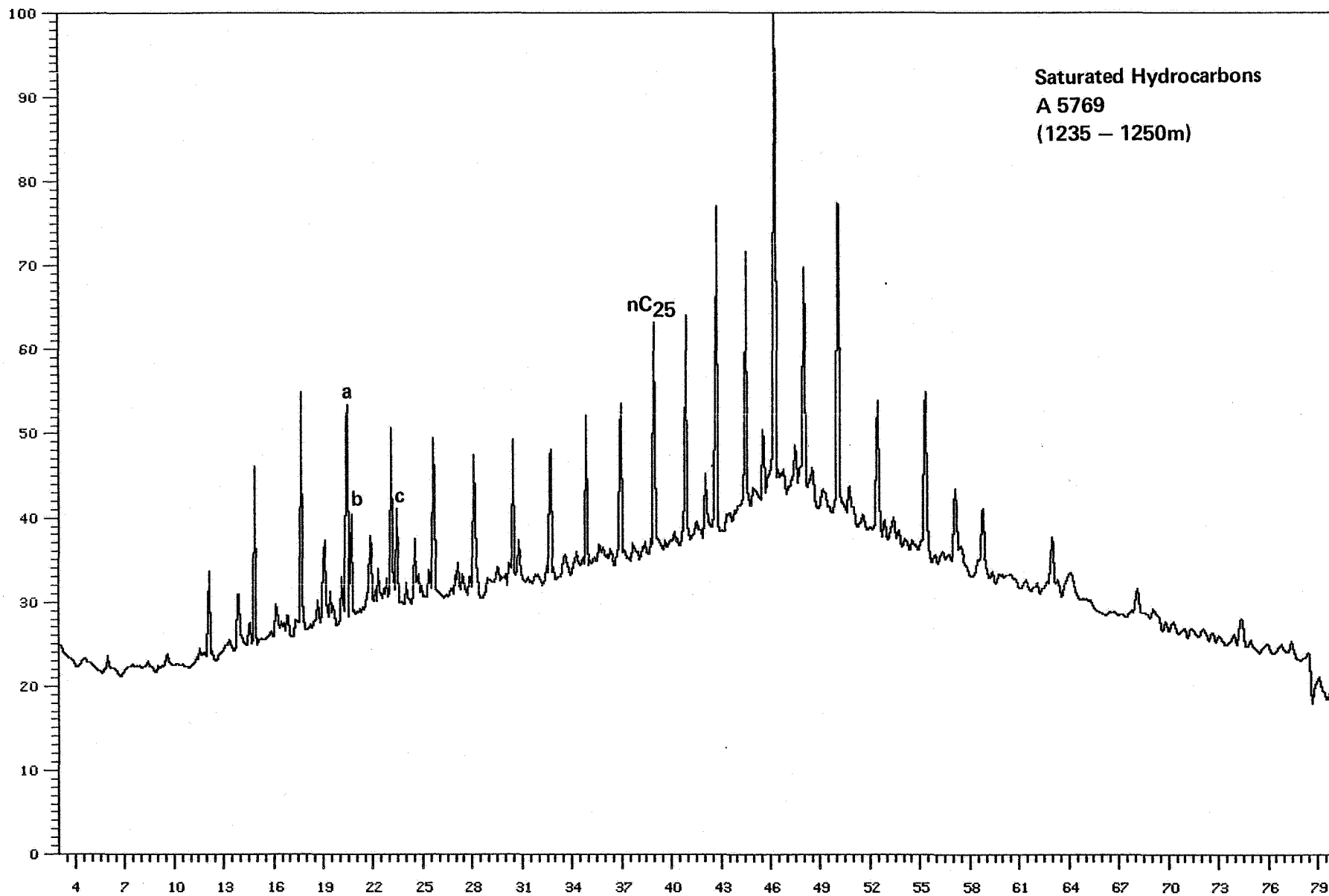
W Woody material
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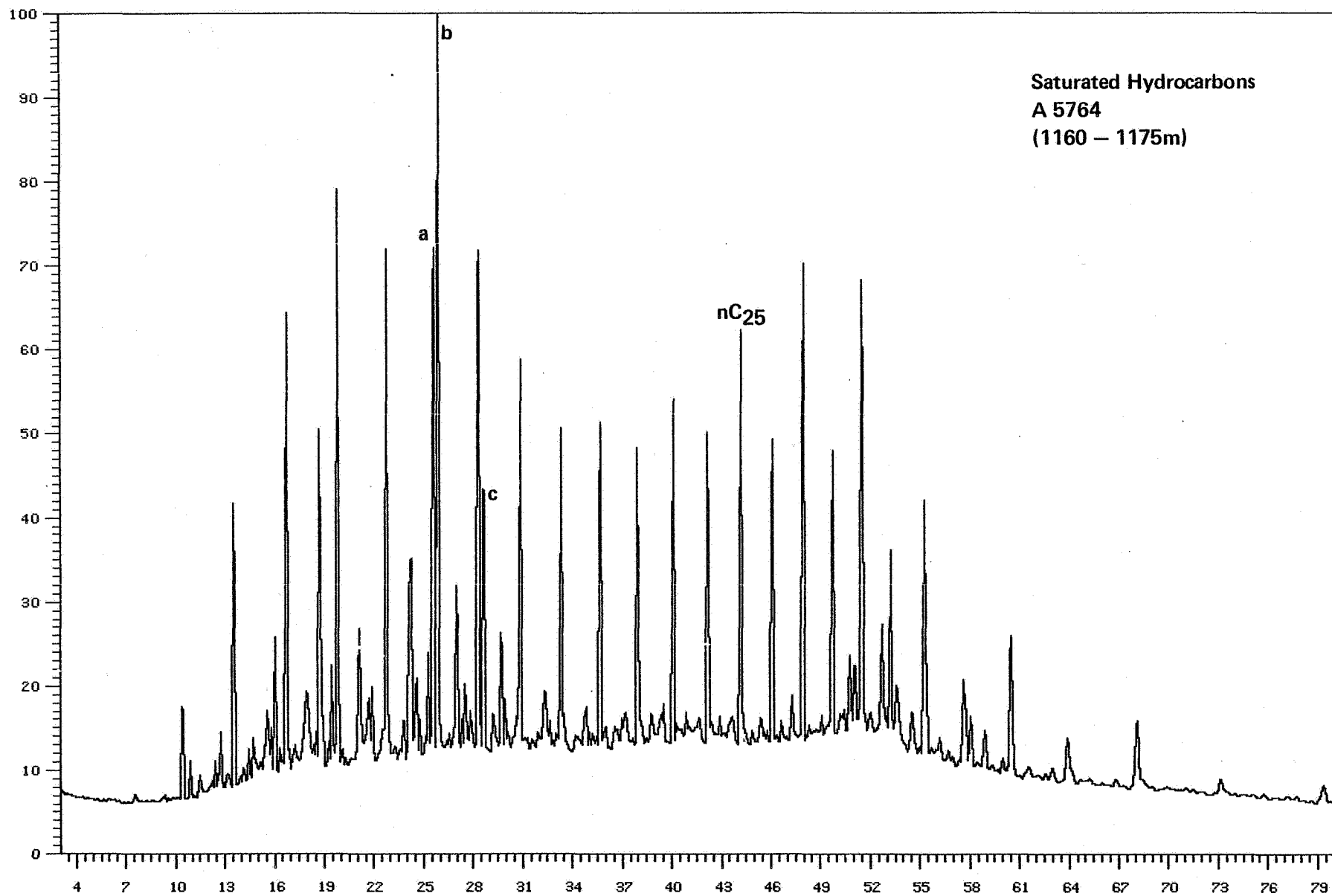
Saturated Hydrocarbon Gas Chromatograms

- a - nC₁₇
- b - pristane
- c - phytane

Analysis : 50138R5769S1 Sample #: 1 Injection #: 1
Sample Name : R-5769, S, 6610/7-1, TV Maximum signal (%): 1.82



Analysis : 50138A5764S1 Sample #: 1 Injection #: 1
Sample Name : A-5764, S, 6610/7-1, TV Maximum signal (%): 7.13



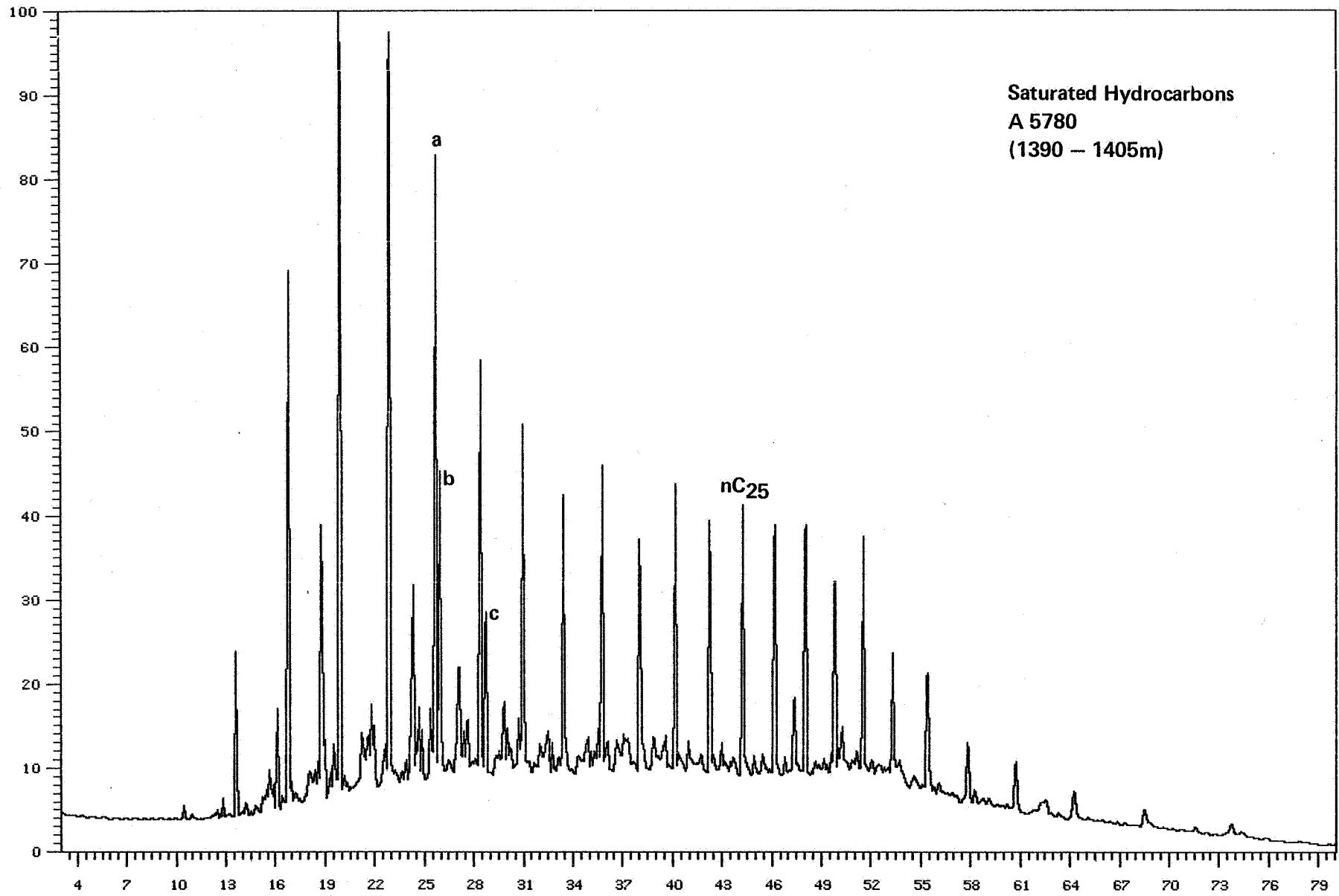
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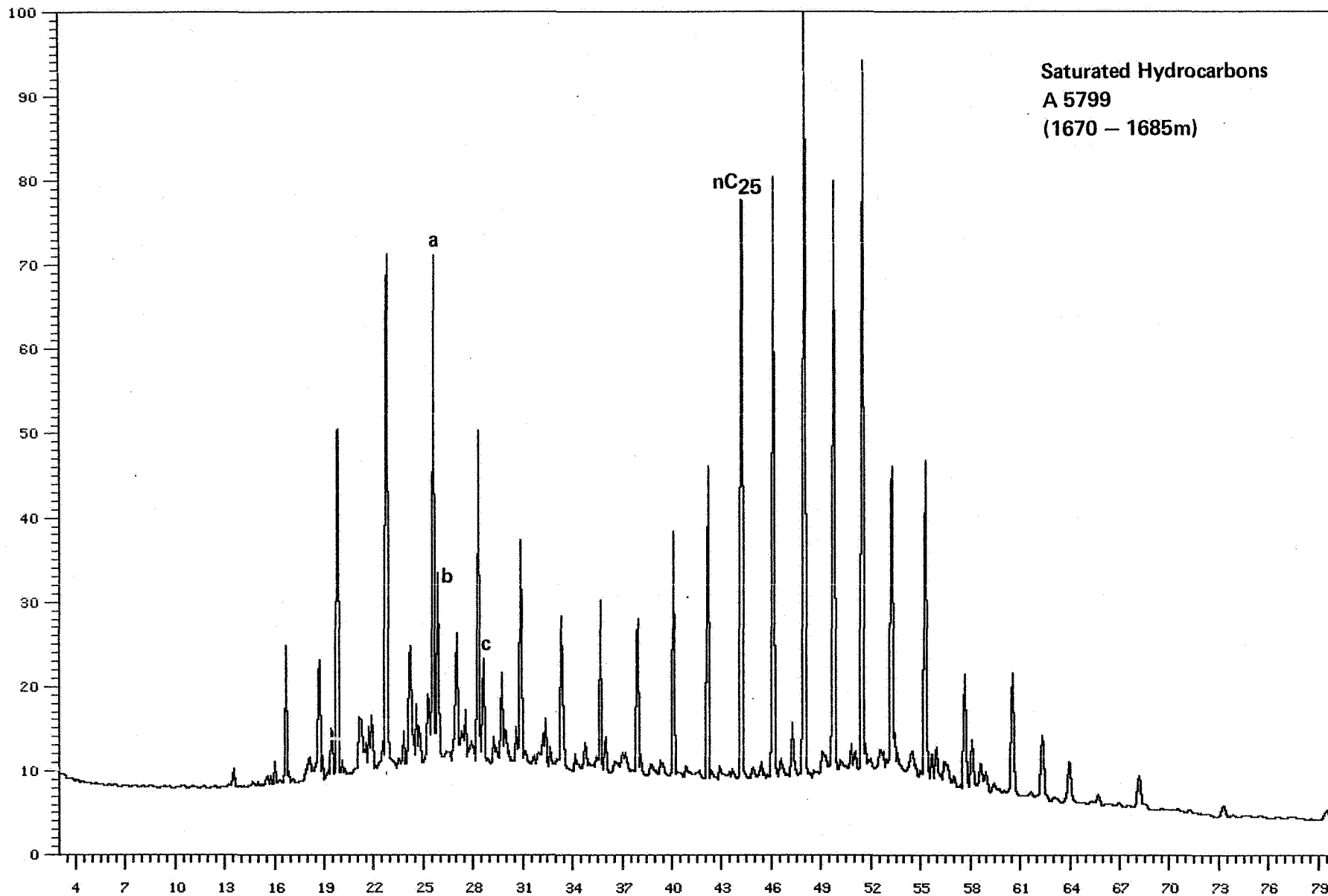
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Analysis : 50138A5780S1 Sample #: 1 Injection #: 1

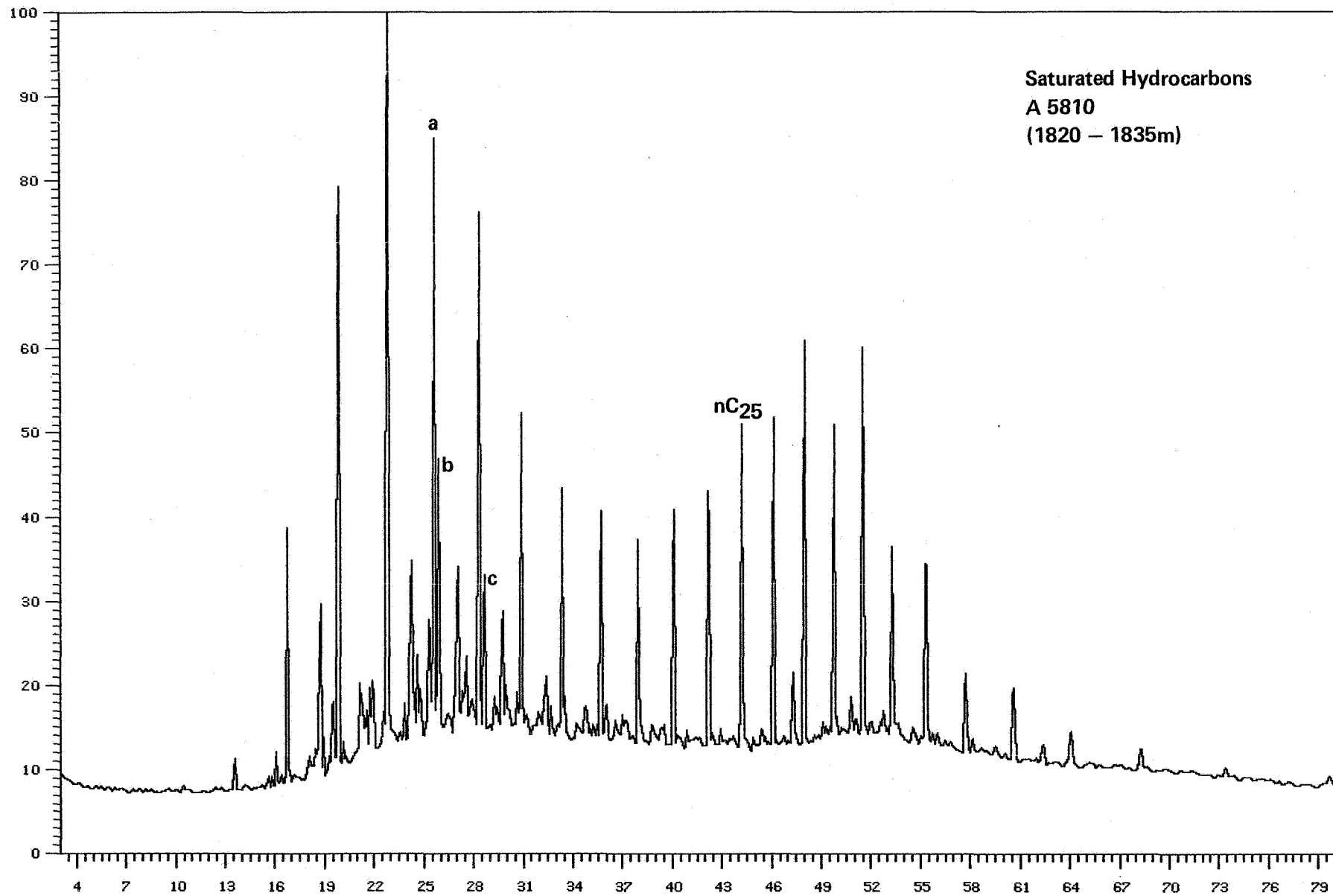
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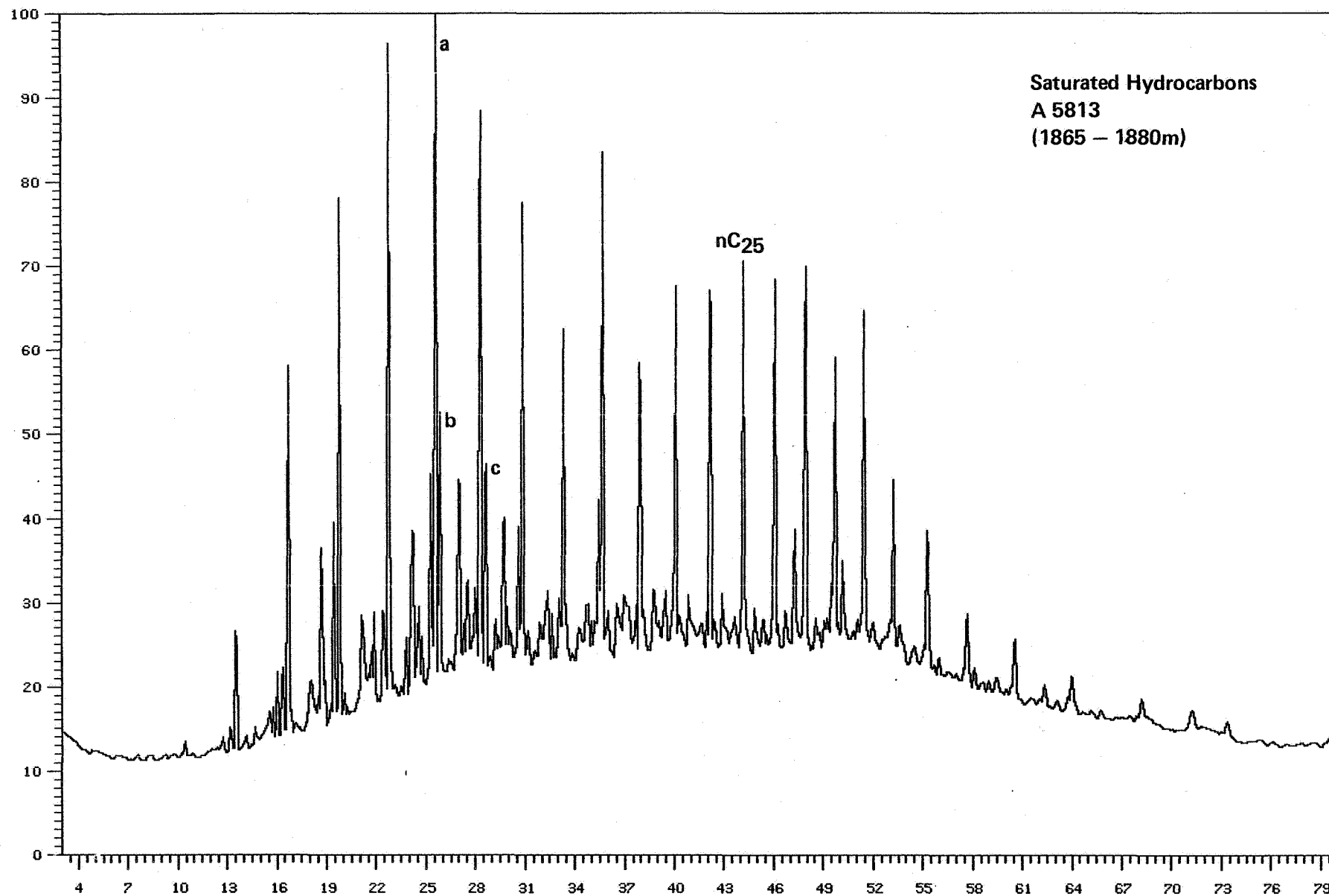
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Sample Name : R-5799,S,6610/7-1,TV Maximum signal (%): 8.38



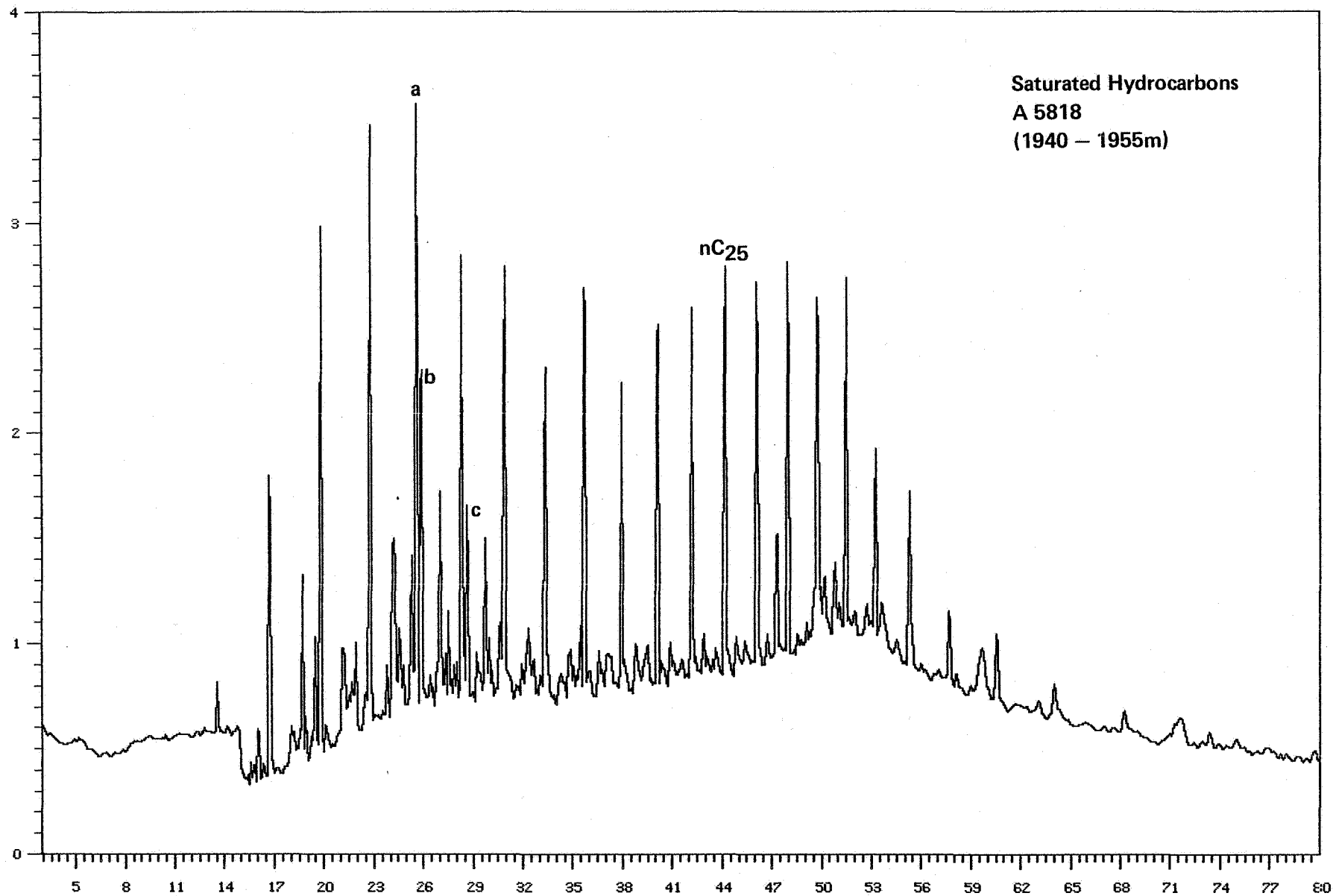
Analysis : 50138A5810S1 Sample #: 1 Injection #: 1
Sample Name : A-5810,S,6610/7-1,Tv Maximum signal (%): 6.55



Analysis : 50138R5813S1 Sample #: 1 Injection #: 1
Sample Name : A-5813,S,6610/7-1,TV Maximum signal (%): 4.11

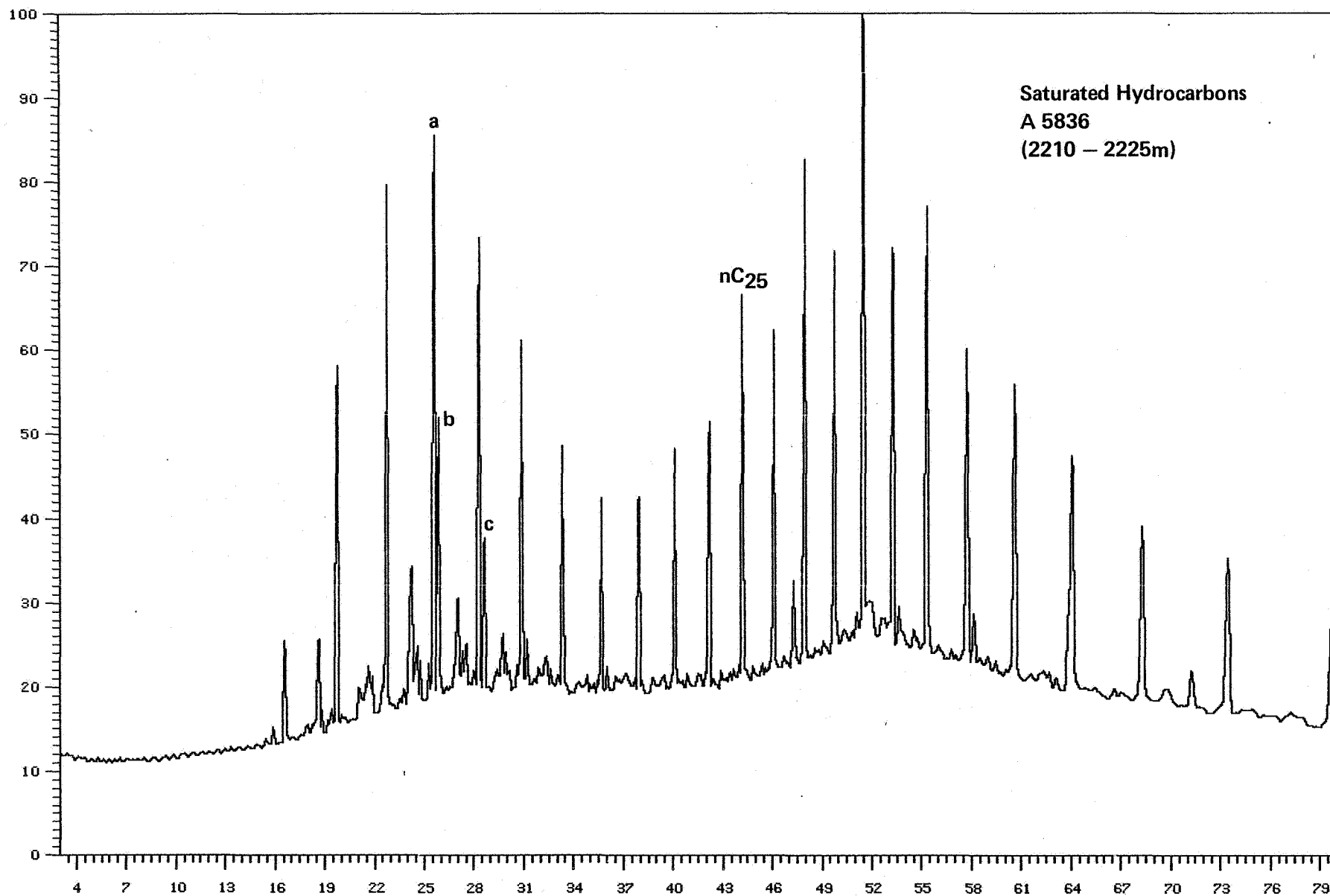


Analysis : 50138A5818S1 Sample #: 1 Injection #: 1
Sample Name : A-5818, S, 6610/7-1, TV Maximum signal (%): 100.00



Analysis : 50138A5836S1 Sample #: 1 Injection #: 1

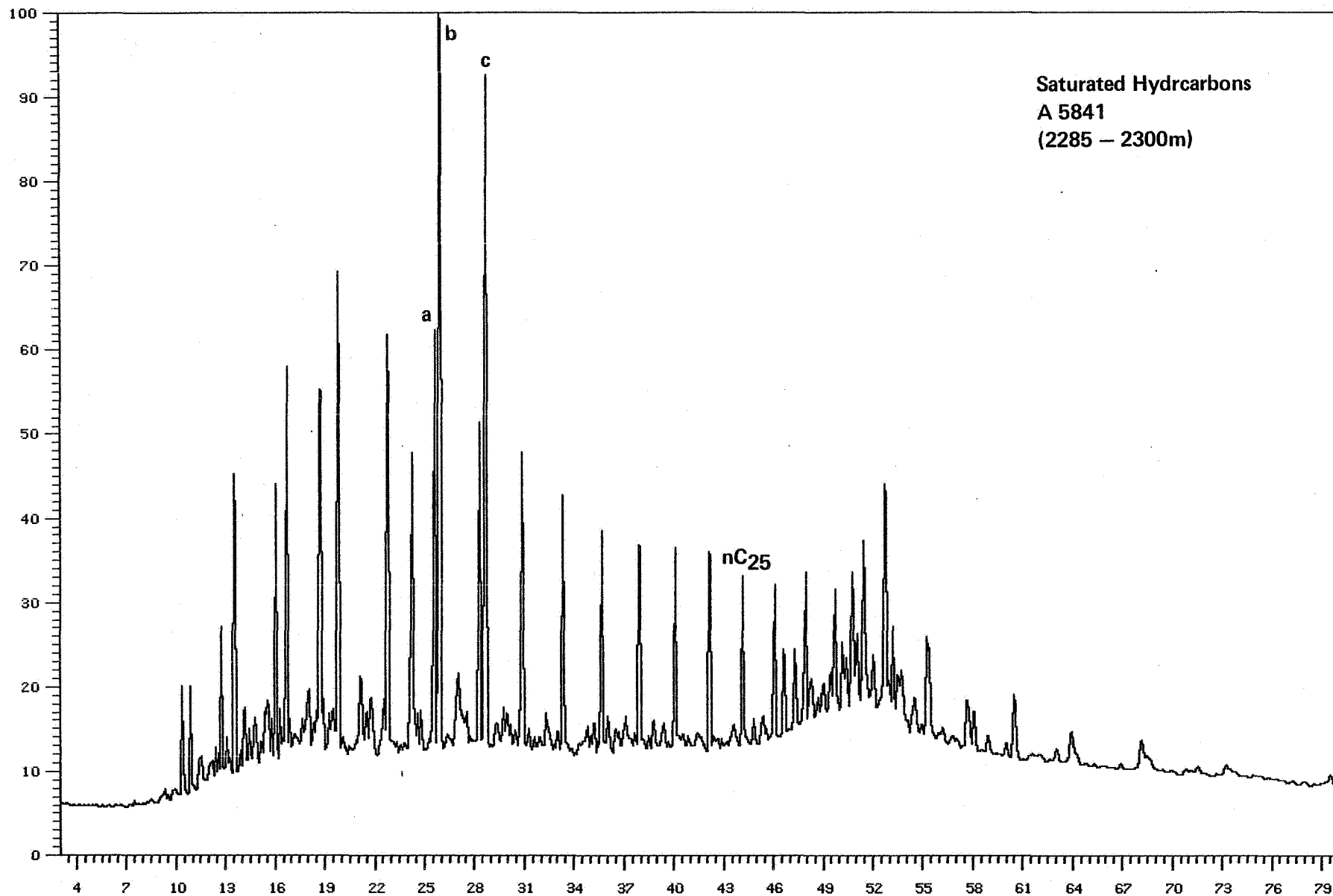
Sample Name : R-5836, S, 6610/7-1, TV Maximum signal (%): 4.00



RAW DATA PLOT-CHANNEL 5

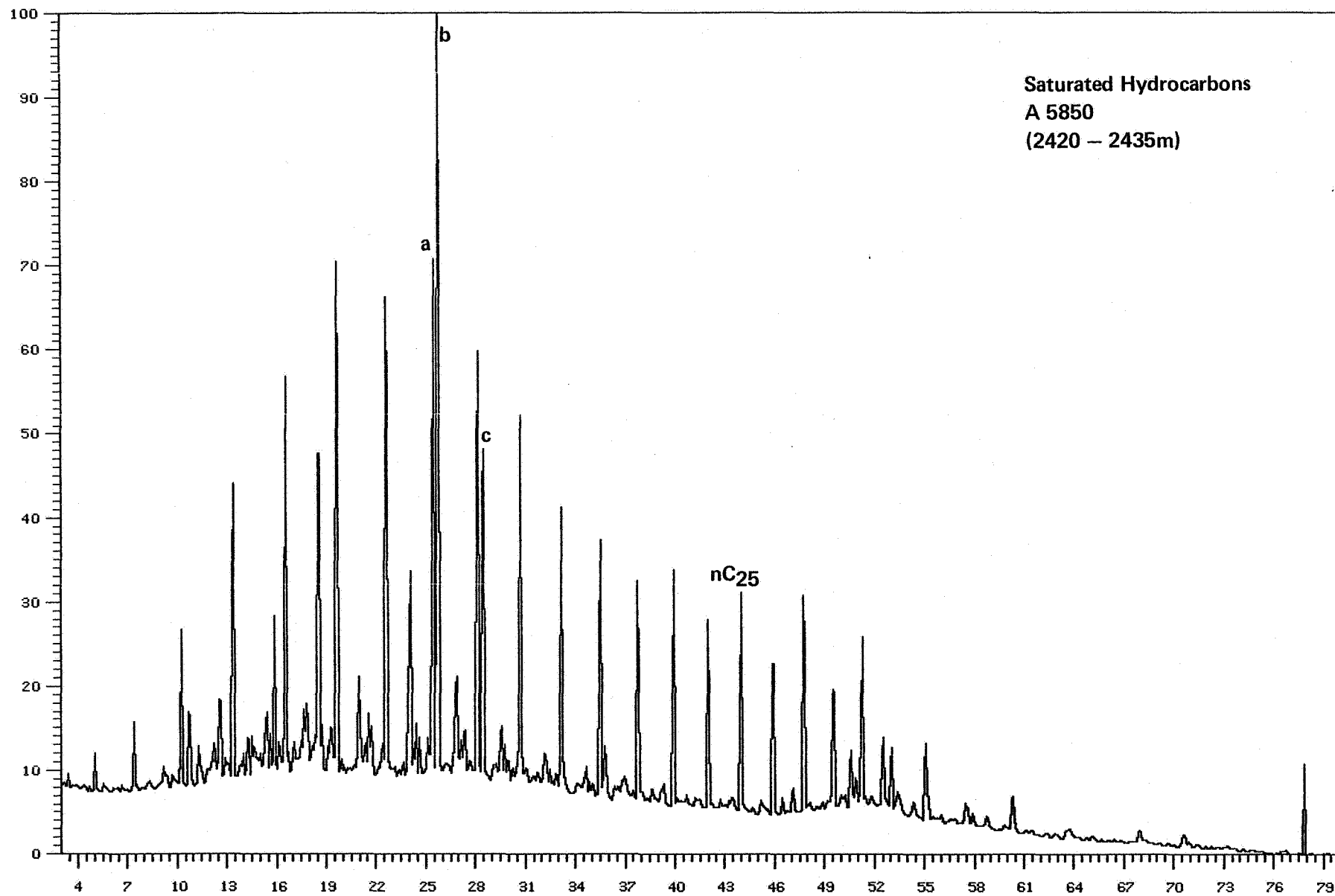
Box 1 of 1

Analysis : 50138A5841S1 Sample #: 1 Injection #: 1
Sample Name : A-5841,S,6610/7-1,TV Maximum signal (%): 10.65

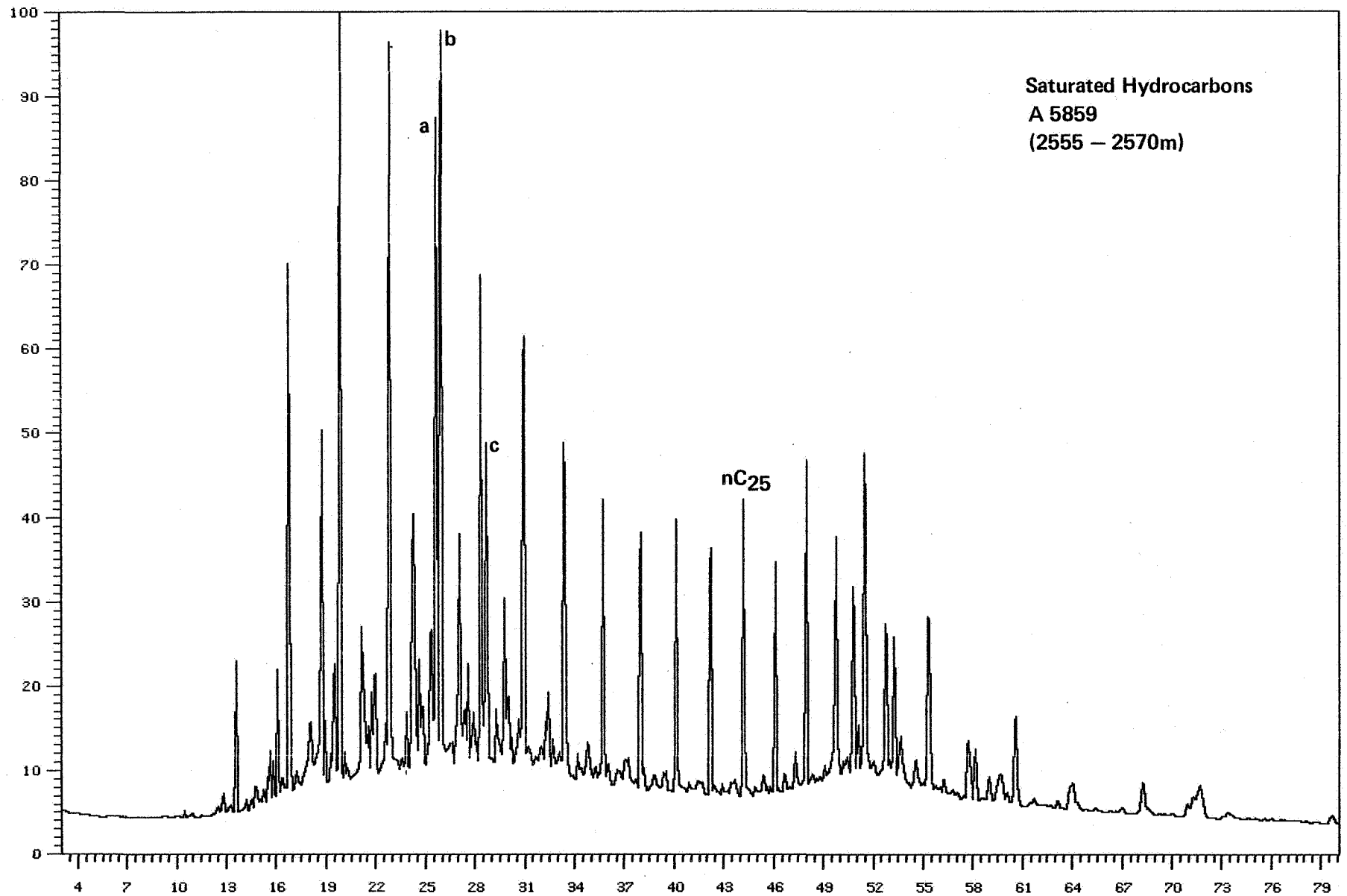


Analysis : 50138A5850S1 Sample #: 1 Injection #: 1

Sample Name : R-5850, S, 6610/7-1, TV Maximum signal (%): 6.63

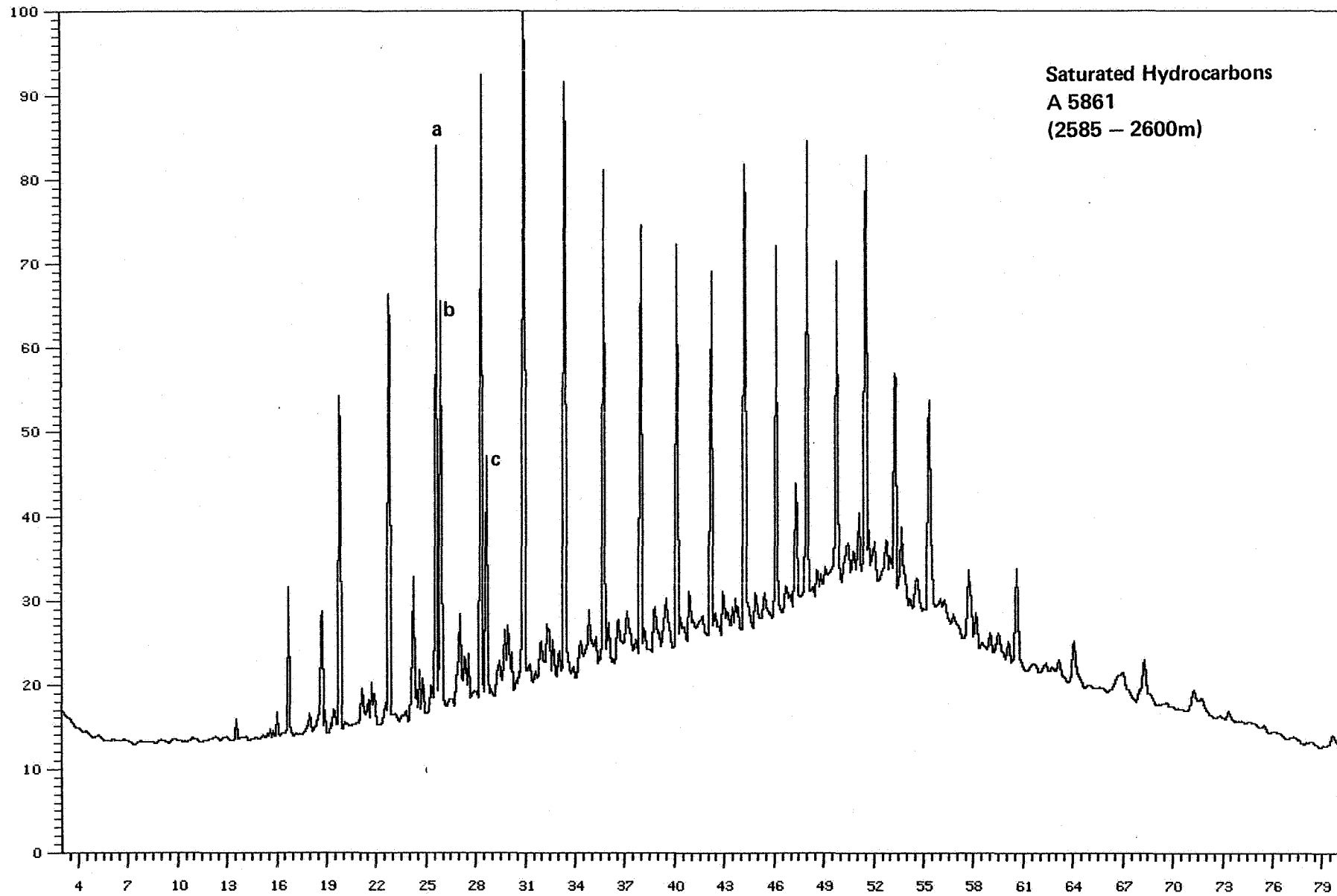


Analysis : 50138A5859S1 Sample #: 1 Injection #: 1
Sample Name : R-5859, S, 6610/7-1, TV Maximum signal (%): 11.80

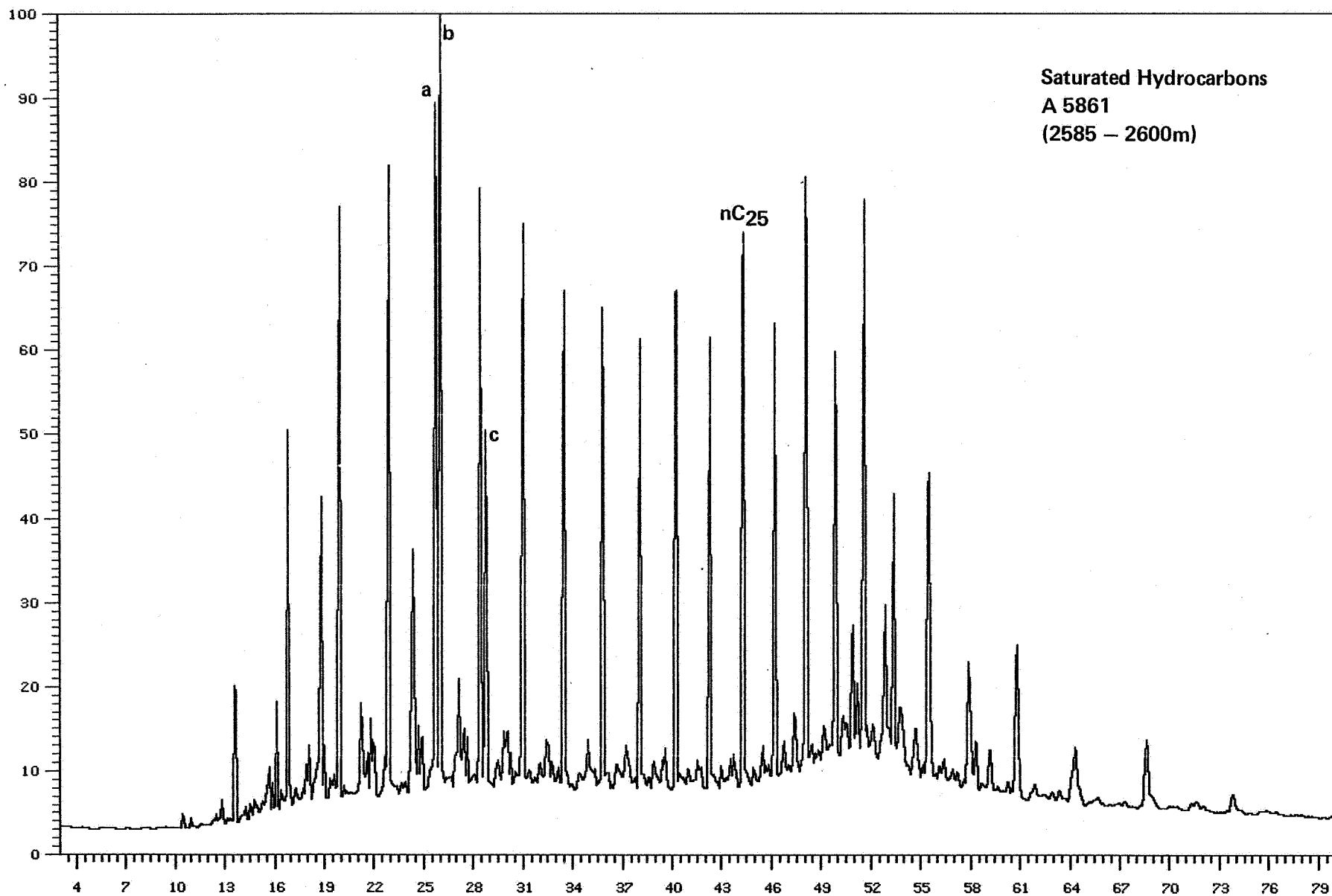


Analysis : 50138A5861S3 Sample #: 1 Injection #: 1
Sample Name : A-5861, silt, 6610/7-1

Maximum signal (%): 5.06

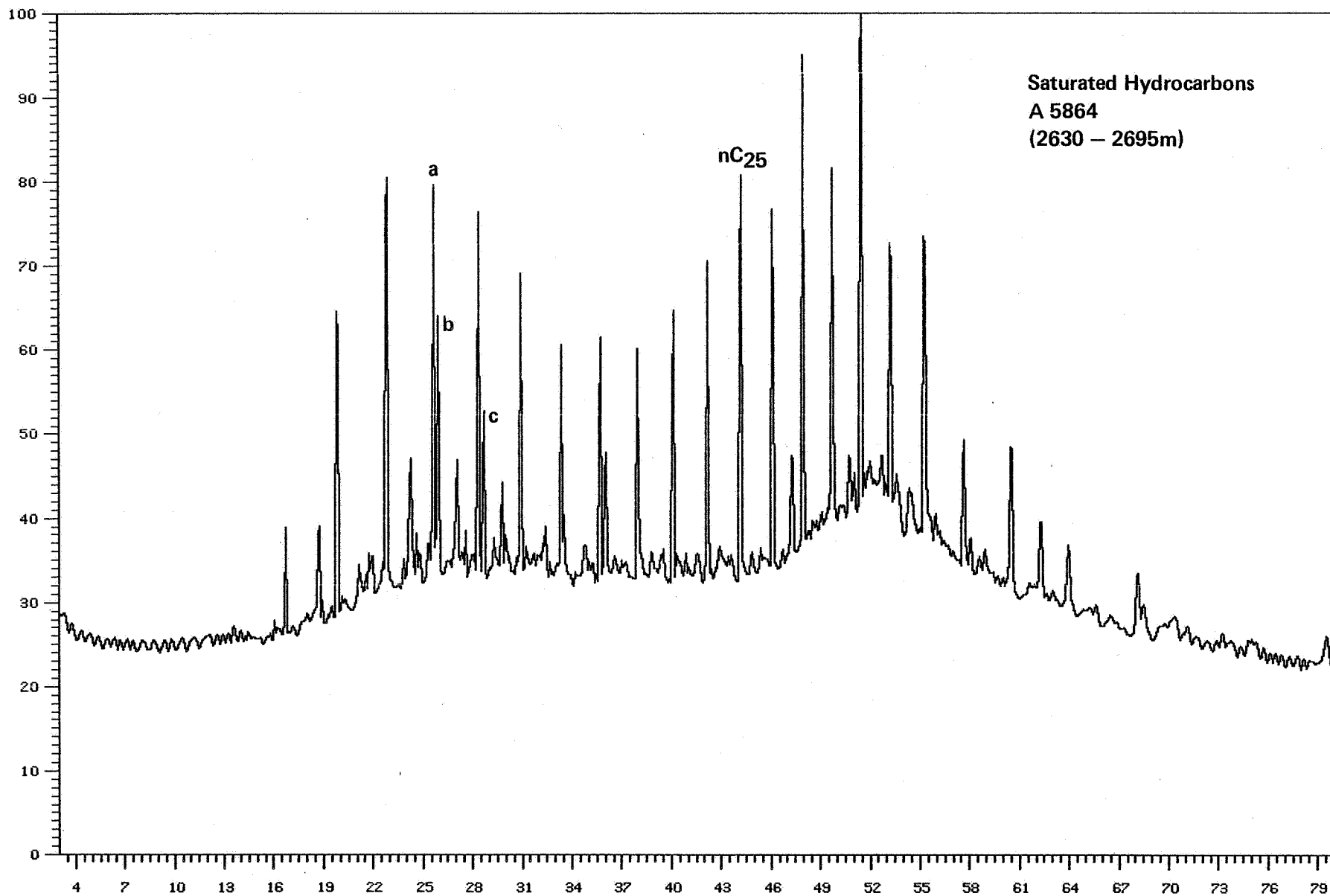


Analysis : 50138A5861S1 Sample #: 1 Injection #: 1
Sample Name : A5861,c,6610/7-1,TV Maximum signal (%): 12.60

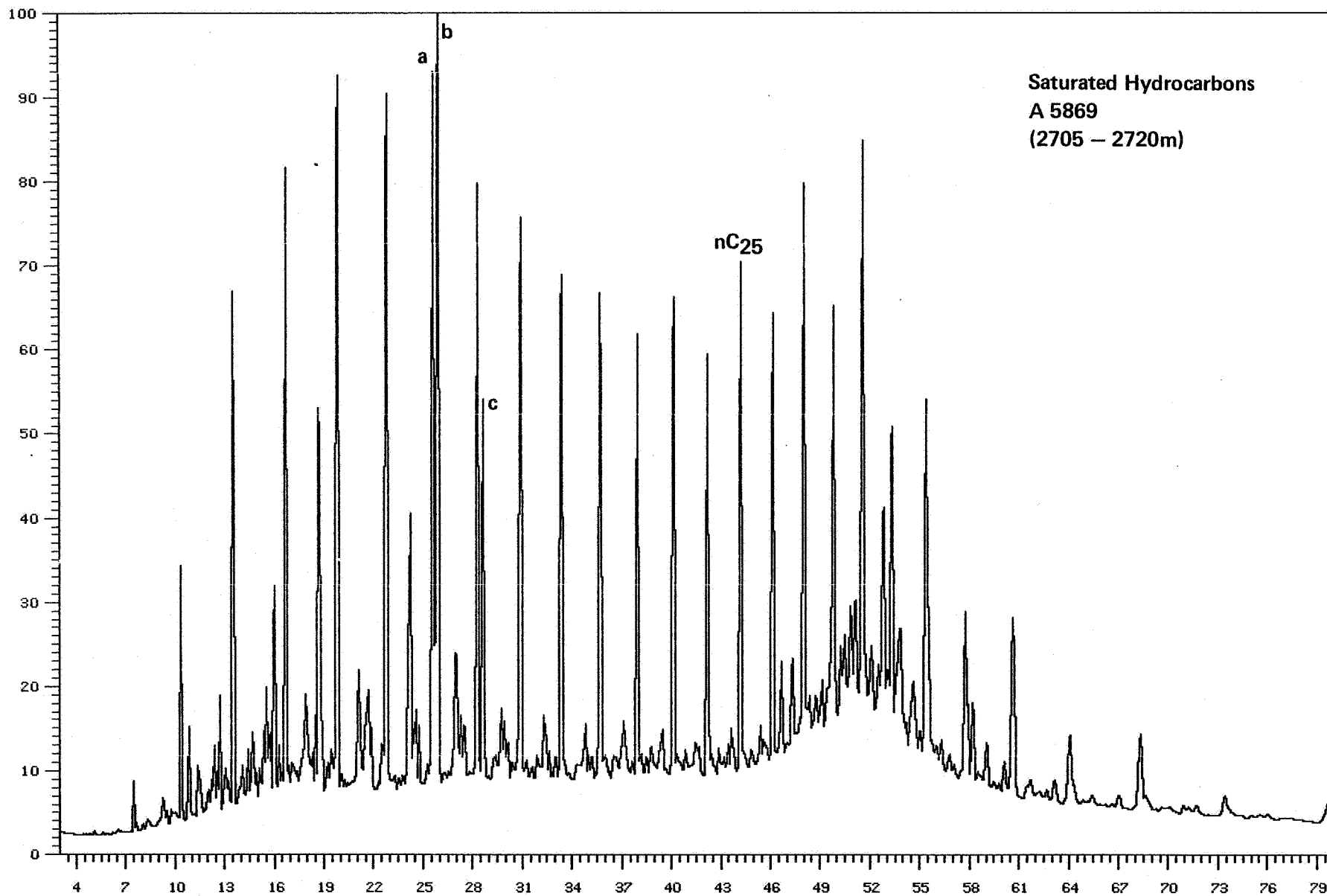


Analysis : 50138A5864S1 Sample #: 1 Injection #: 1

Sample Name : R-5864, S, 6610/7-1, TV Maximum signal (%): 1.94



Analysis : 50138A5869S1 Sample #: 1 Injection #: 1
Sample Name : A-5869, S, 6610/7-1, TV Maximum signal (%): 21.21



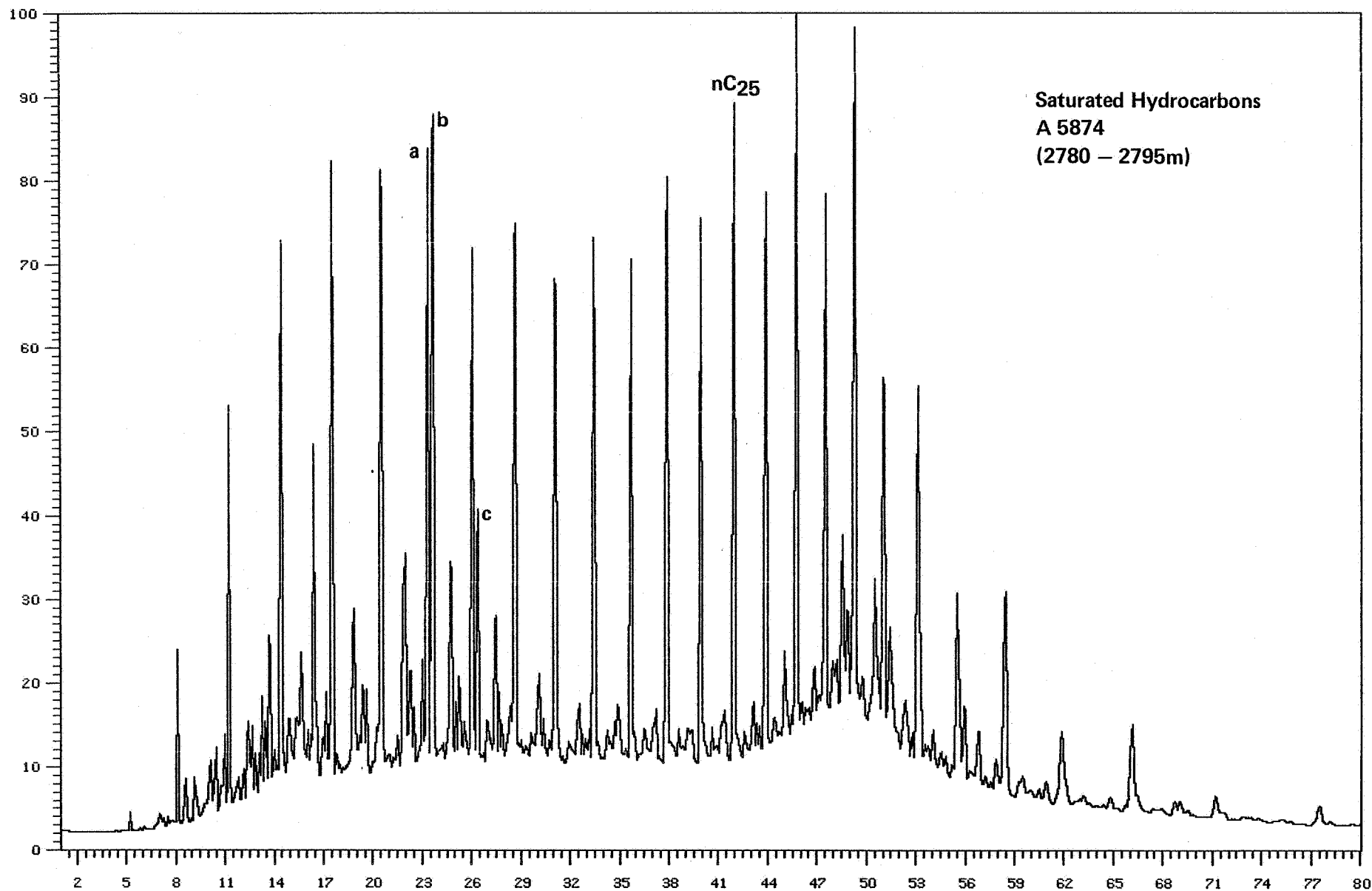
Printed at 09:57 on 28/Jul/83

RAW DATA PLOT-CHANNEL 5

Box 1 of 1

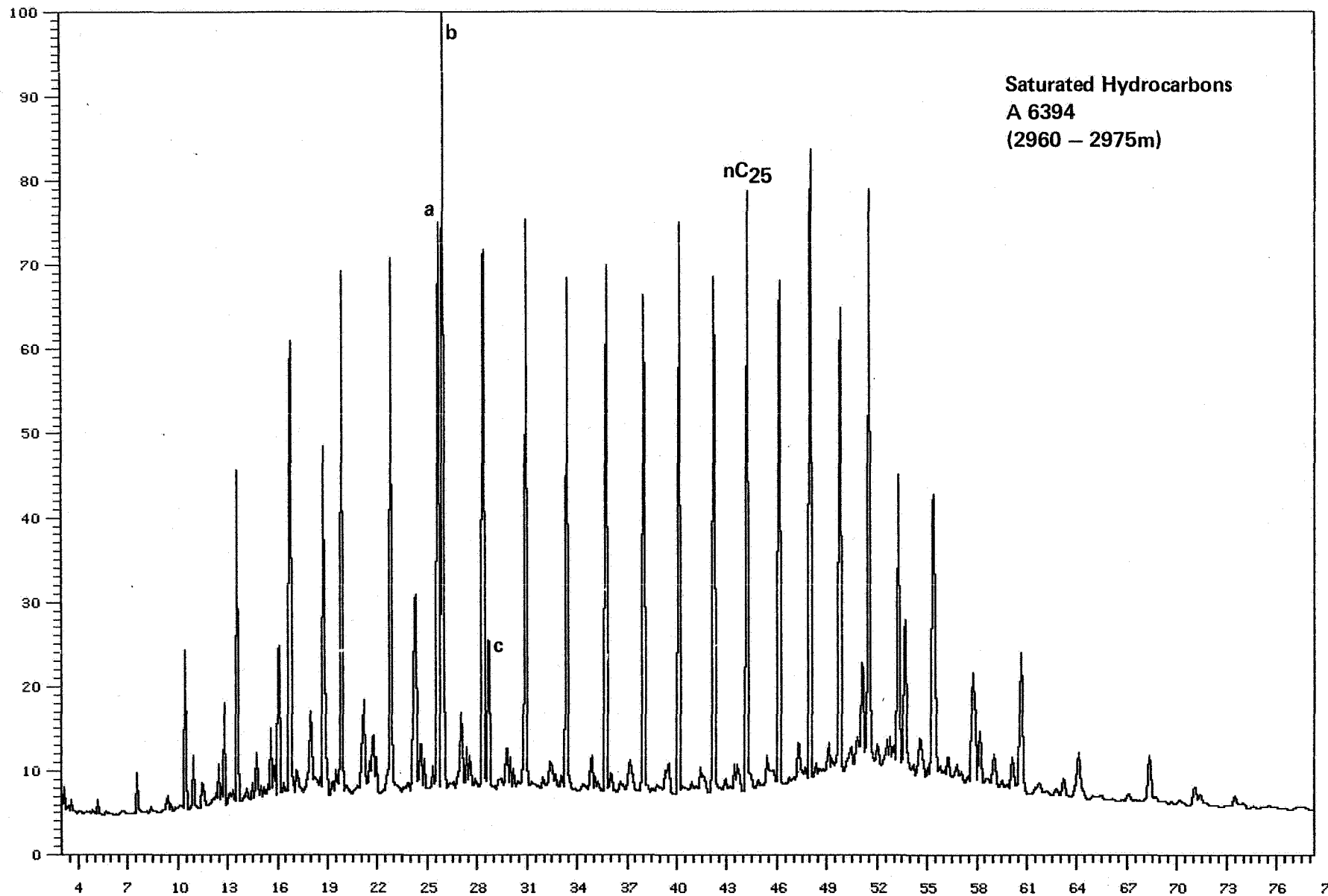
Analysis : 50138A5874S1 Sample #: 1 Injection #: 1

Sample Name : A-5874, S, 6610/7-1, TV Maximum signal (%): 25.27

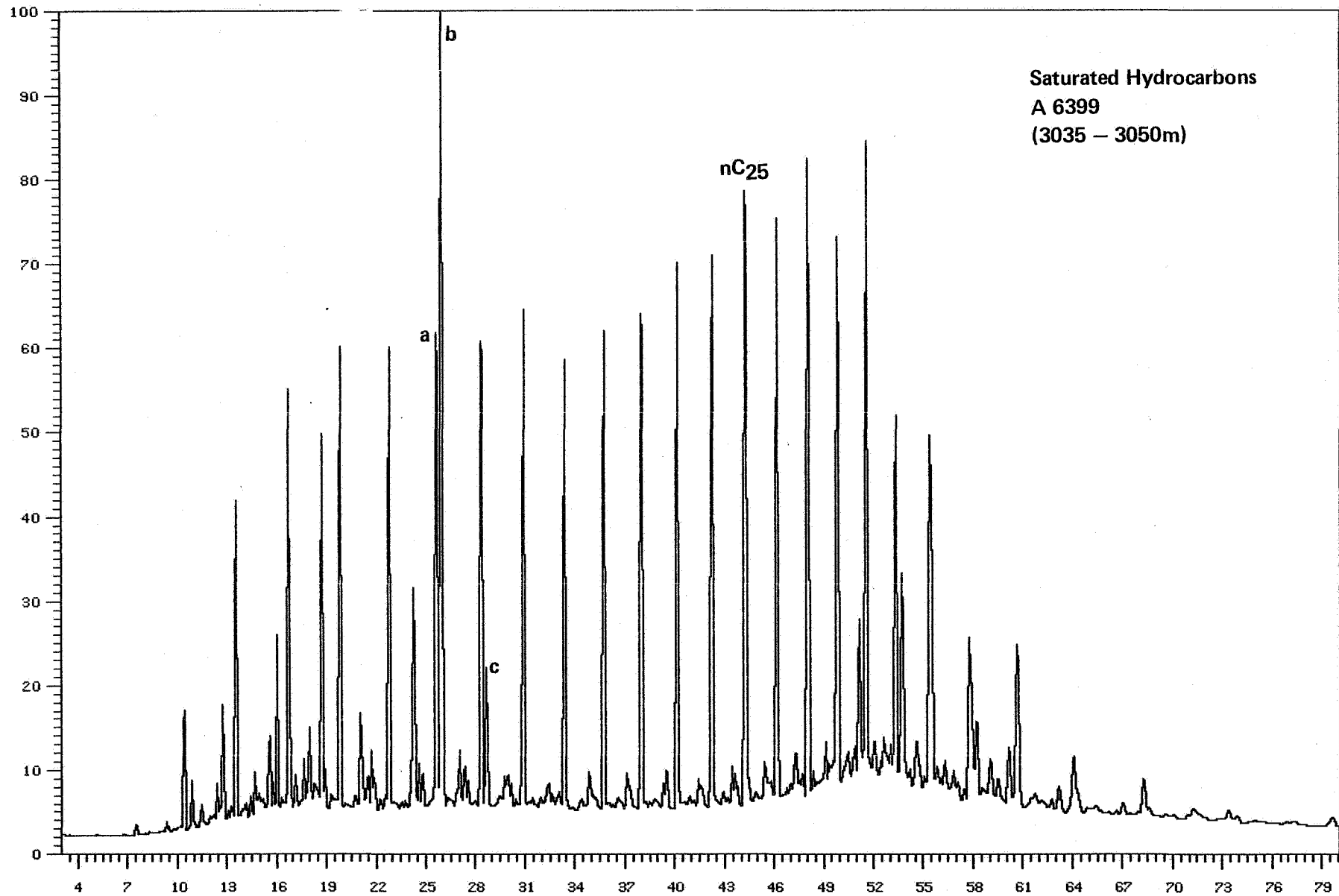


Saturated Hydrocarbons
A 5874
(2780 – 2795m)

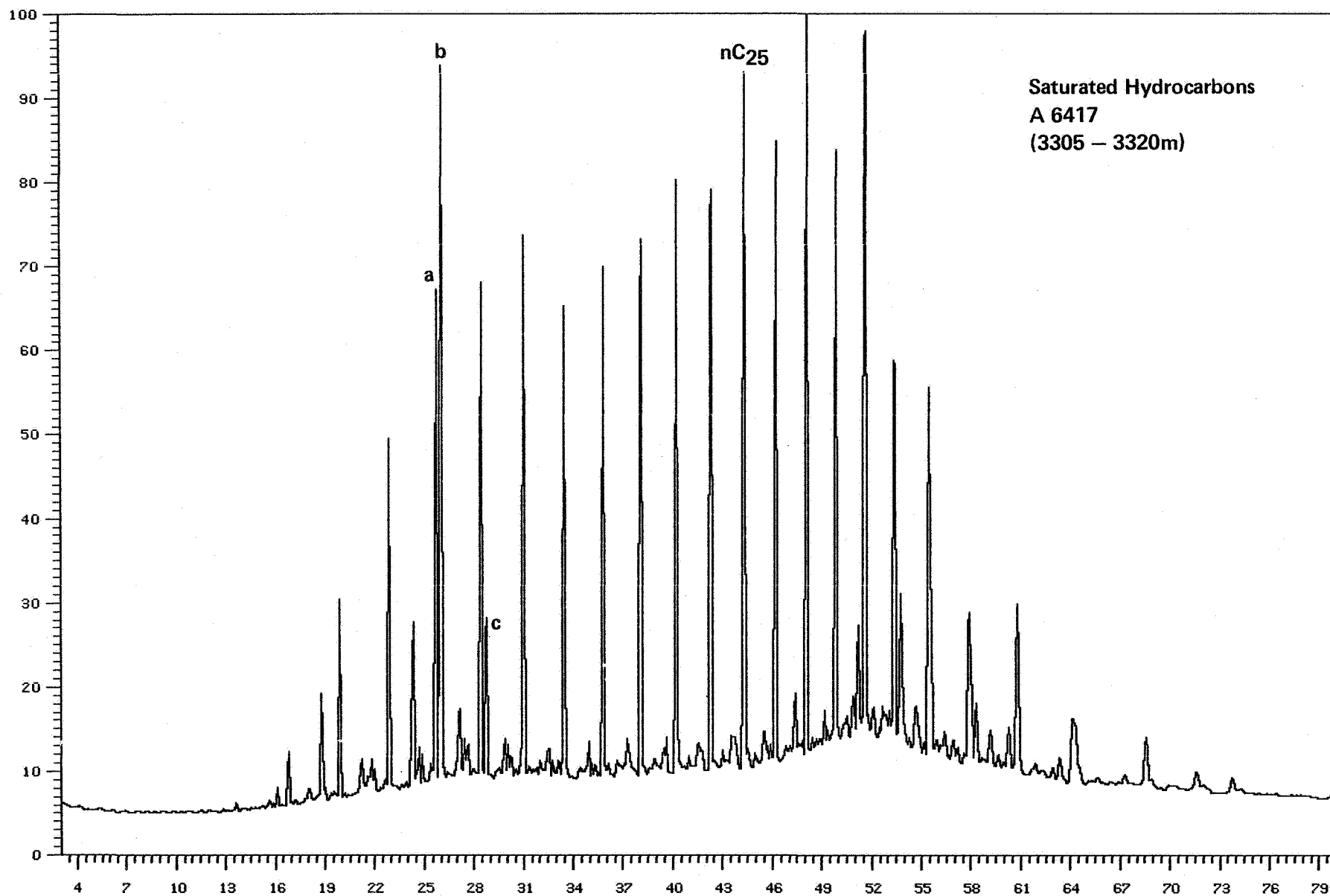
Analysis : 50138A6394S1 Sample #: 1 Injection #: 1
Sample Name : A-6394,S,6610/7-1,TV Maximum signal (%): 9.52



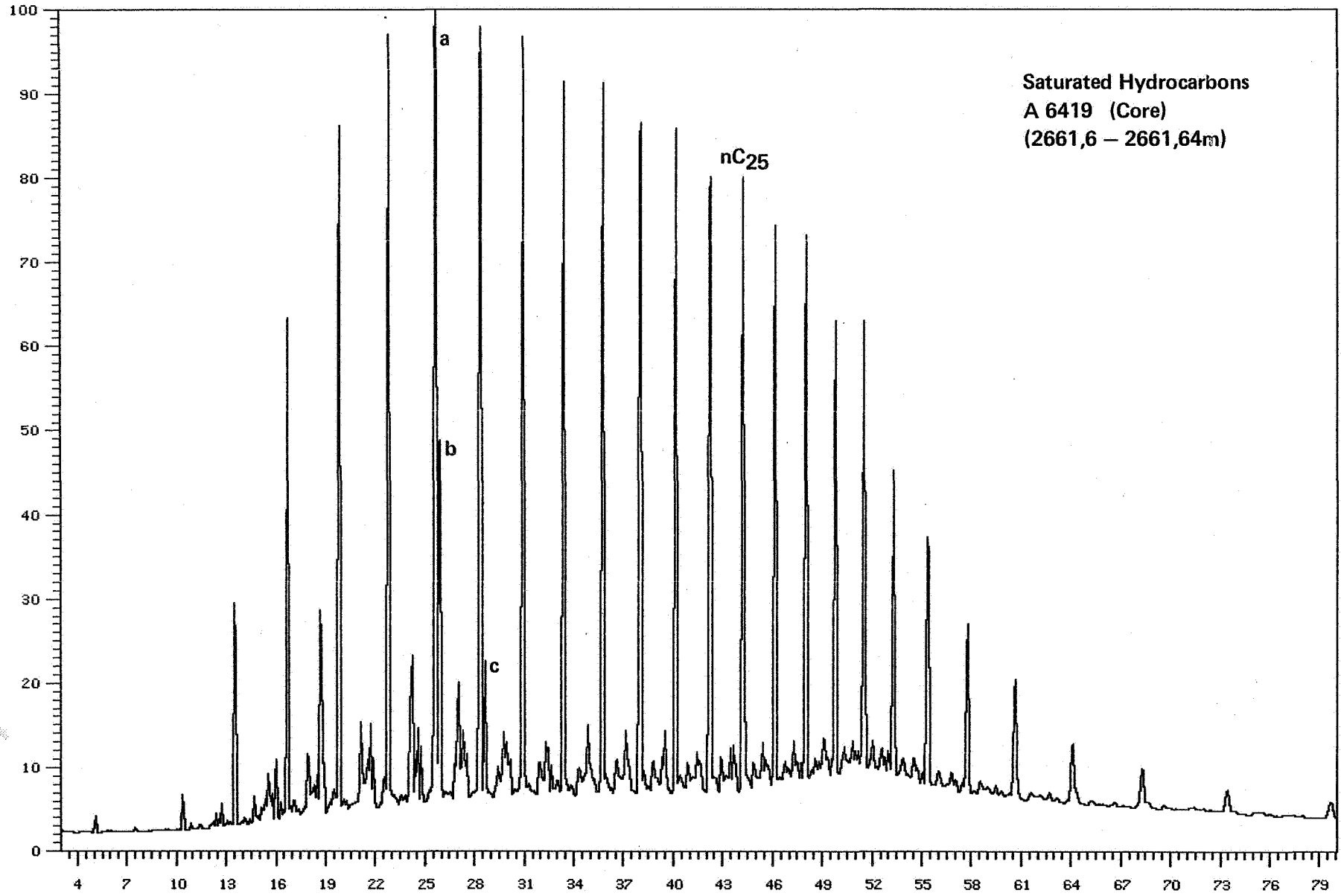
Analysis : 50138A6399S1 Sample #: 1 Injection #: 1
Sample Name : A-6399, S, 6610/7-1, TV Maximum signal (%): 21.03



Analysis : 50138A6417S1 Sample #: 1 Injection #: 1
Sample Name : R-6417,S,6610/7-1,TV Maximum signal (%): 8.62



Analysis : 50138A6419S1 Sample #: 1 Injection #: 1
Sample Name : R-6419,S,6610/7-1,TV Maximum signal (%): 21.86



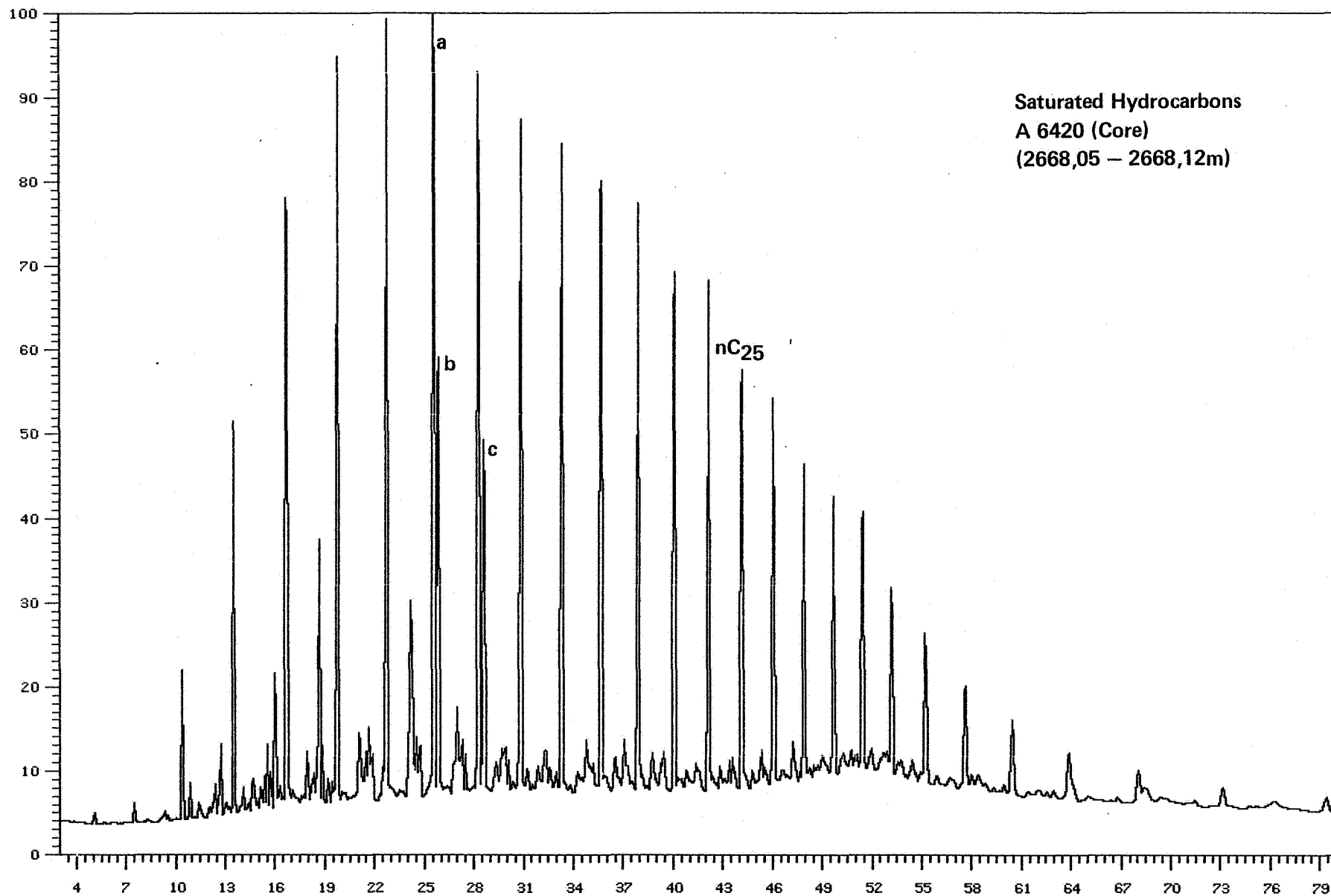
Saturated Hydrocarbons
A 6419 (Core)
(2661,6 - 2661,64m)

Printed at 16:20 on 30/Jul/83

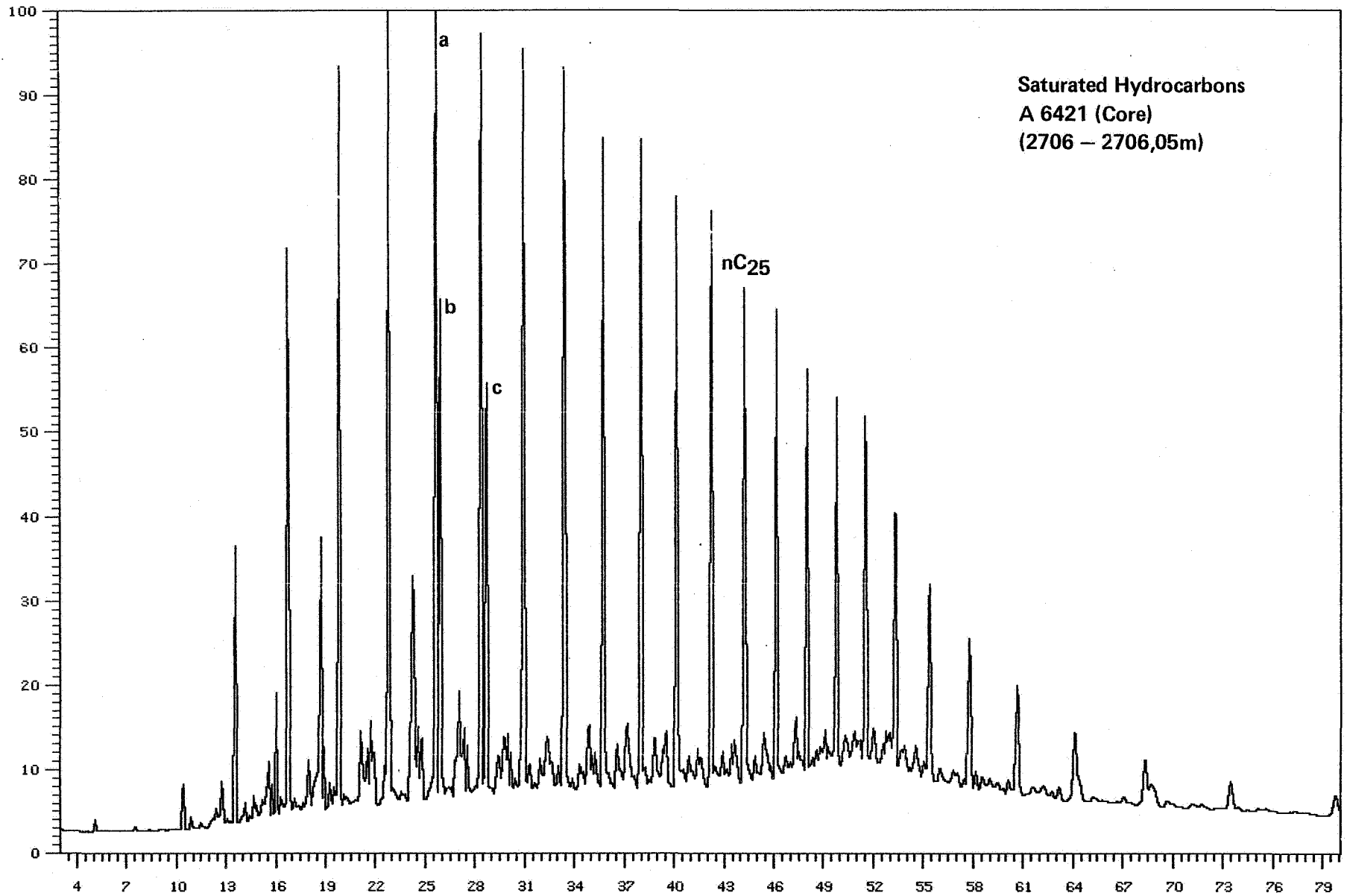
RAW DATA PLOT-CHANNEL 5

Box 1 of 1

Analysis : 50138A6420S1 Sample #: 1 Injection #: 1
Sample Name : R-6420, S, 6610/7-1, TV Maximum signal (%): 11.29



Analysis : 50138A6421S1 Sample #: 1 Injection #: 1
Sample Name : A-6421,S,6610/7-1,TY Maximum signal (%): 19.22

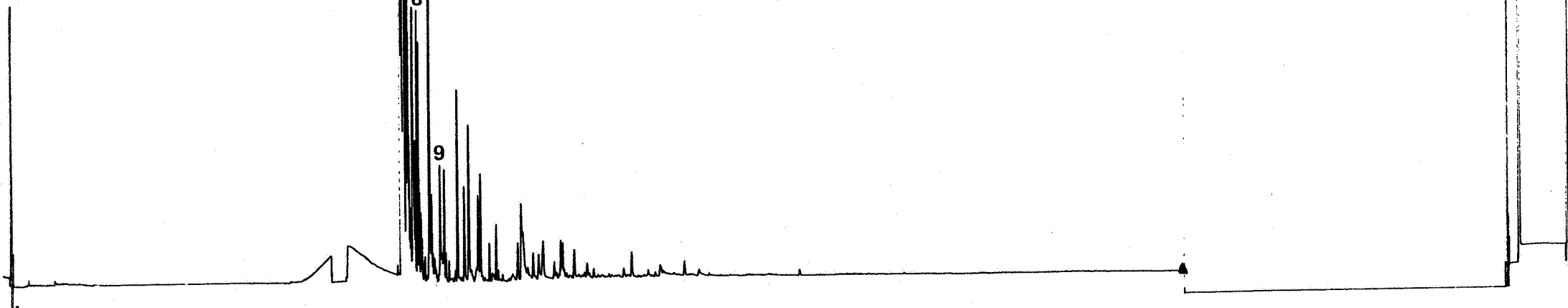


A 5764
(1085 – 1700m)
py - gc S₂

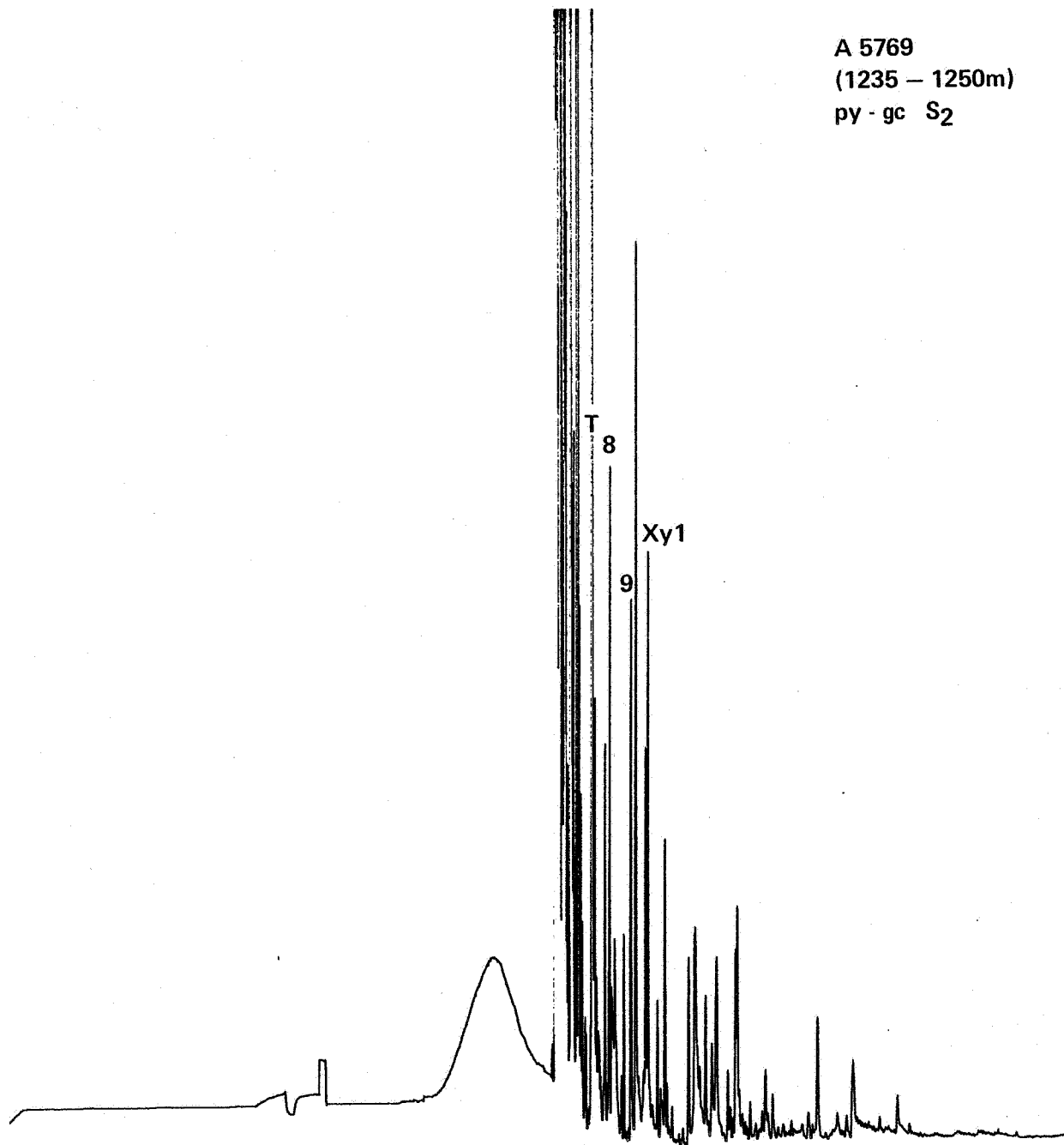
T X

8

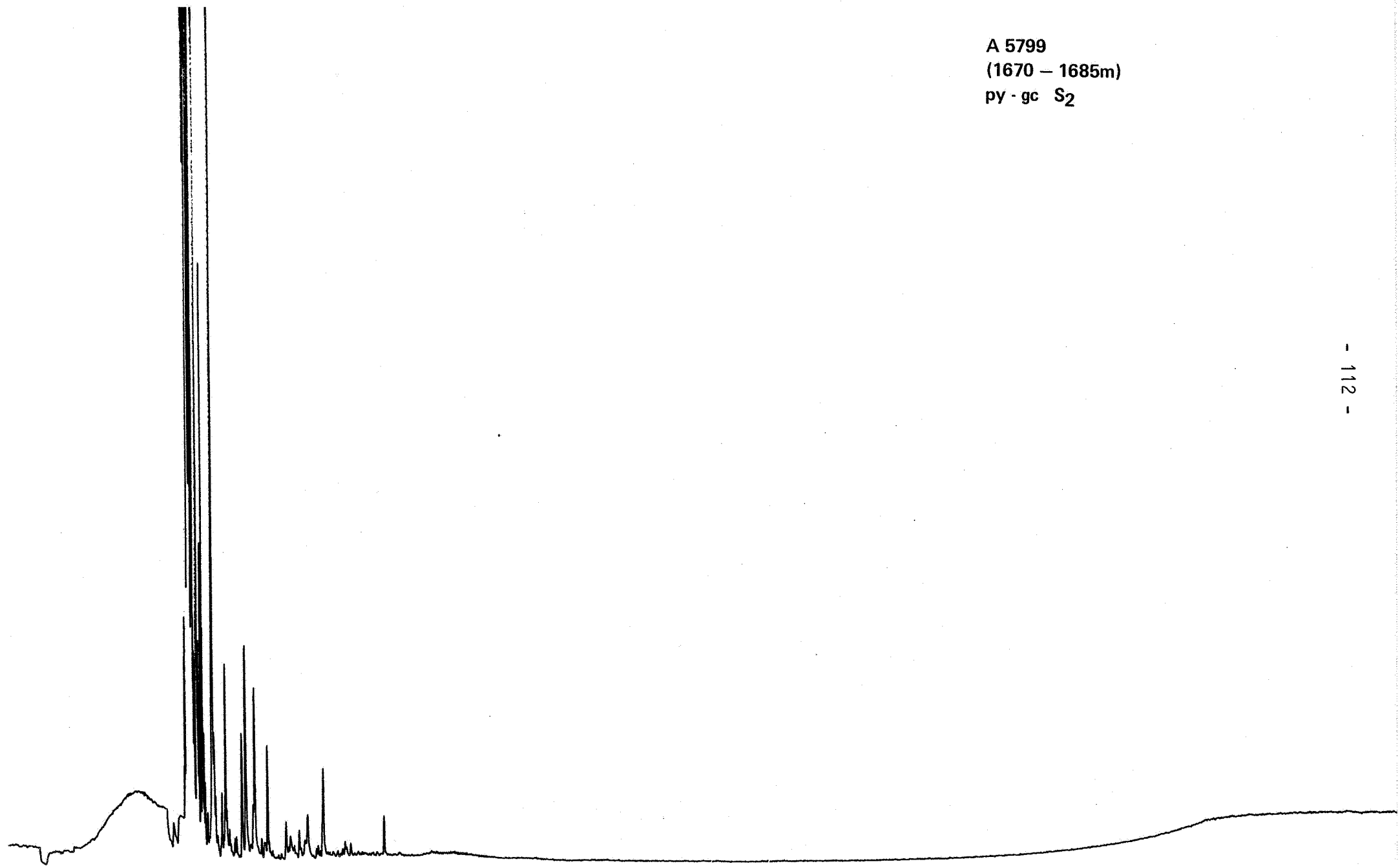
9

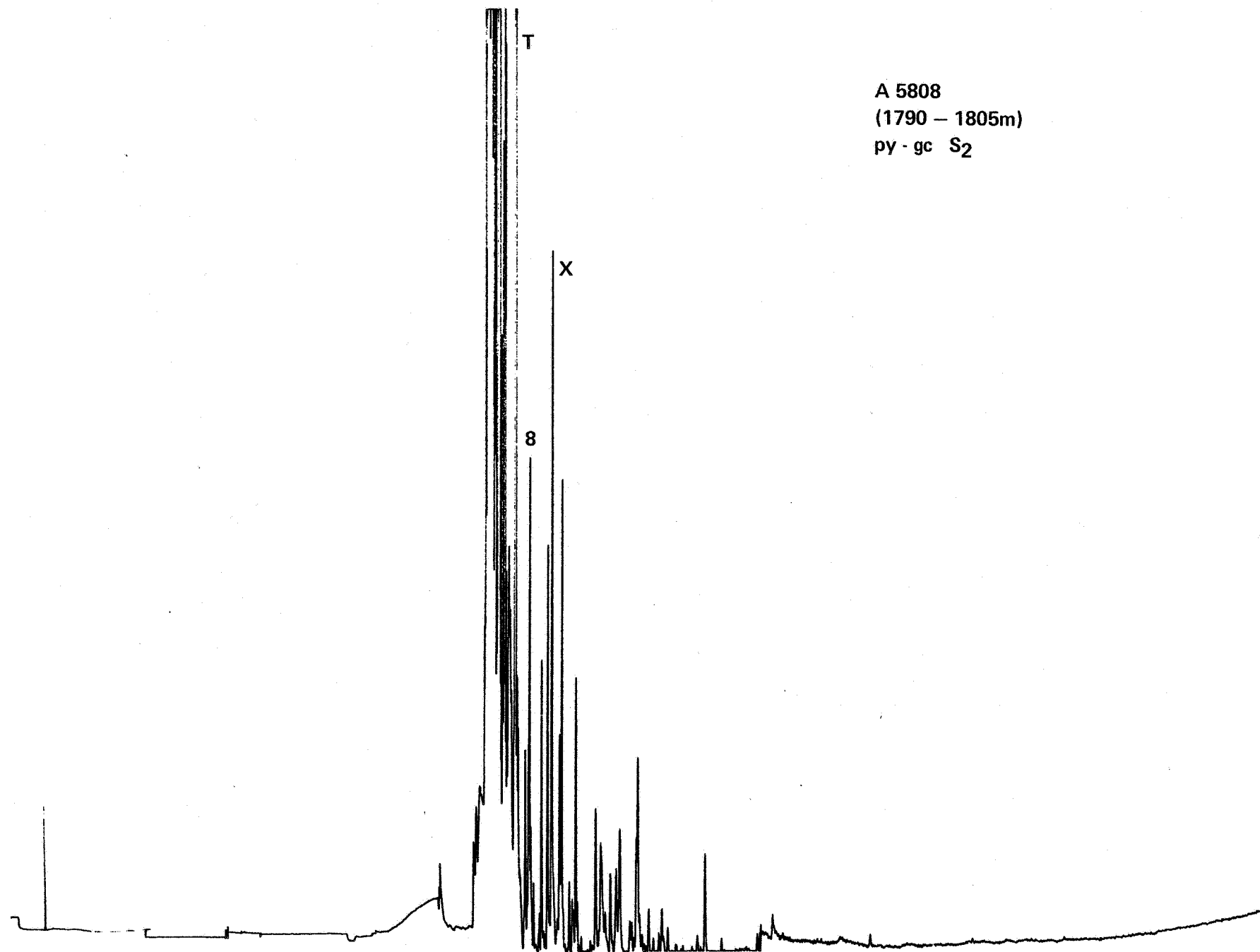


A 5769
(1235 – 1250m)
py - gc S₂



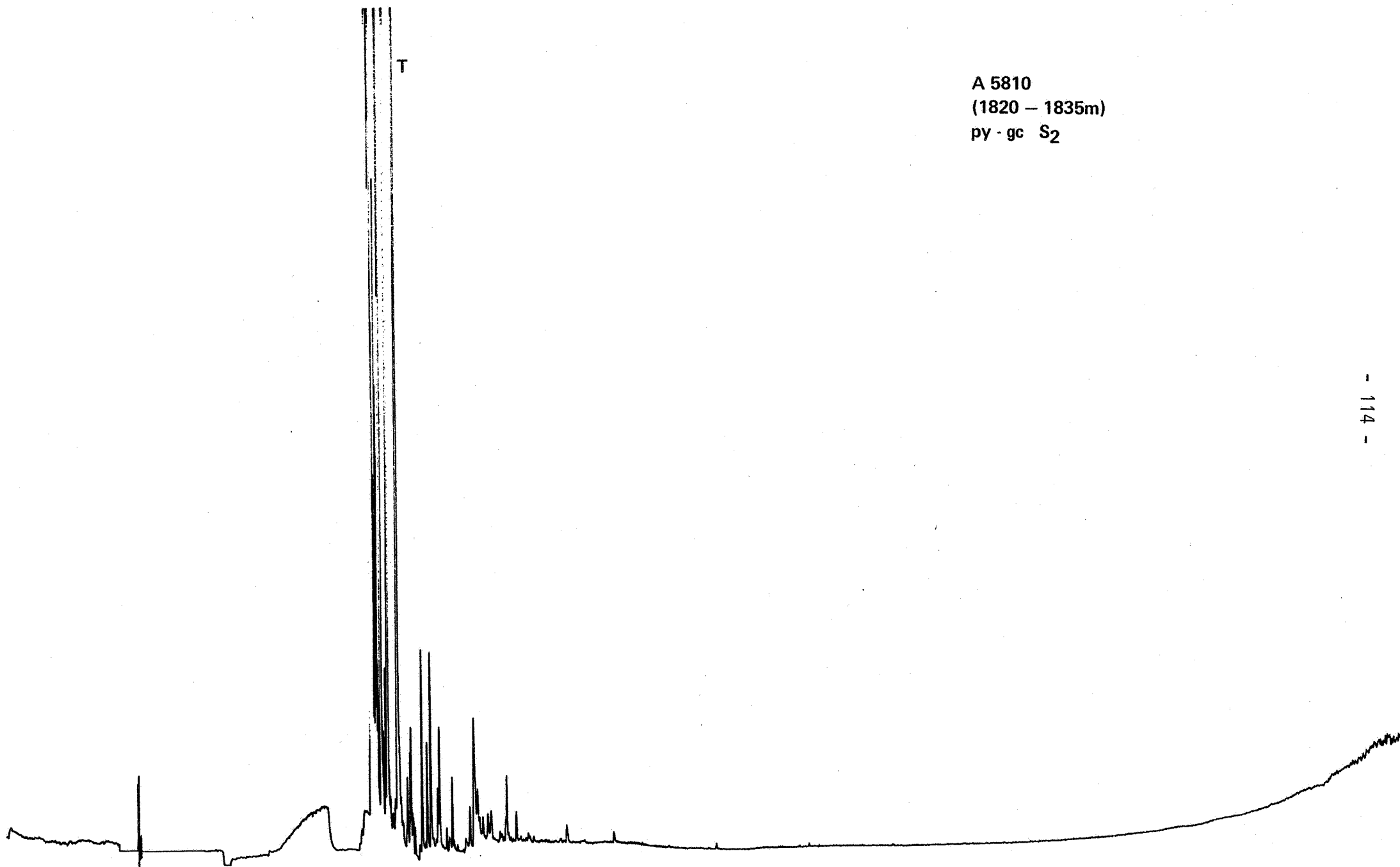
A 5799
(1670 – 1685m)
py - gc S₂



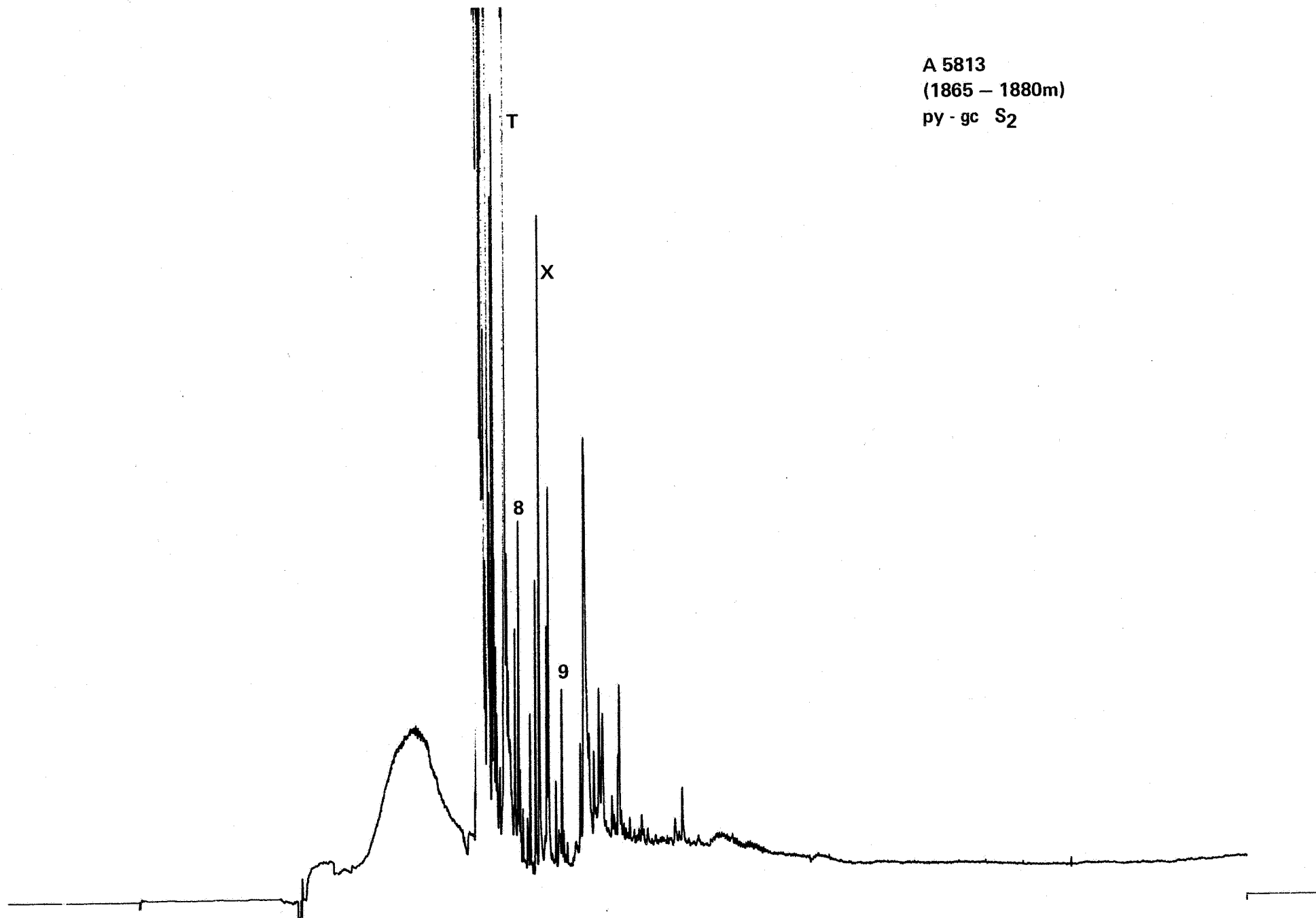


A 5808
(1790 – 1805m)
py - gc S₂

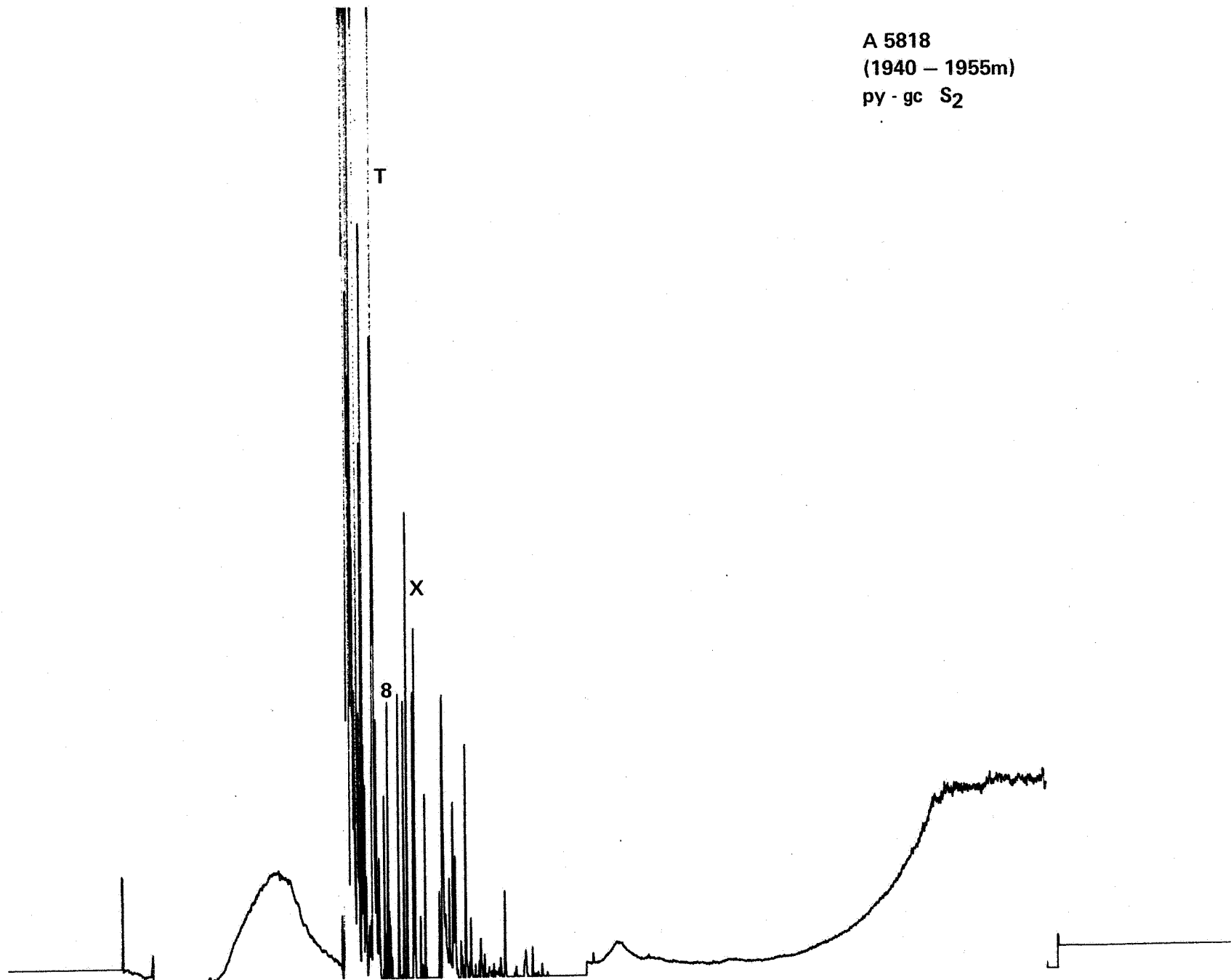
A 5810
(1820 – 1835m)
py - gc S₂



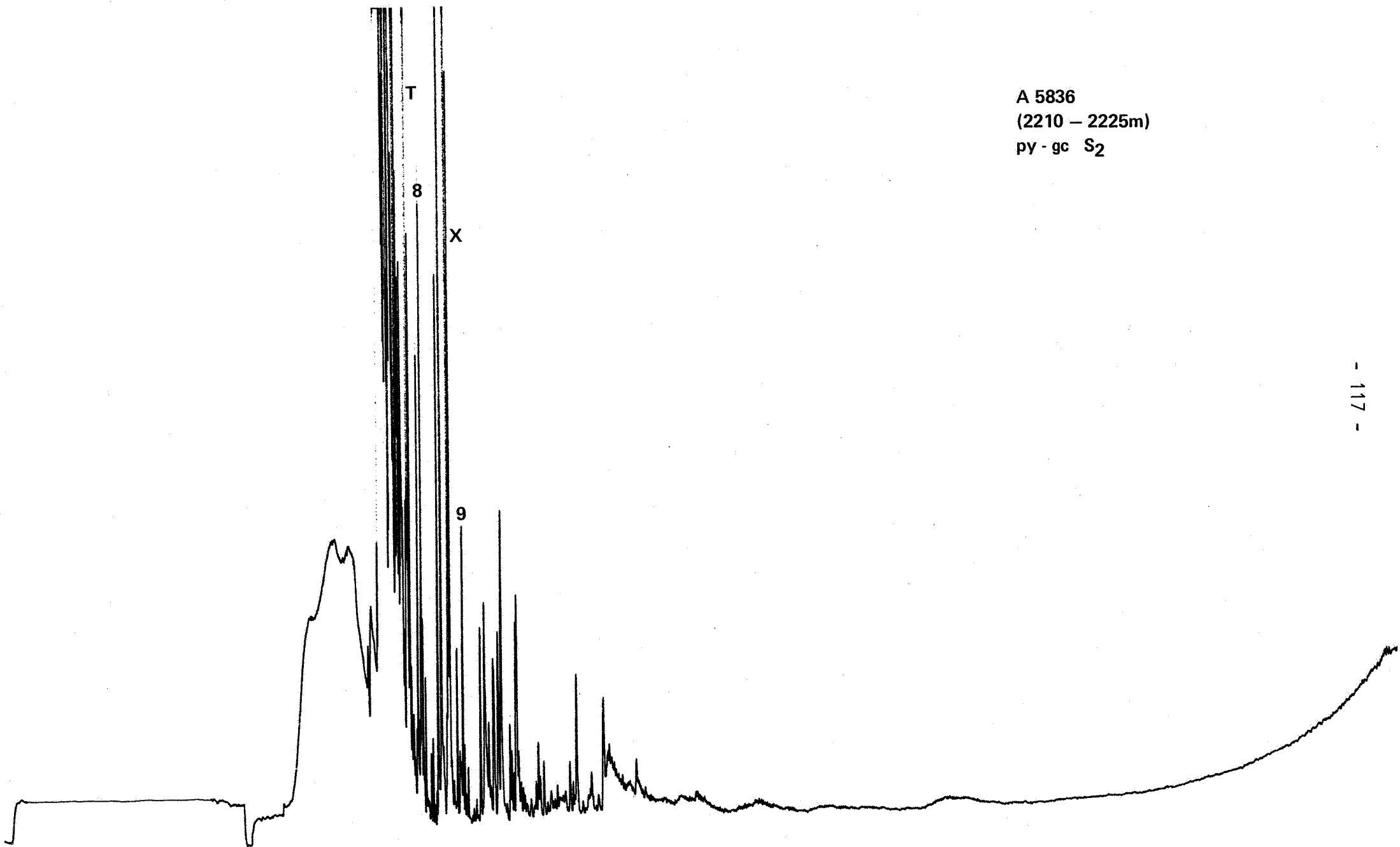
A 5813
(1865 – 1880m)
py - gc S₂



A 5818
(1940 — 1955m)
py - gc S₂



A 5836
(2210 – 2225m)
py - gc S₂



A 5841
(2285 - 2300m)
py - gc S₂

T X
8 9

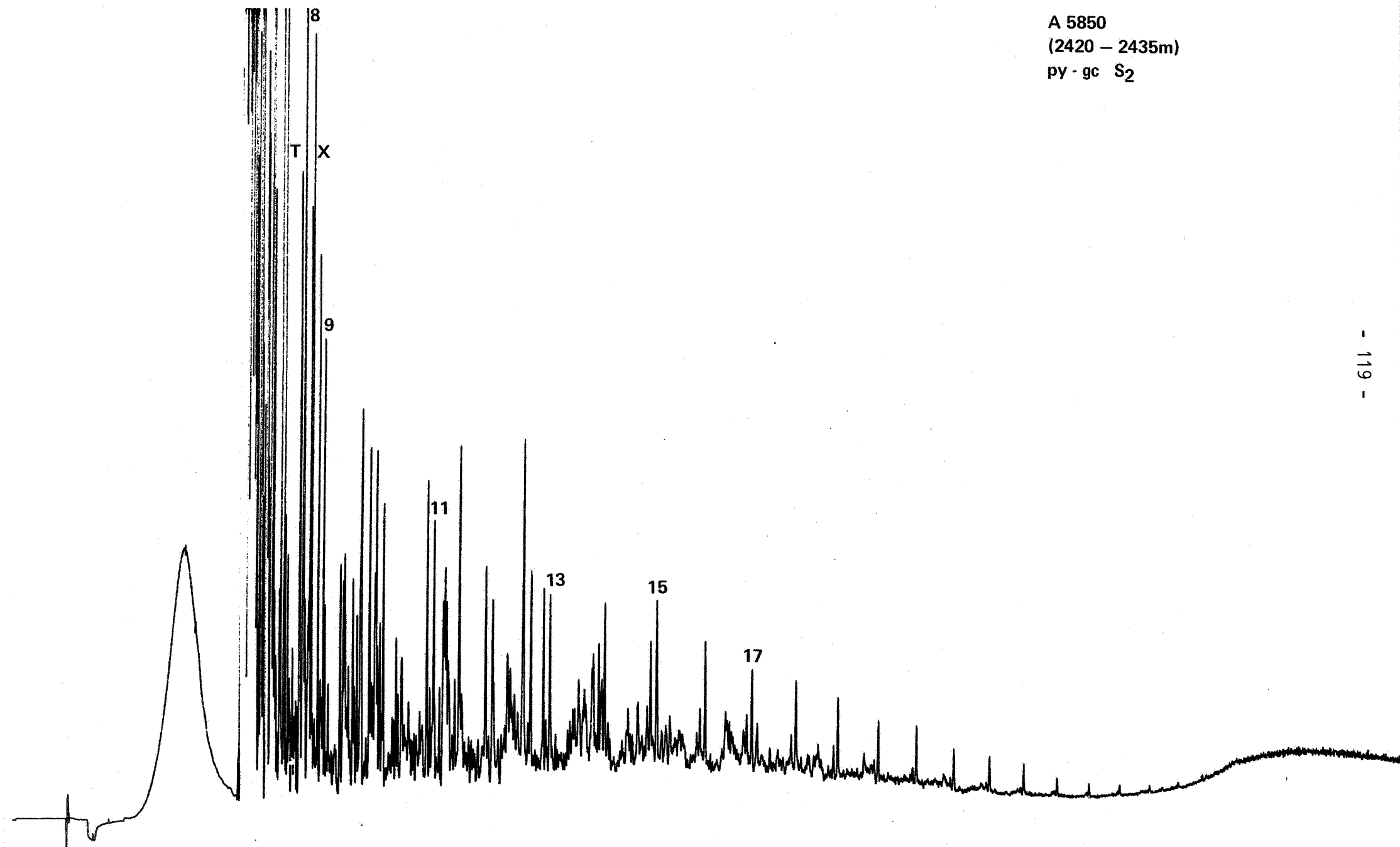
11

13

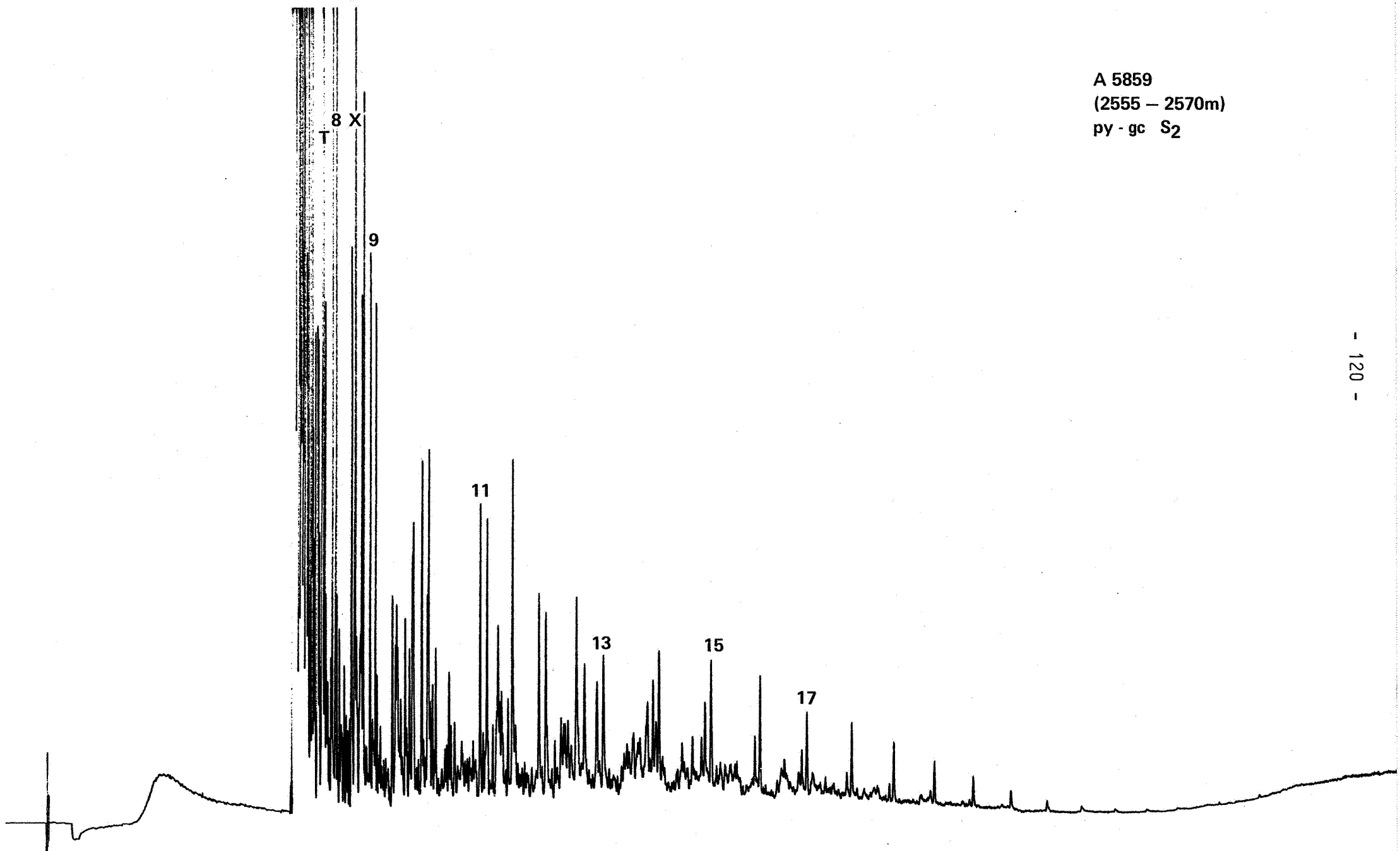
15

17

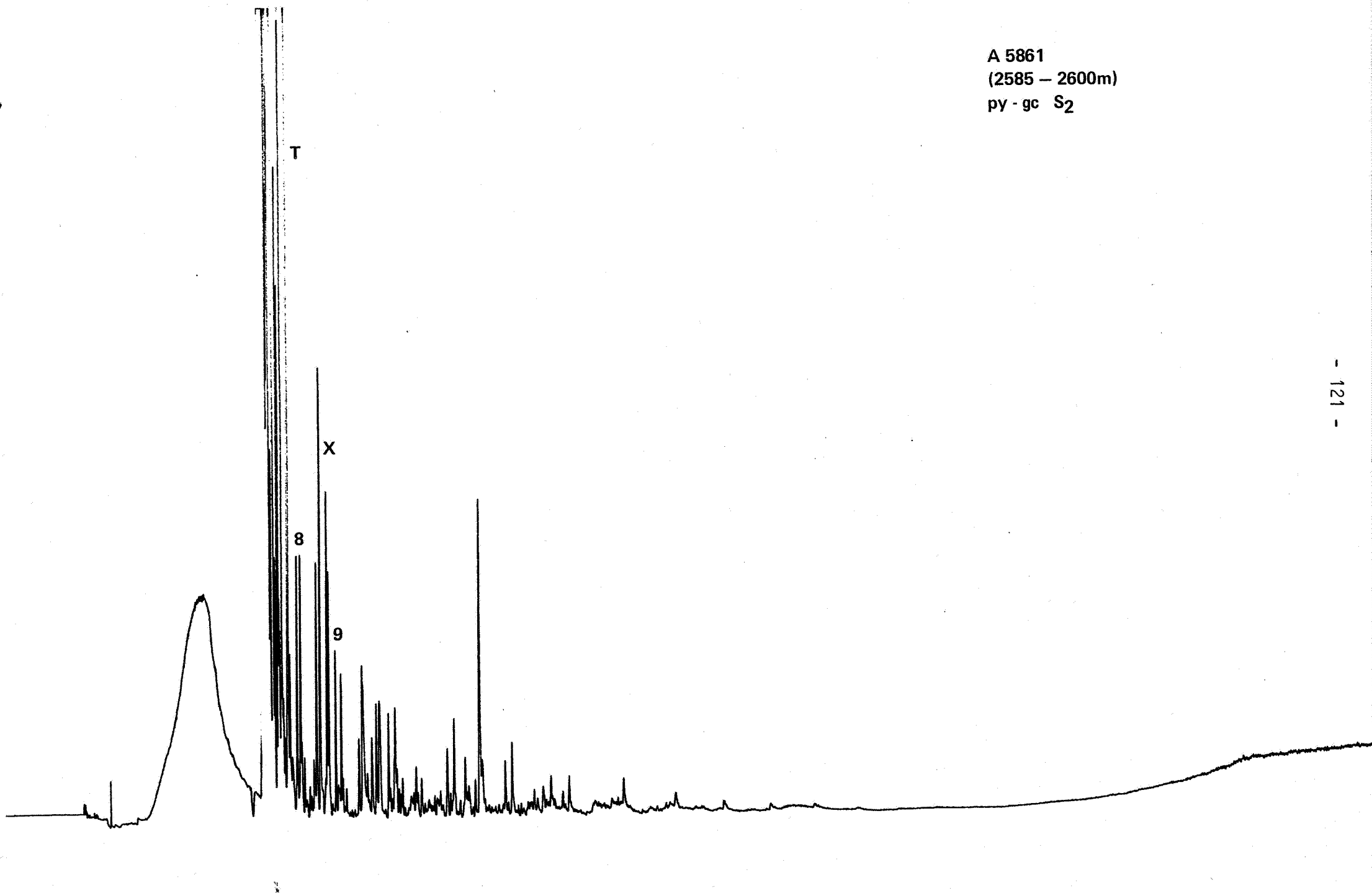
A 5850
(2420 - 2435m)
py - gc S₂



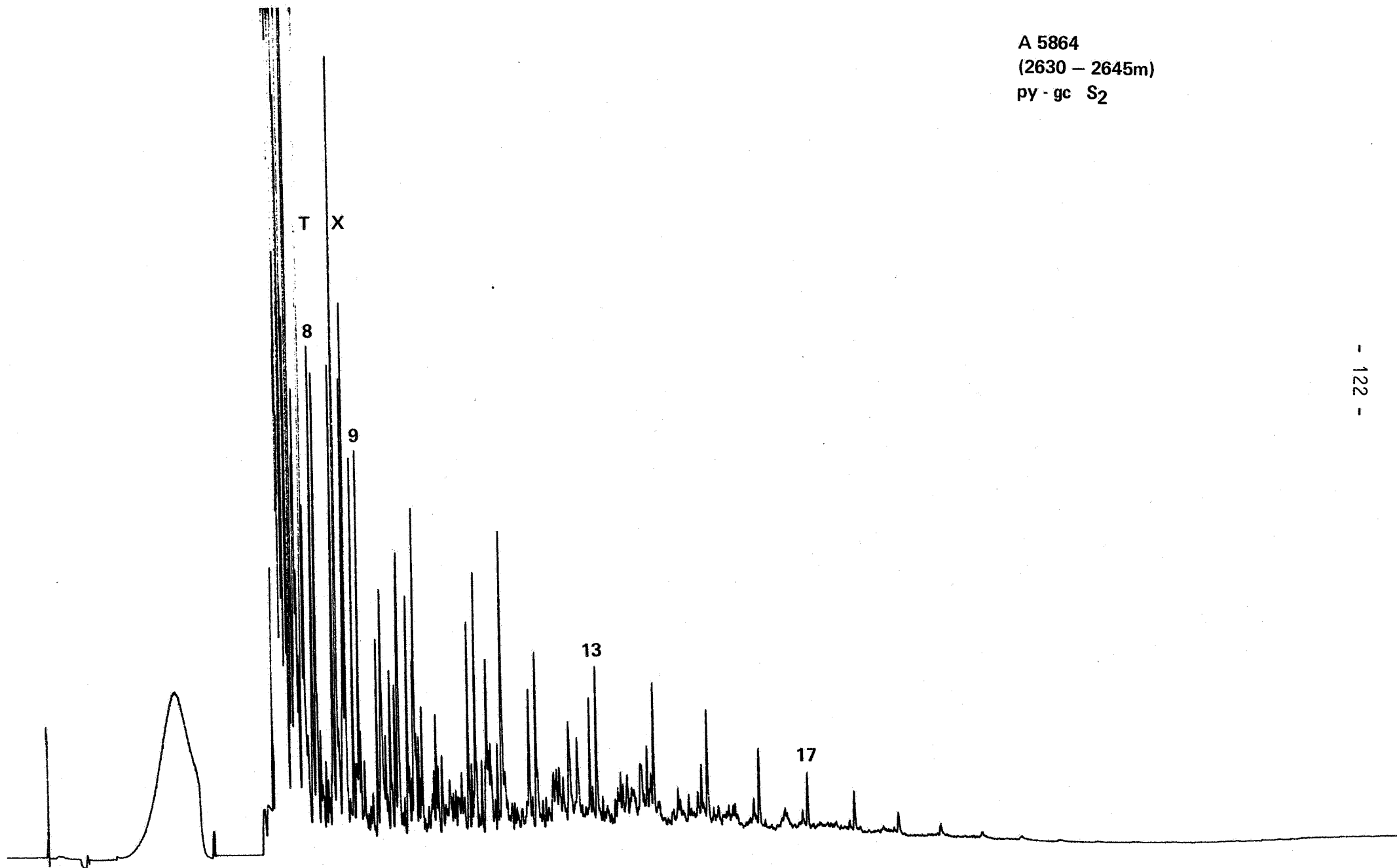
A 5859
(2555 — 2570m)
py - gc S₂

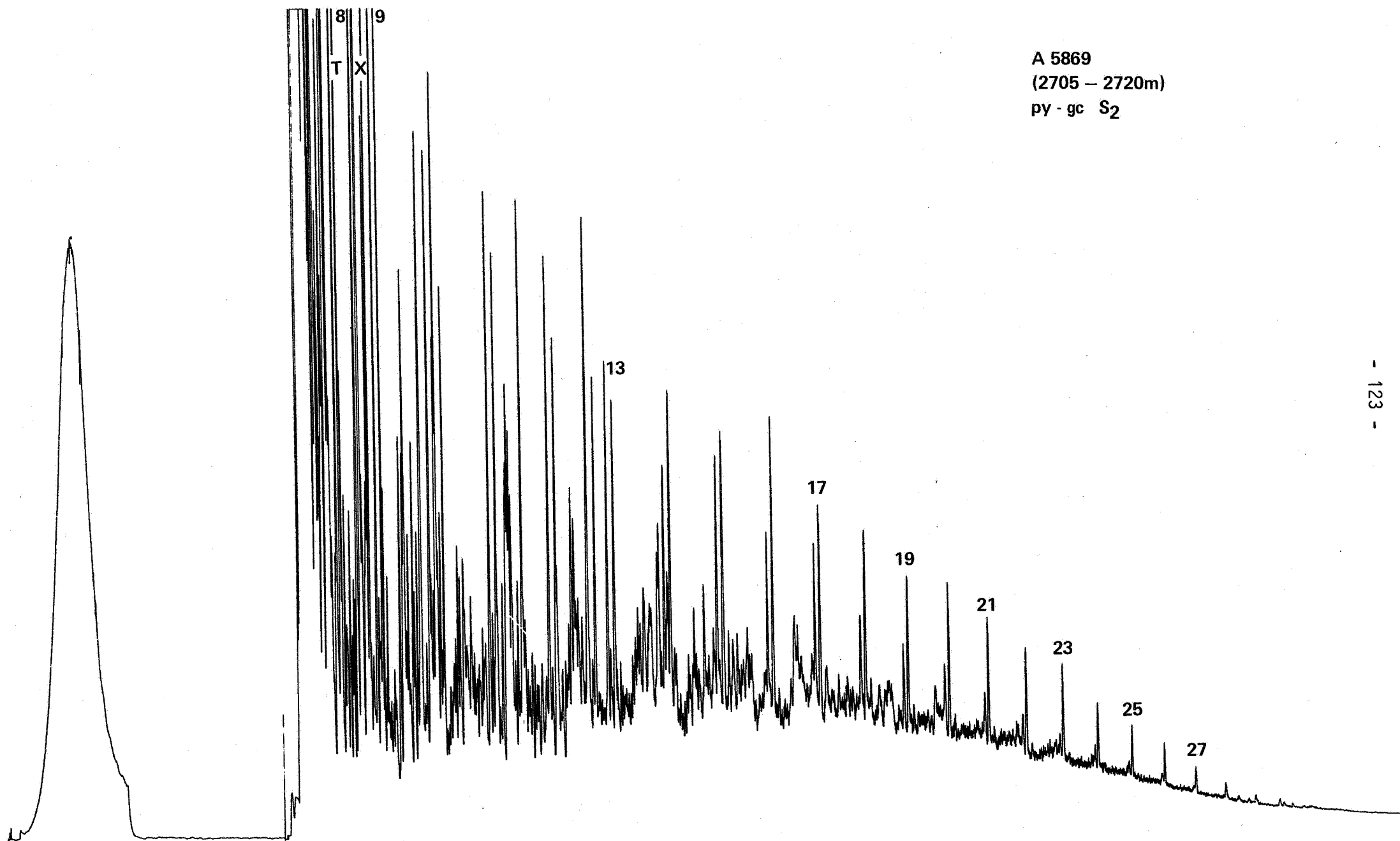


A 5861
(2585 — 2600m)
py - gc S₂



A 5864
(2630 — 2645m)
py - gc S₂





8 9
T X

A 5869
(2705 – 2720m)
py - gc S₂

13

17

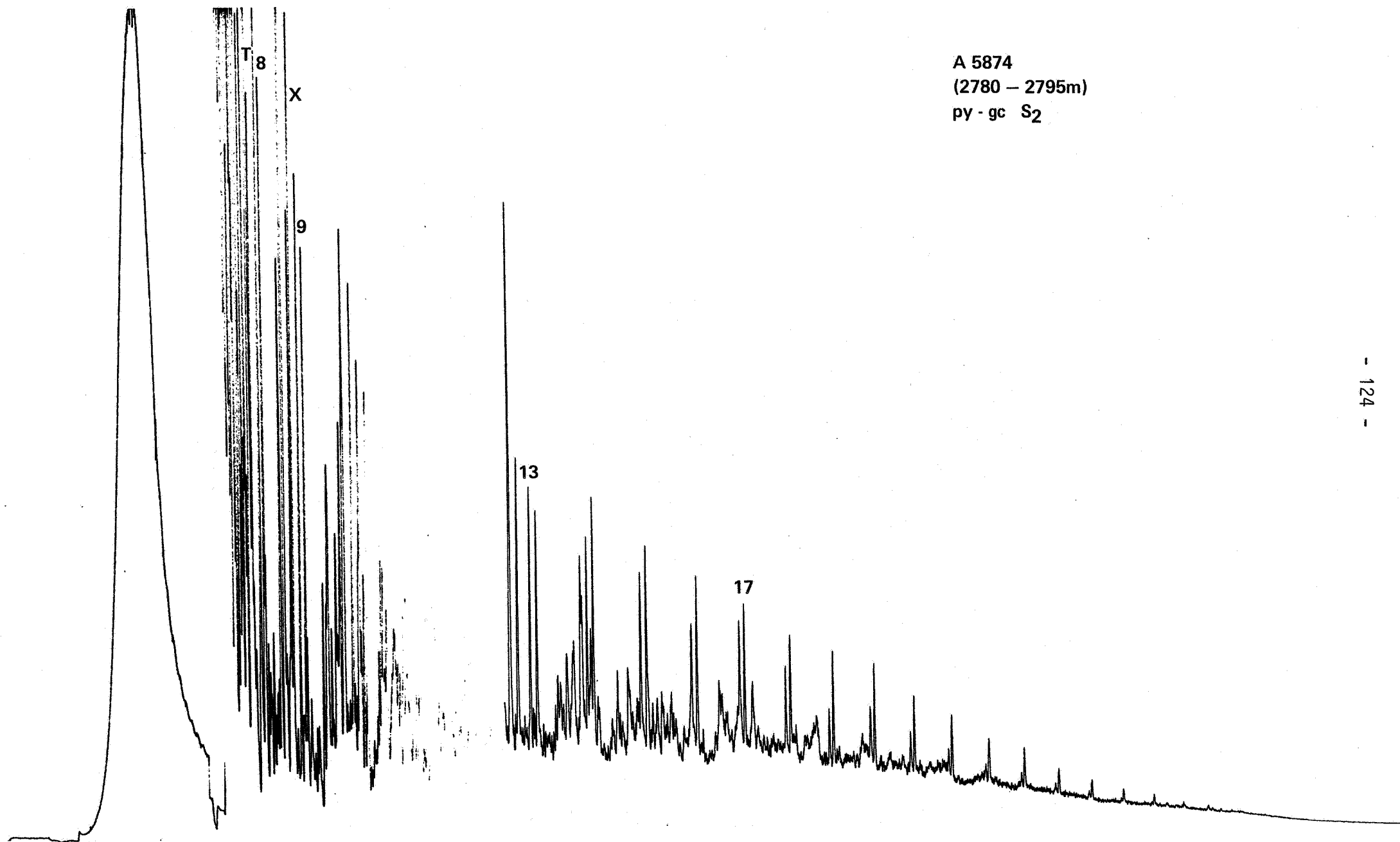
19

21

23

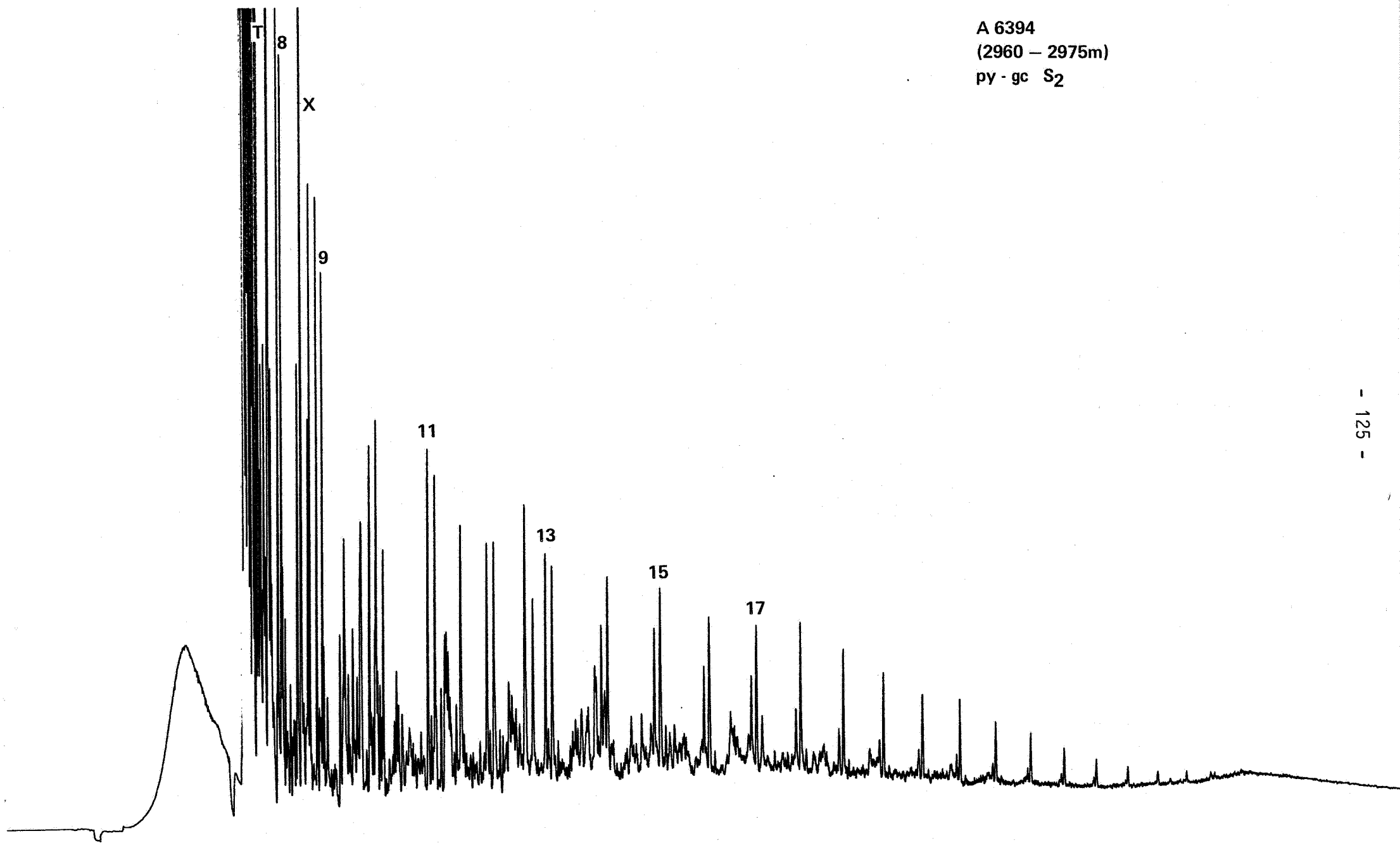
25

27

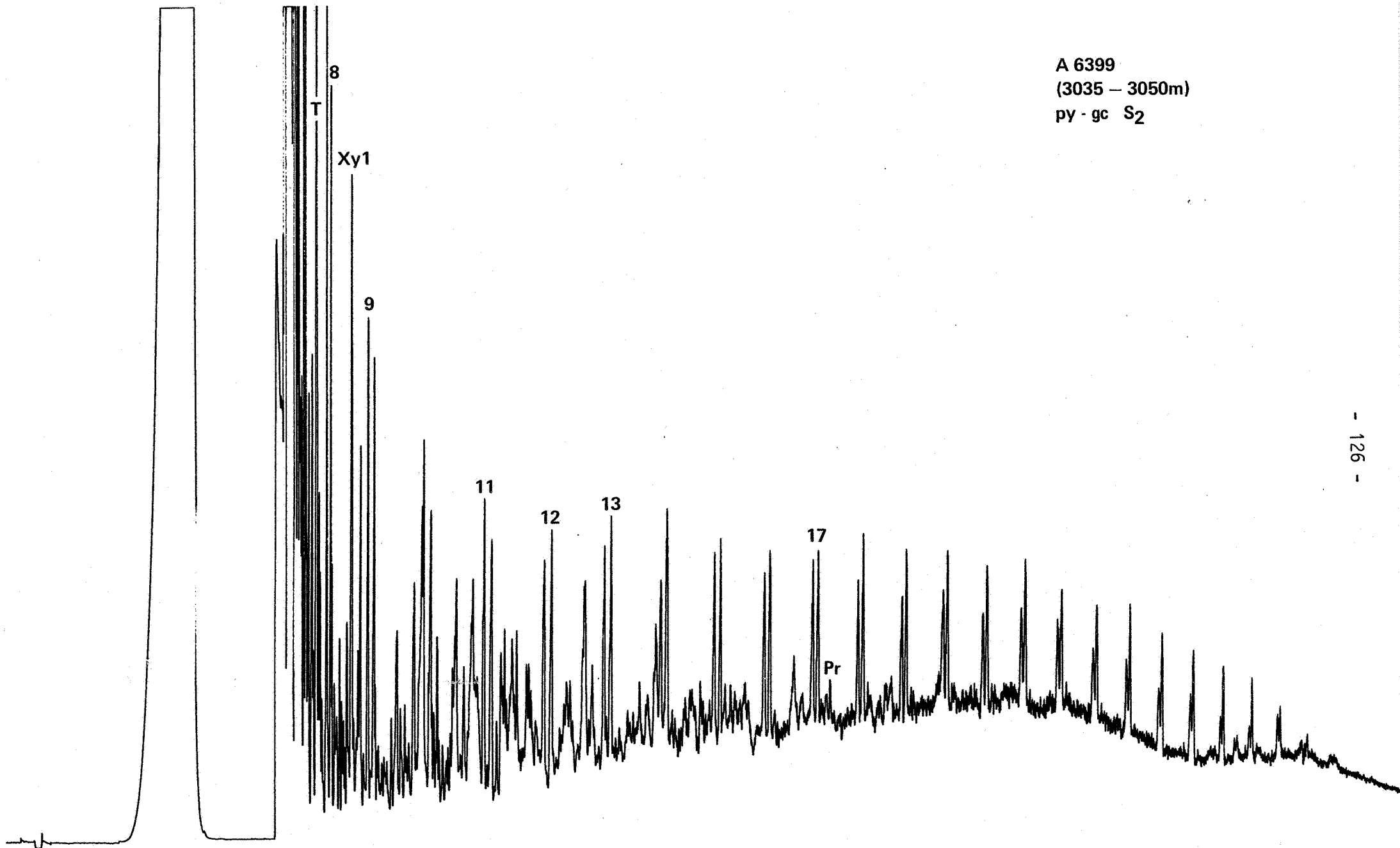


A 5874
(2780 – 2795m)
py - gc S₂

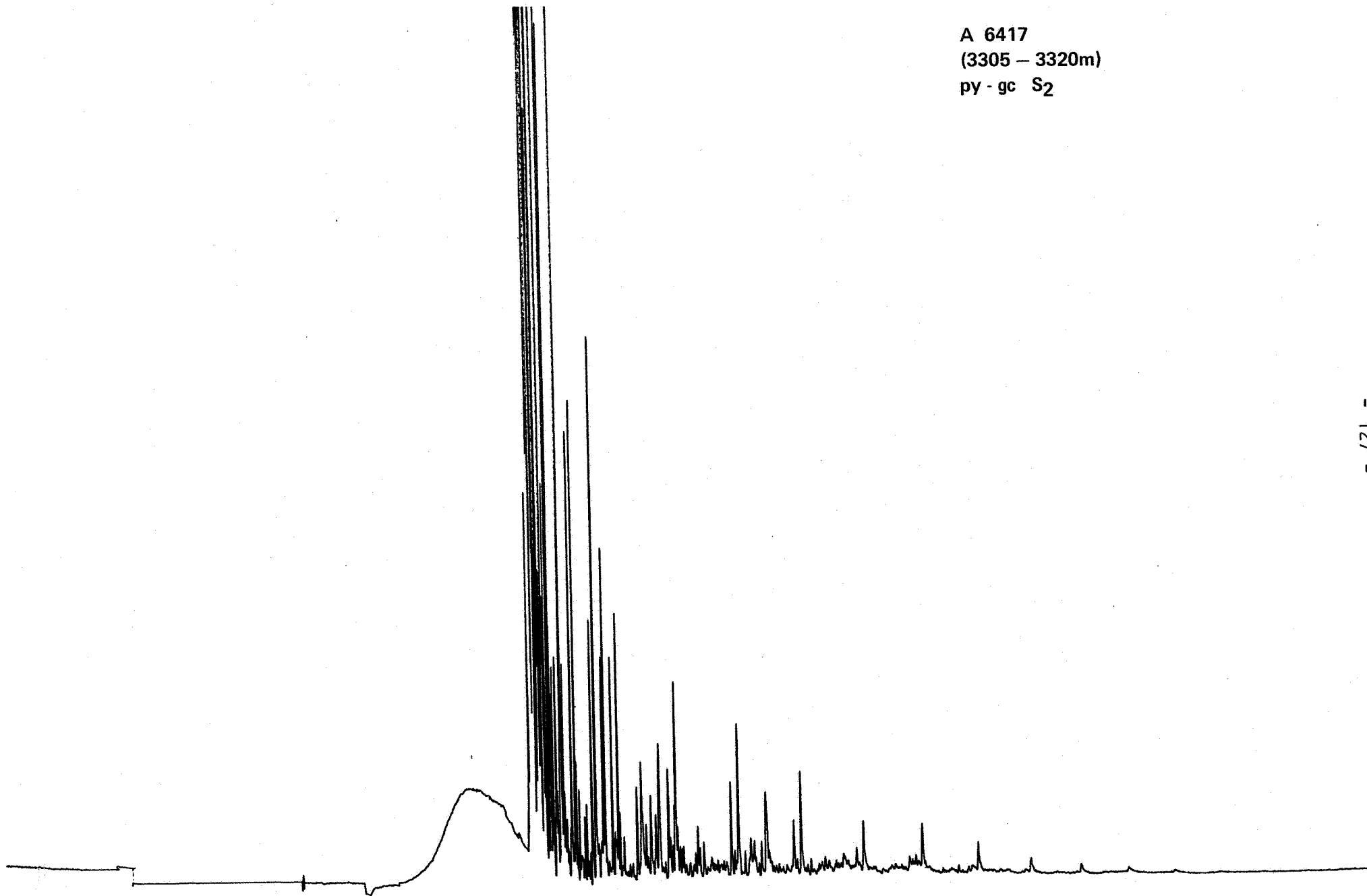
A 6394
(2960 – 2975m)
py - gc S₂



A 6399
(3035 – 3050m)
py - gc S₂



A 6417
(3305 – 3320m)
py - gc S₂

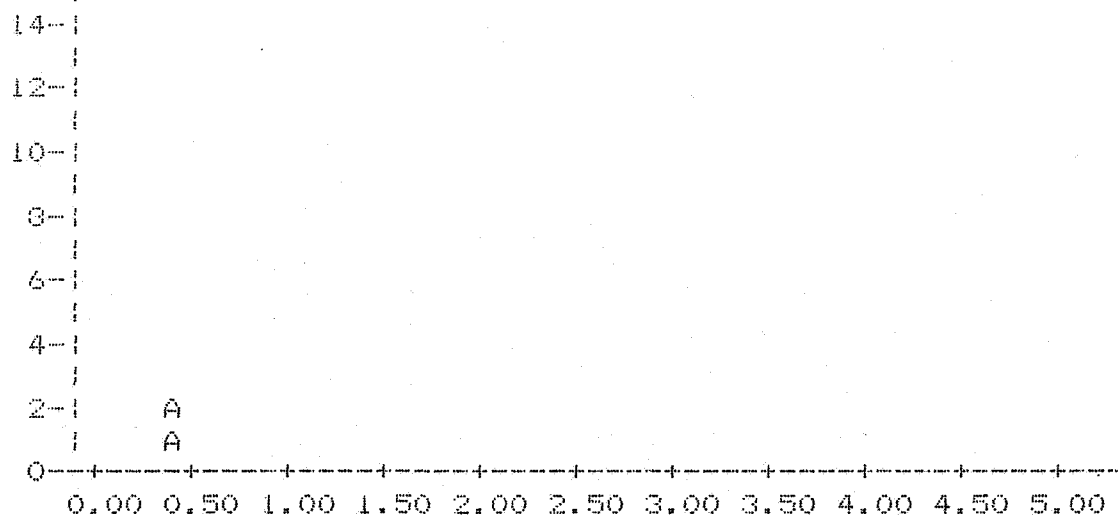


VITRINITE REFLECTANCE HISTOGRAMS KEY TO LITHOLOGY

A = Clst. gy
B = Clst. dk. gy
C = Clst. an
D = Clst. bn
E = Clst. rd
F = Clst. calc.
G = Clst. carb.
H = Shale
I = Sandstone
J = Limestone
K = Coal
L = Lignite
M = Carbarsillite
N = Siltstone
O =
P =

a,b etc = same lithology as above but value not included in any population, possibly because suspected cavings, reworking, contamination or other erroneous recording.

IKU# A 5785 1480.0M 6610/7-1

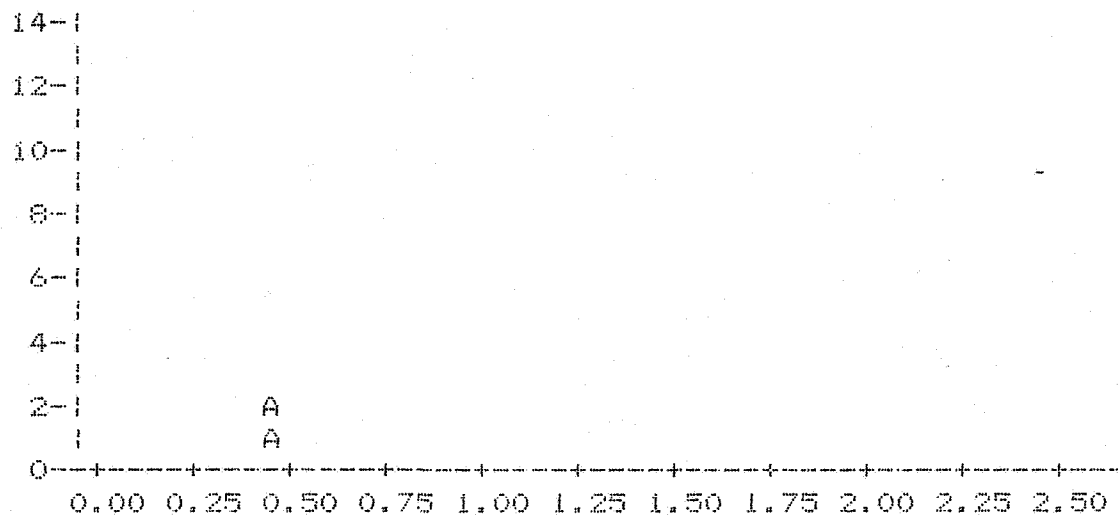


PP LOW HIGH LIT #VAL MEAN STDV
 Y 0.45 0.50 A 2 0.48 0.00
 OVERALL 2 0.48 0.00

ORDERED VALUES FOLLOW:

0.48A 0.48A

IKU# A 5785 1480.0M 6610/7-1

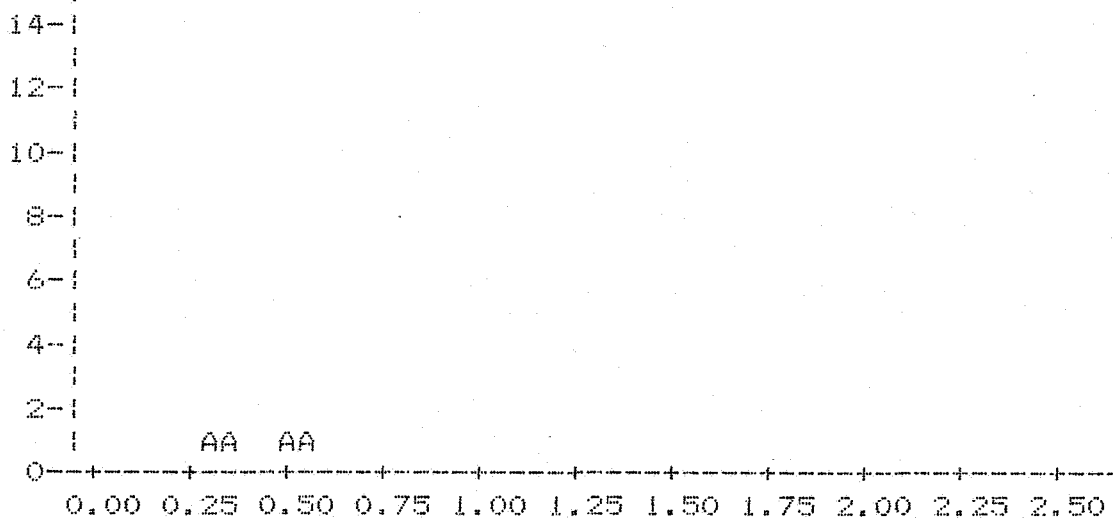


PP LOW HIGH LIT #VAL MEAN STDV
 Y 0.45 0.50 A 2 0.48 0.00
 OVERALL 2 0.48 0.00

ORDERED VALUES FOLLOW:

0.48A 0.48A

IKU# A 5813 1880.0M 6610/7-1

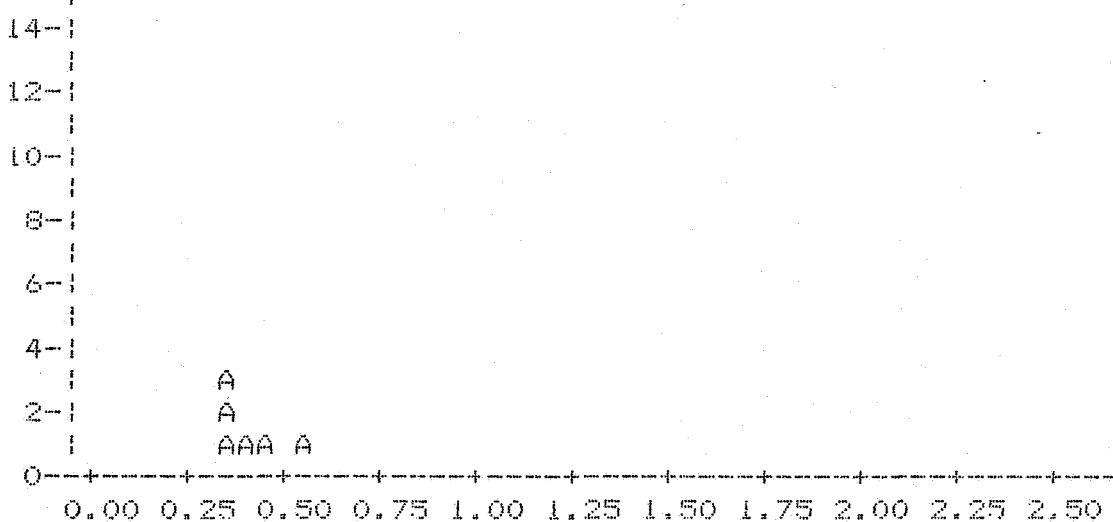


PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.30	0.42	A	2	0.36	0.06
Y	0.50	0.56	A	2	0.53	0.03
	OVERALL			4	0.45	0.10

ORDERED VALUES FOLLOW:

0.32A 0.40A 0.51A 0.55A

IKU# A 5820 1985.0M 6610/7-1

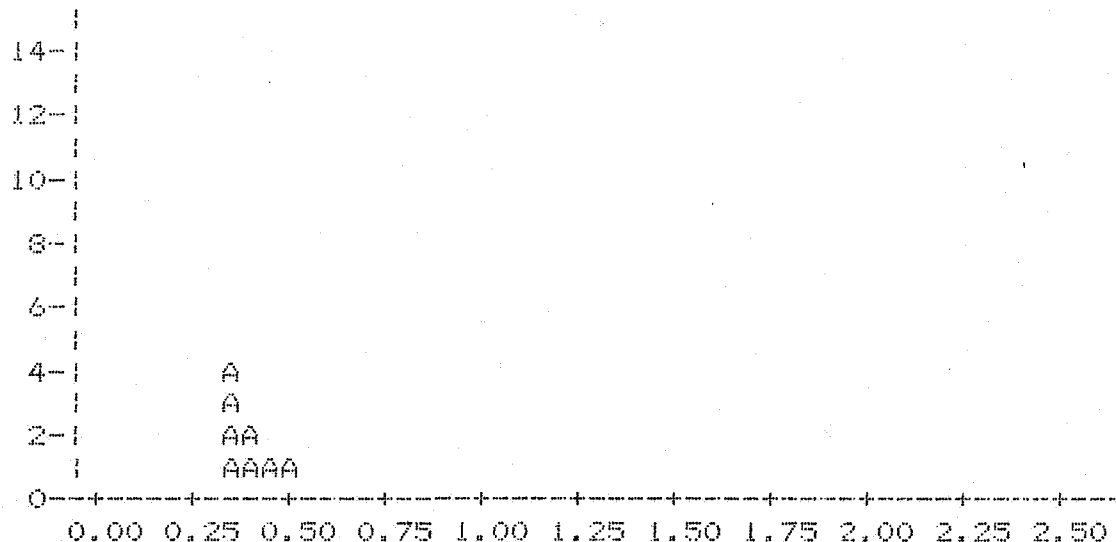


PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.30	0.60	ALL	6	0.43	0.07
	OVERALL			6	0.43	0.07

ORDERED VALUES FOLLOW:

0.37A 0.39A 0.40A 0.41A 0.47A 0.53A

IKU# A 5825 2060.0M 6610/7-1

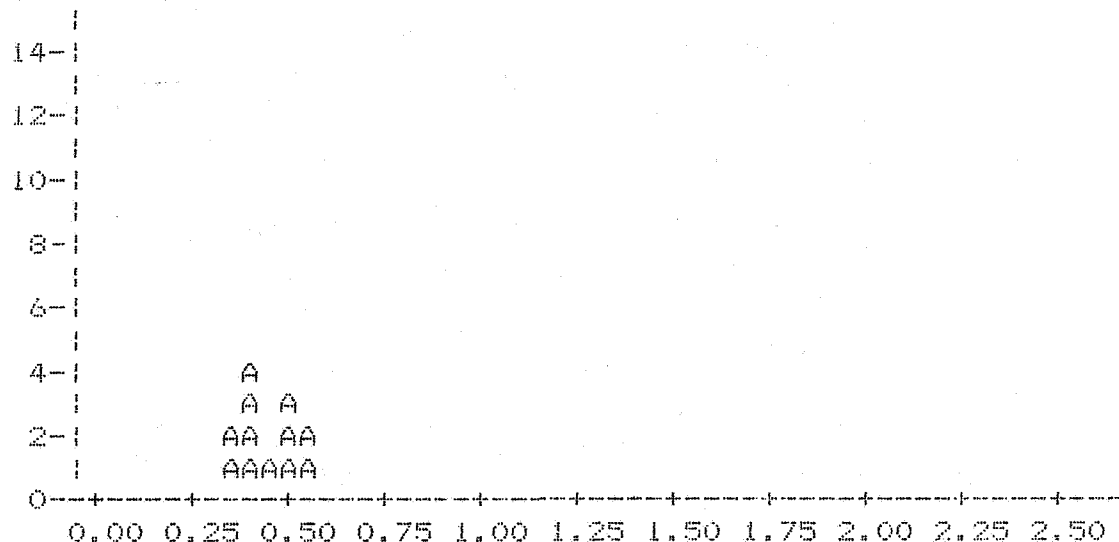


PP LOW HIGH LIT #VAL MEAN STDV
 Y 0.30 0.60 ALL 8 0.43 0.05
 OVERALL 8 0.43 0.05

ORDERED VALUES FOLLOW:

0.36A 0.40A 0.40A 0.40A 0.41A 0.45A 0.49A 0.52A

IKU# A 5841 2300.0M 6610/7-1

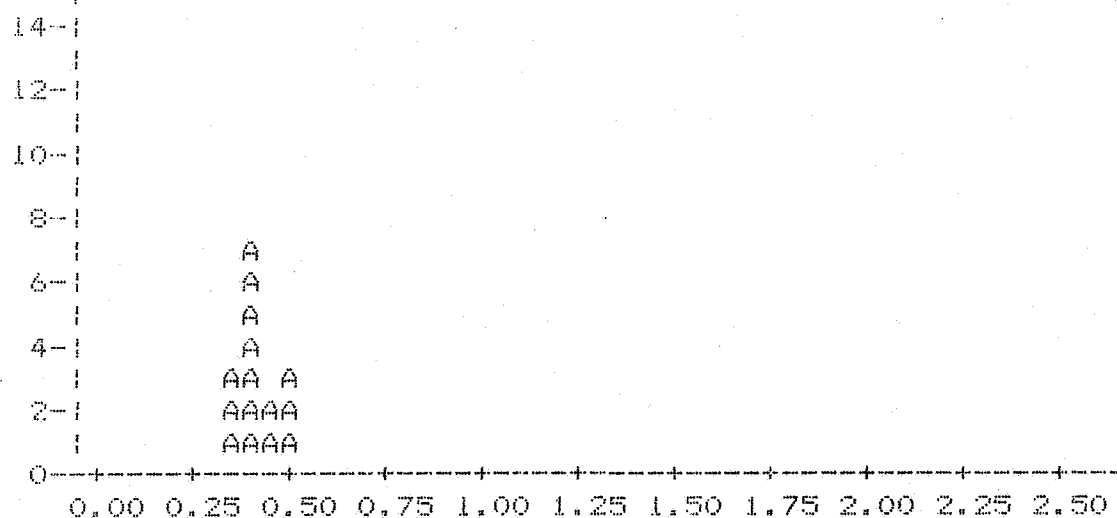


PP LOW HIGH LIT #VAL MEAN STDV
 Y 0.30 0.60 ALL 12 0.47 0.07
 OVERALL 12 0.47 0.07

ORDERED VALUES FOLLOW:

0.36A 0.39A 0.41A 0.43A 0.45A 0.45A 0.47A 0.51A 0.52A 0.54A 0.55A 0.57A

IKU# A 5846 2375.0M 6610/7-1

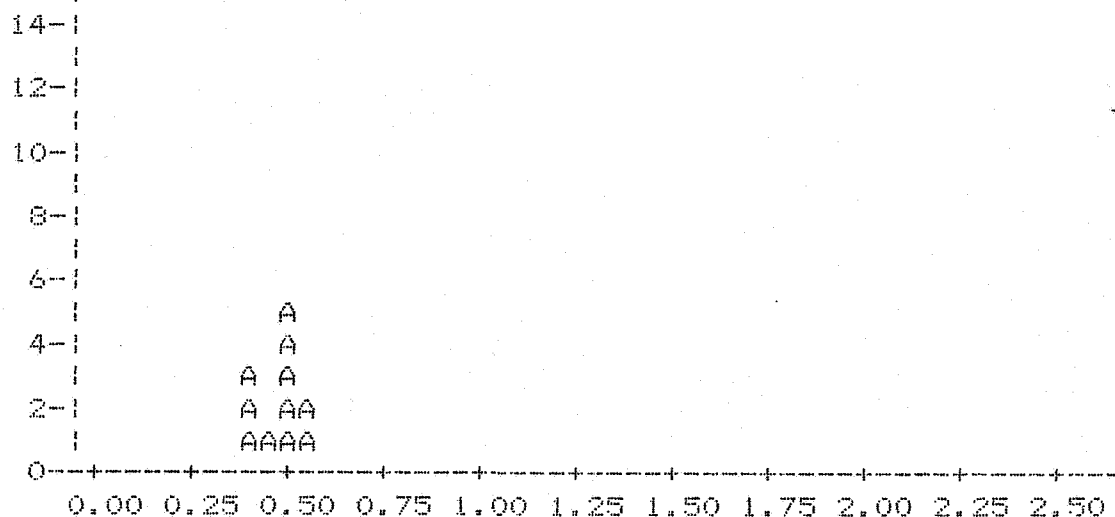


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.38 0.53 ALL 15 0.44 0.04
OVERALL 15 0.44 0.04

ORDERED VALUES FOLLOW:

0.39A 0.39A 0.40A 0.42A 0.42A 0.42A 0.43A 0.44A 0.44A 0.45A 0.47A 0.47A 0.50A
0.51A 0.52A

IKU# A 5850 2435.0M 6610/7-1

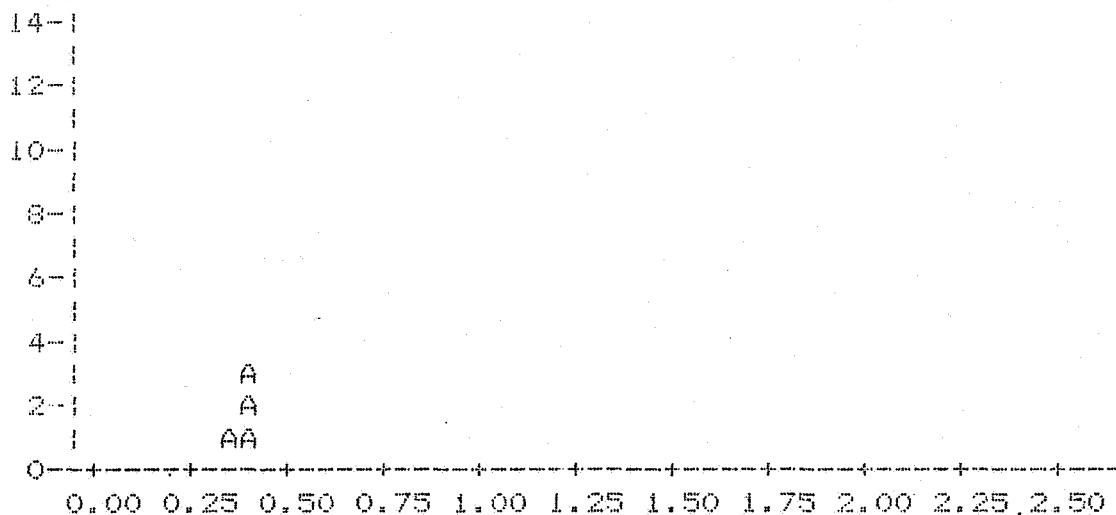


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.40 0.57 ALL 11 0.50 0.06
OVERALL 11 0.50 0.06

ORDERED VALUES FOLLOW:

0.41A 0.42A 0.43A 0.46A 0.51A 0.52A 0.53A 0.54A 0.54A 0.55A 0.56A

IKU# A 5853 2430.0M 6610/7-1

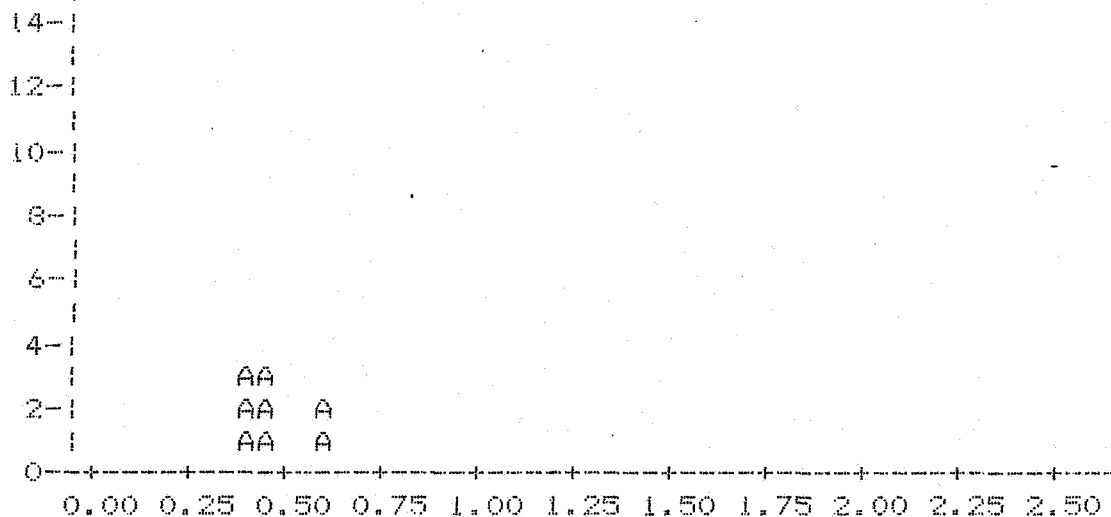


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.35 0.45 ALL 4 0.41 0.02
OVERALL 4 0.41 0.02

ORDERED VALUES FOLLOW:

0.38A 0.41A 0.42A 0.43A

IKU# A 5861 2600.0M 6610/7-1

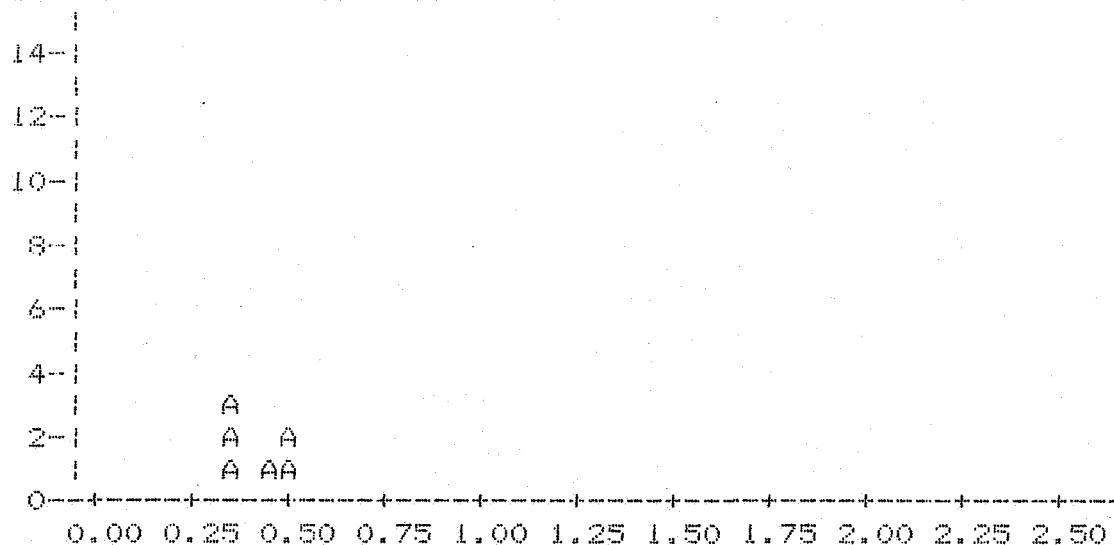


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.40 0.50 ALL 6 0.45 0.03
Y 0.60 0.65 ALL 2 0.61 0.01
OVERALL 8 0.49 0.07

ORDERED VALUES FOLLOW:

0.42A 0.43A 0.44A 0.47A 0.48A 0.49A 0.60A 0.61A

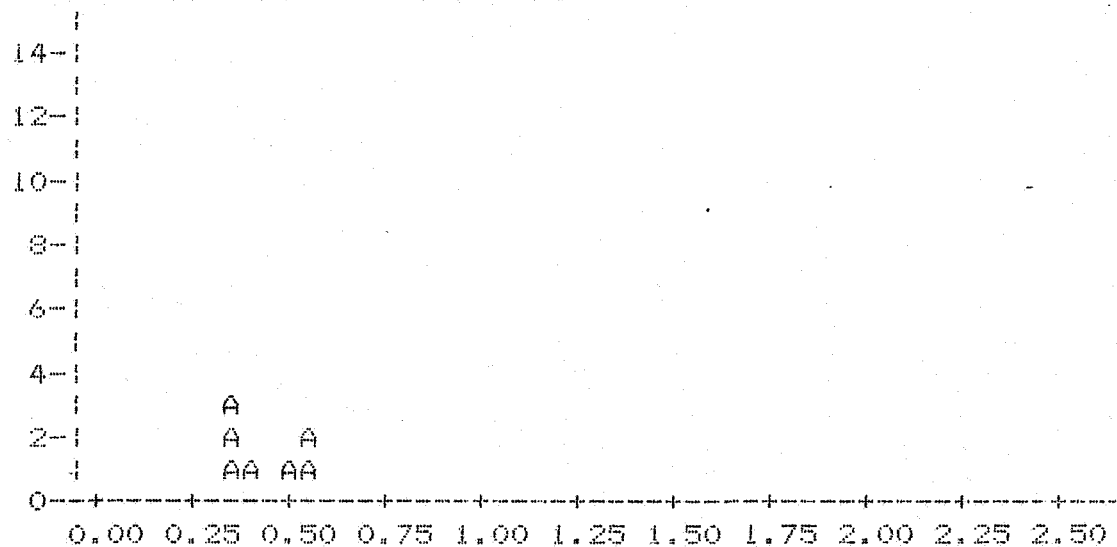
IKU# A 5864 2645.0M 6610/7-1



ORDERED VALUES FOLLOW:

0.38A 0.39A 0.39A 0.49A 0.50A 0.53A

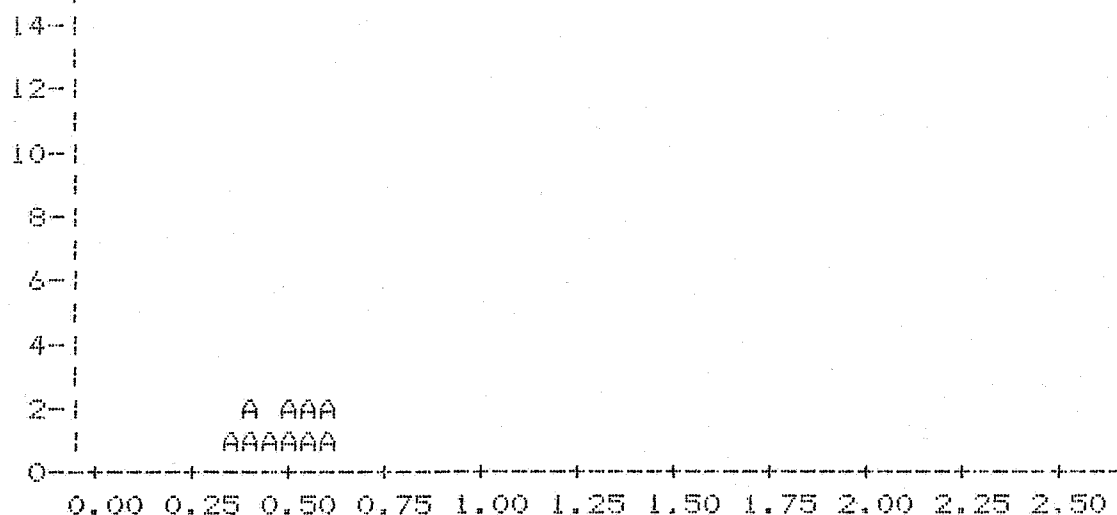
IKU# A 5866 2675.0M 6610/7-1



ORDERED VALUES FOLLOW:

0.35A 0.40A 0.40A 0.41A 0.51A 0.56A 0.57A

IKU# A 5869 2720.0M 6610/7-1

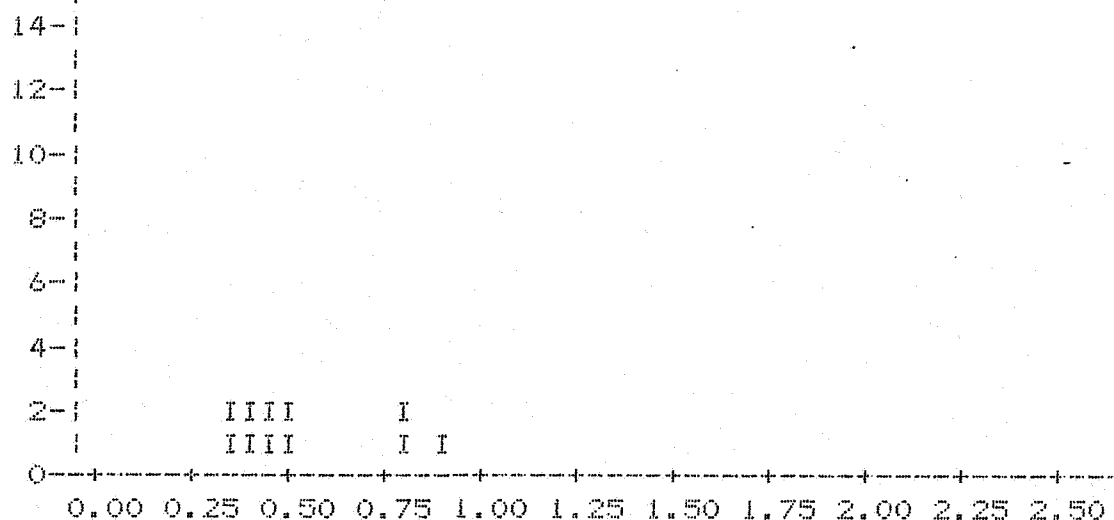


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.35 0.65 ALL 10 0.51 0.09
OVERALL 10 0.51 0.09

ORDERED VALUES FOLLOW:

0.36A 0.41A 0.43A 0.48A 0.51A 0.53A 0.55A 0.57A 0.63A 0.63A

IKU# A 6390 2915.0M 6610/7-1

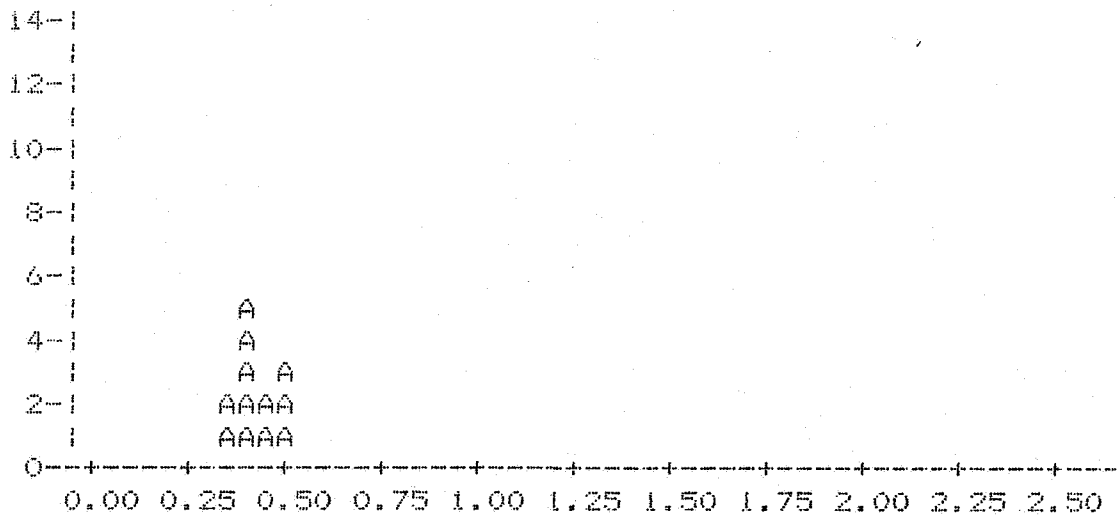


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.30 0.55 ALL 8 0.45 0.06
Y 0.80 0.96 ALL 3 0.88 0.06
OVERALL 11 0.57 0.21

ORDERED VALUES FOLLOW:

0.38I 0.40I 0.41I 0.42I 0.48I 0.49I 0.50I 0.54I 0.84I 0.84I 0.95I

IKU# A 6392 2945.0M 6610/7-1

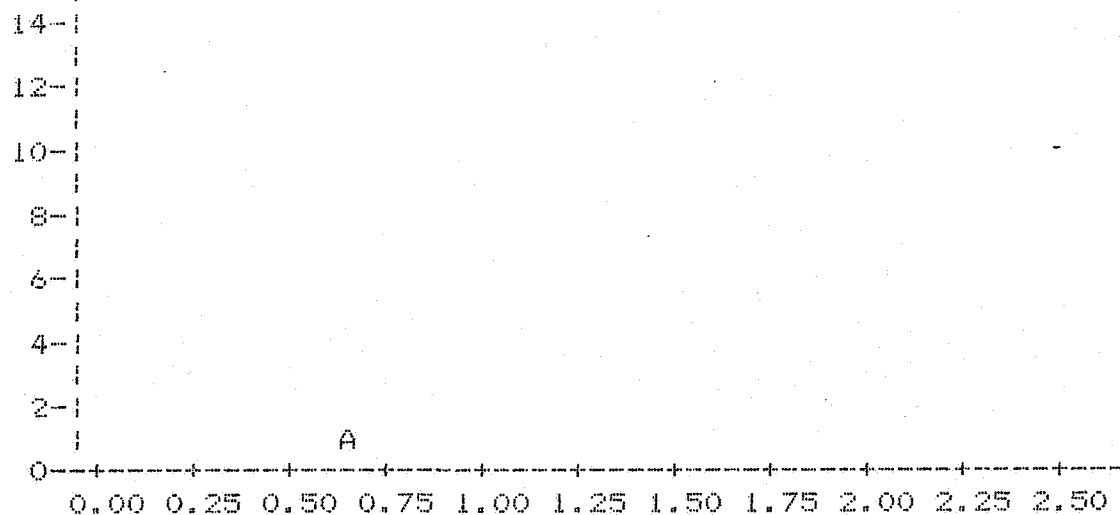


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.35 0.55 ALL 12 0.45 0.06
OVERALL 12 0.45 0.06

ORDERED VALUES FOLLOW:

0.35A 0.37A 0.41A 0.41A 0.42A 0.45A 0.45A 0.47A 0.48A 0.51A 0.52A 0.53A

IKU# A 6397 3020.0M 6610/7-1

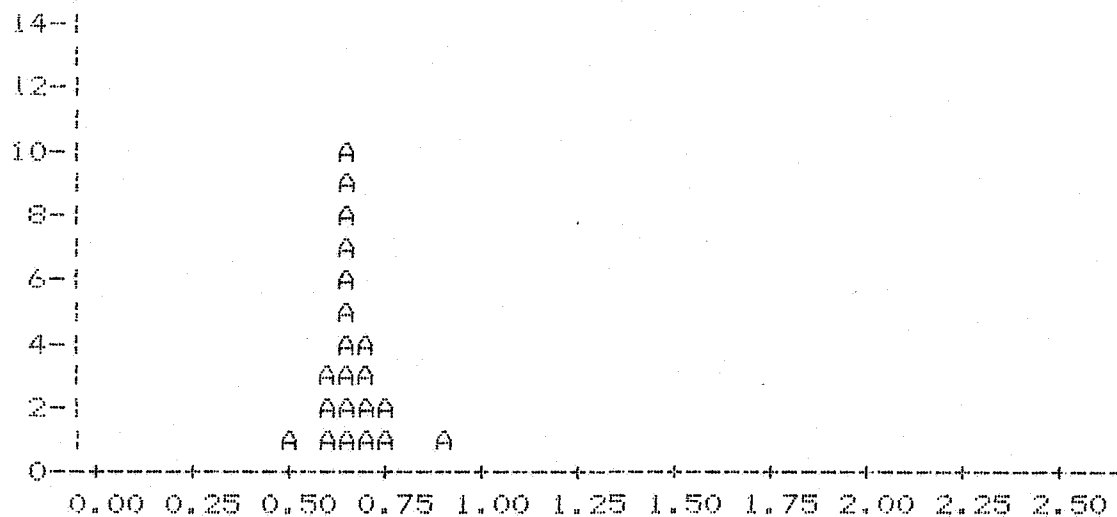


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.65 0.70 ALL 1 0.68 0.00
OVERALL 1 0.68 0.00

ORDERED VALUES FOLLOW:

0.68A

IKU# A 6399 3050.0M 6610/7-1

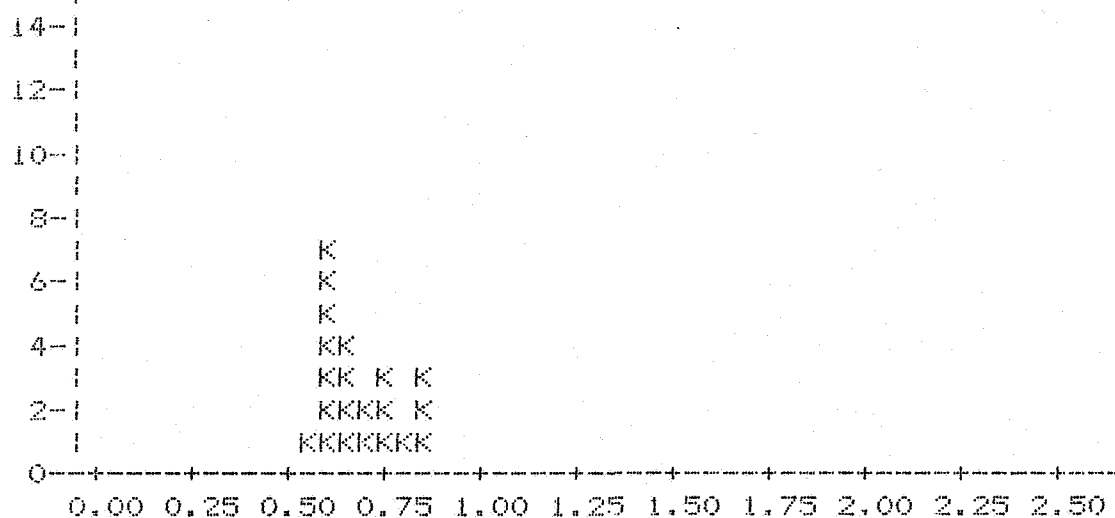


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.50 0.95 ALL 21 0.69 0.08
OVERALL 21 0.69 0.08

ORDERED VALUES FOLLOW:

0.51A 0.60A 0.62A 0.64A 0.66A 0.66A 0.67A 0.67A 0.68A 0.68A 0.68A 0.69A 0.70A
0.70A 0.72A 0.73A 0.73A 0.74A 0.76A 0.76A 0.92A

IKU# A 6407 3170.0M 6610/7-1

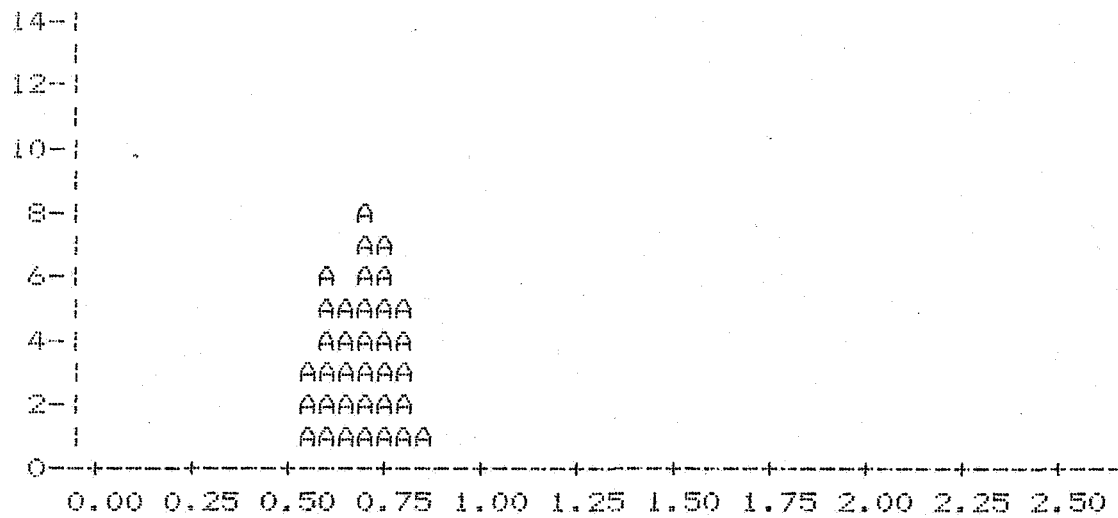


PP LOW HIGH LIT #VAL MEAN STDV
Y 0.57 0.91 ALL 21 0.71 0.10
OVERALL 21 0.71 0.10

ORDERED VALUES FOLLOW:

0.58K 0.60K 0.60K 0.61K 0.62K 0.62K 0.63K 0.65K 0.66K 0.69K 0.70K 0.70K 0.71K
0.75K 0.76K 0.77K 0.78K 0.84K 0.88K 0.89K 0.90K

IKU# A 6410 3215.0M 6610/7-1



PP LOW HIGH LIT #VAL MEAN STDV
Y 0.55 0.90 ALL 35 0.72 0.09
OVERALL 35 0.72 0.09

ORDERED VALUES FOLLOW:

0.56A 0.58A 0.59A 0.60A 0.60A 0.60A 0.61A 0.63A 0.64A 0.67A 0.67A 0.68A 0.69A
0.70A 0.71A 0.73A 0.74A 0.75A 0.75A 0.75A 0.75A 0.75A 0.76A 0.76A 0.79A 0.80A
0.80A 0.80A 0.80A 0.81A 0.81A 0.82A 0.83A 0.84A 0.88A