


STAVANGER PETROLEUMSTEKNISK FORSKNINGSSENTER

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ANALYSIS OF 6 DEASPHALTED ROCK EXTRACTS

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**ORGANISK
GEOKJEMI**

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Instrumental conditions

Gas chromatography

Gas chromatograph: HP 5710A (Hewlett Psekard, USA) with capillary column injector.

Injector: Splitless, temperature 250° C.

Oven temperature program: 150 - 320° (delay 16 min.) with 6°/min.

Carrier gas: ca. 2 ml He/min.

GC/MS interface temperature: 250° C.

Mass spectrometry

MS: VG 7250HS (VG Analytical, England)

Ion energy: 70 eV

Source temperature: 200° C

See Table 1 for more MS information.

The mass spectrometer was operated in the selected ion recording mode with a dwell time of 80 ms on each channel and an interchannel delay of 20 ms.

Perfluoro kerosene (PFK) was used as calibration reference compound.

Table 1

Sampling 210.

* SYSTEM:BIOMARKER		Parameters for Selective Ion Recording [G# 1]				(Sector)
IAY	Maximum volts	4000	GTM Time(h:mm:ss) 0:00:05 to 1:00:00			Mode EI+
IMR	Maximum mass at IAY	870	CHN	M(amu)	S(ms)	D(ms)
SMP	#Samples	1	A	259.2418	80	20
GRP	#Groups	1	B	253.1950	80	20
DAT	Data filename	B:EXTRACT	C	231.2112	80	20
REF	Reference filename	PFK	D	231.1170	80	20
INS	Instrument type	7250HS	E	218.2028	80	20
ACN	Customer account	STATOIL	F	217.1956	80	20
RES	Instrument resolution	2500	G	211.1482	80	20
INJ	#Injections	1	H	205.1950	80	20
CLS	#Calibration scans	4	I	191.1794	80	20
CST	Cal. scan time (s)	20	J	180.9888	80	20
CTL	Cal. tolerance (ppm)	200	K	177.1638	80	20
CEX	Cal. examination	Y	Pw(h:mm:ss) 0:00:00 00:00 0:00			ZA 0.0 dA 0
INT	Internal standards	N	Std.cn(µg/mL) 0.000000 .gr 0 .ch 0			Rf 0.0
PEX	Peak examination	Y				
TOP	Peak top or profile	T				
Sample# 1: EXTRACTS FROM SAMPLE 600 SAMPLES						
'H=hardcopy RETURN=next ESC=prev CTRL/A=abort 'G=go 'Q=quit 'C=create 'DEL=delete 'O=overwrite 'Z=zero <group,sample>						

- A Diasteranes (rearranged steranes)
- B Monoaromatic steranes (ring C)
- C Nuclear methylated steranes (ring A/B)
- D Triaromatic steranes
- E 14 α (H) steranes
- F Regular steranes
- G Monoaromatic steranes (ring A/B)
- H Methylated hopanes (ring A/B)
- I Hopanes (mainly hopanes)
- J (Reference mass from Perfluorodecane (PFK))
- K Demethylated hopanes (ring A/B)

Results

Six samples of rock extracts of unknown origin were analysed according to the method described by Bjorøy et al. (1981). Table 1 shows the ions of interest for this work, and Figures 1 - 6 show the most important ion chromatograms.

Peak identifications were made in accordance with Meyer et al. (1984, and references therein), Volkman et al. (1983a, b), Pym et al. (1975), Ekweozor & Strausz (1981), Aquino Neto et al. (1981).

Based on the peak intensities and respective peak heights the triterpane ratios described in Cornford et al. were calculated and Tabulated in Table 2.

Table 2. Biomarker ratios.

Sample	a	b	c	d	e	f
S27	41%	1.5	15%	9%	59%	61%
S28	30	2.4	28	12	57	56
S29	8	11.1	2	27	52	53
S30	28	2.5	24	7	54	52
S31	35	1.9	48	9	60	60
S32	28	2.6	34	13	59	55

a, $T_S/(T_M + T_S)$, © $T_t \# 1$, 29 - 100

b, T_M/T_S *See foot.*

c, $C_{28}/C_{27} - 29$ hopane, © $+T_t \# 4$, 0.1 - 46

d, normoretane/(normoretane + norhopane), © $T_t \# 5, 01 - 21$

e, $C_{31} - 34 S/(S + R)$ average value

f, $C_{31} S/(S + R)$, © $T_t \# 8$, 55 - 73

© = Cornford et al. notation, Cornford et al. range for North Sea samples.

The first striking feature of the present samples is that the content of terpanes appear to be much higher than the content of steranes. Secondly, some of the samples (S27, S28, S30, S31) contain series of tri- and tetracyclic terpanes of which the tricyclic ones are pointed out as being indicative of high maturity (Seifert and Moldowan, 1978; Seifert 1978). They are also believed to survive degradation (Seifert 1978; Philp, 1983).

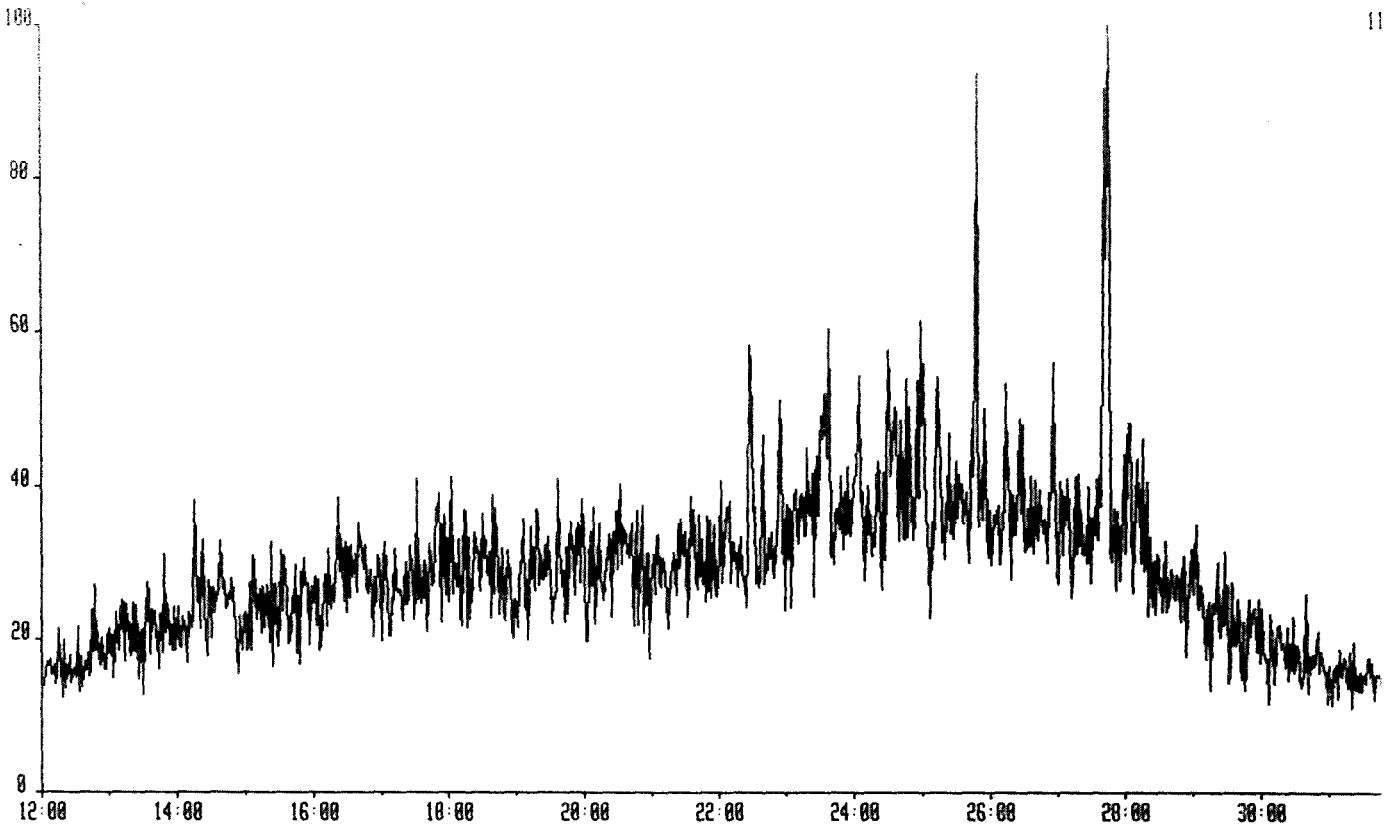
References

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- W.K. Seifert and J.M. Moldowan: *Geochim. Cosmochim. Acta*, 42 (1978) 77.
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Fig. 1A

S27111 259.2418 G1 11 S1

11



S27111 217.1956 G1 11 S1

128

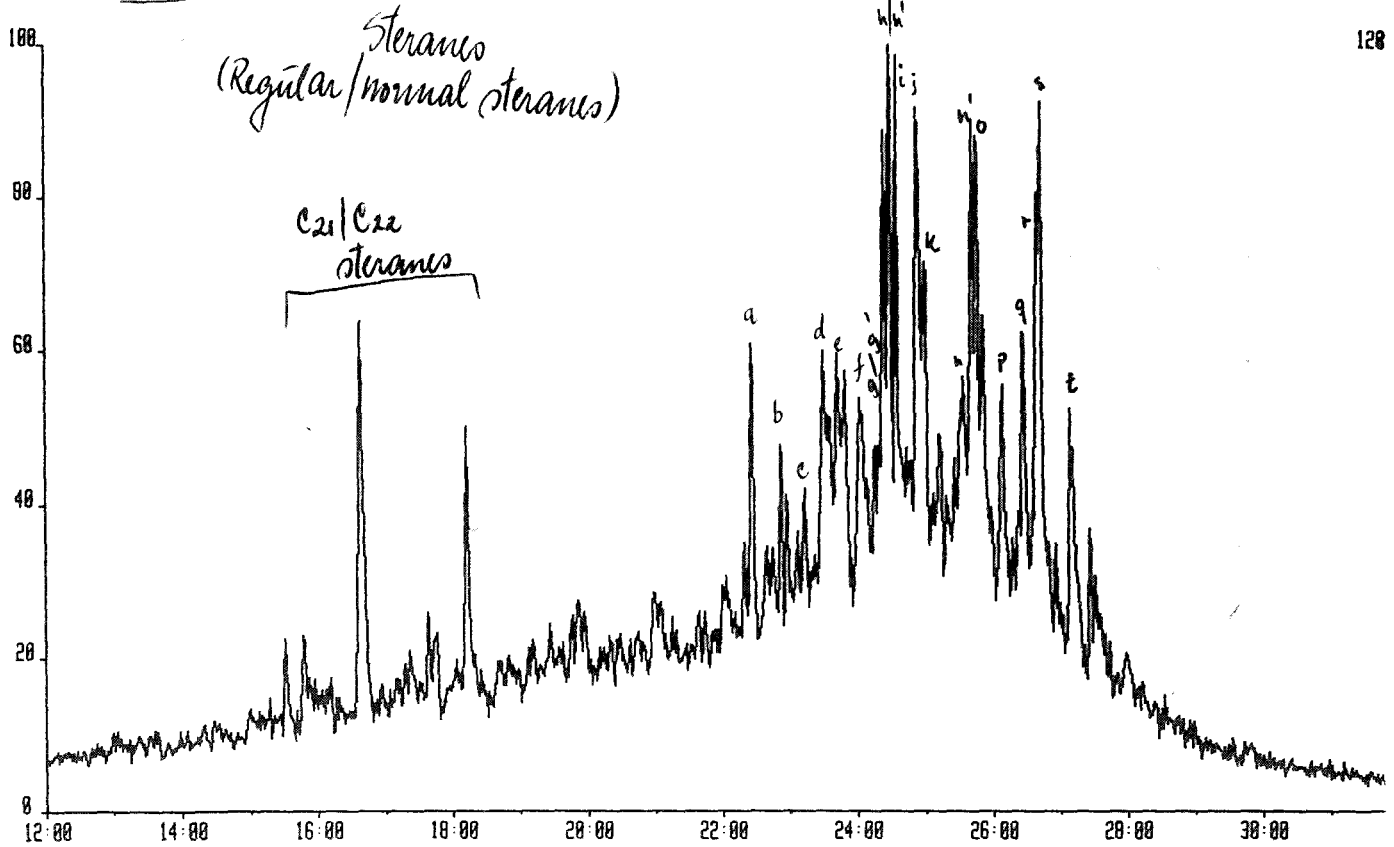
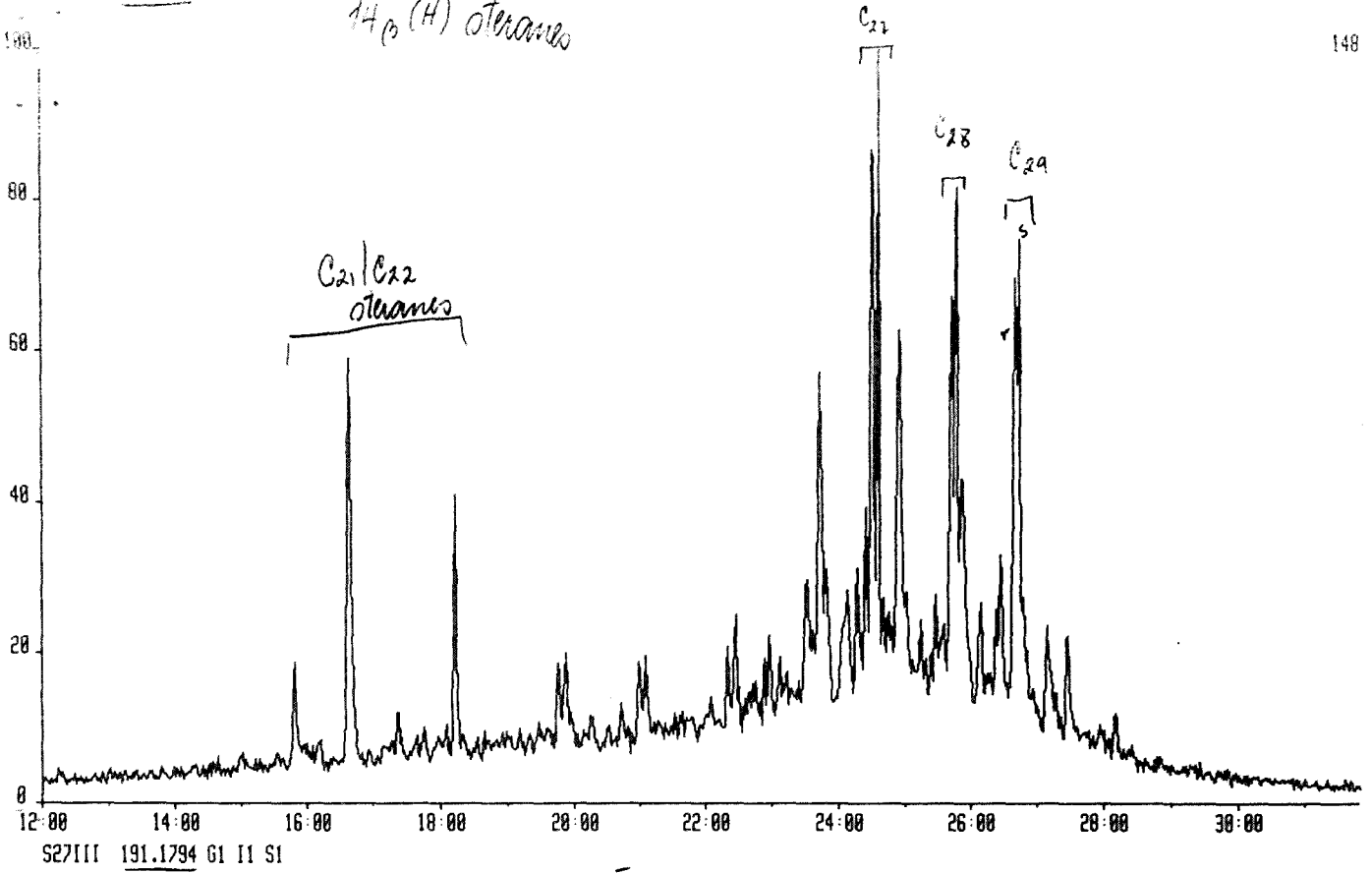


Fig. 1b

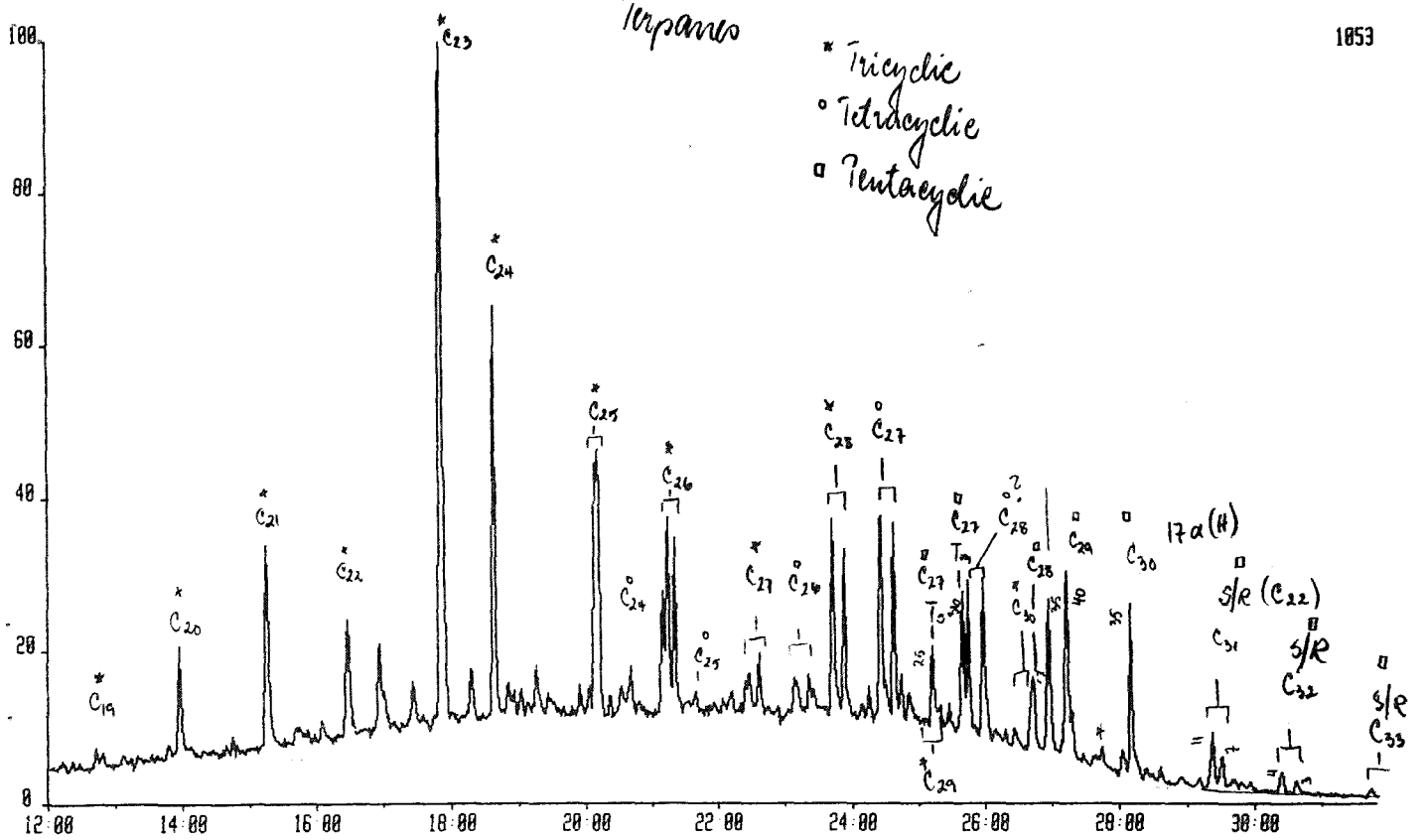
927111 119.2029 G1 11 S1

14₀ (H) steranes

148



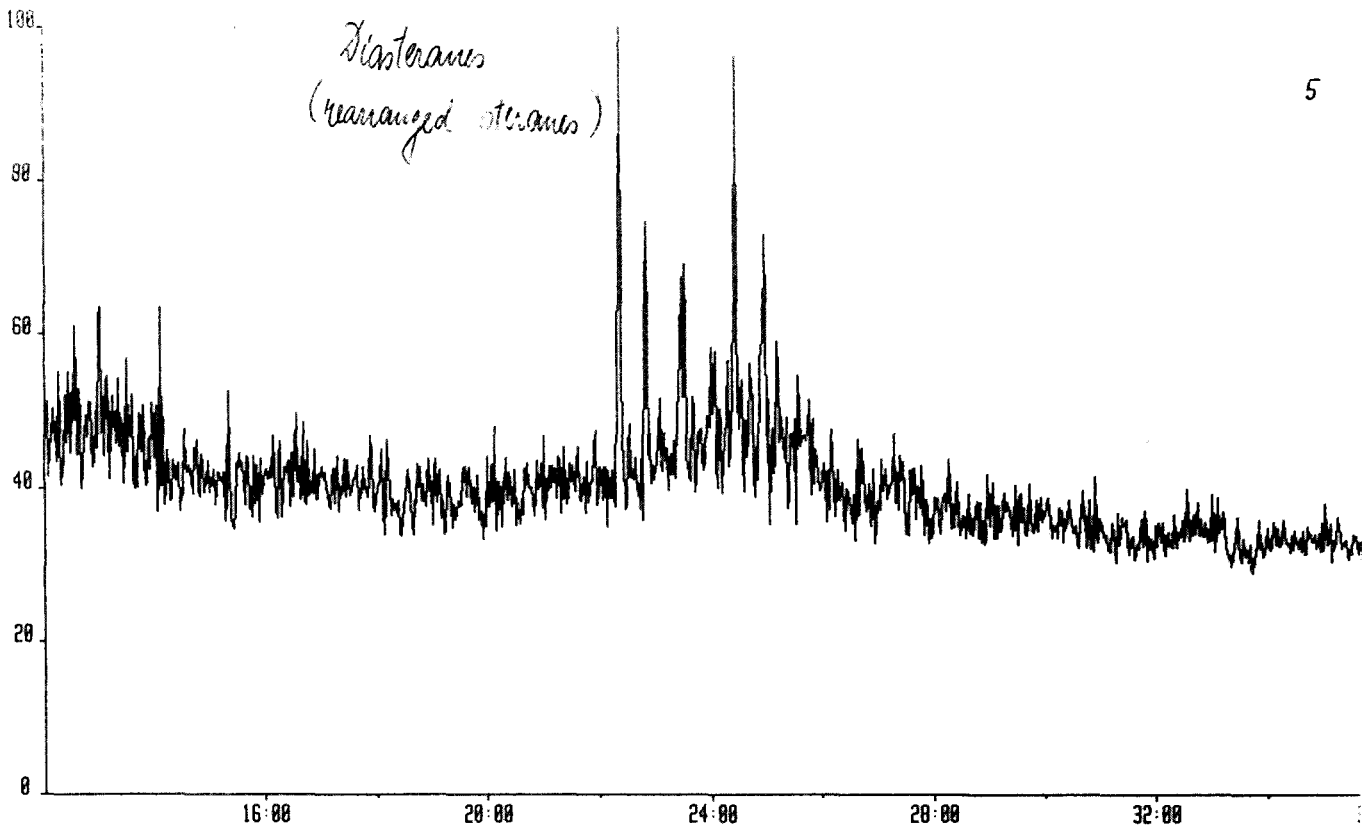
S27111 191.1794 G1 11 S1



1053

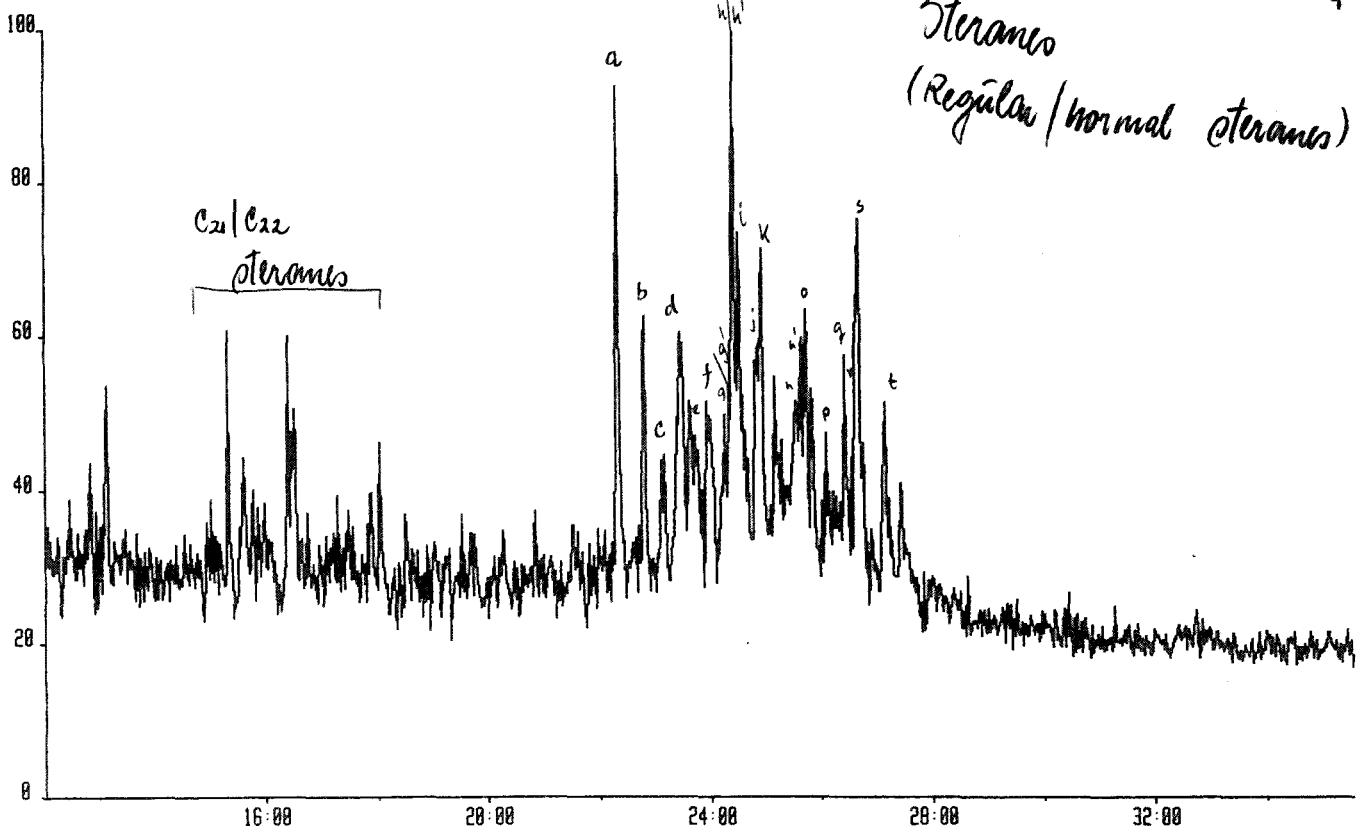
Fig. 2A

S28V1 253.2419 01 11 01



5

S28V1 217.1956 01 11 51



9

Fig. 2b

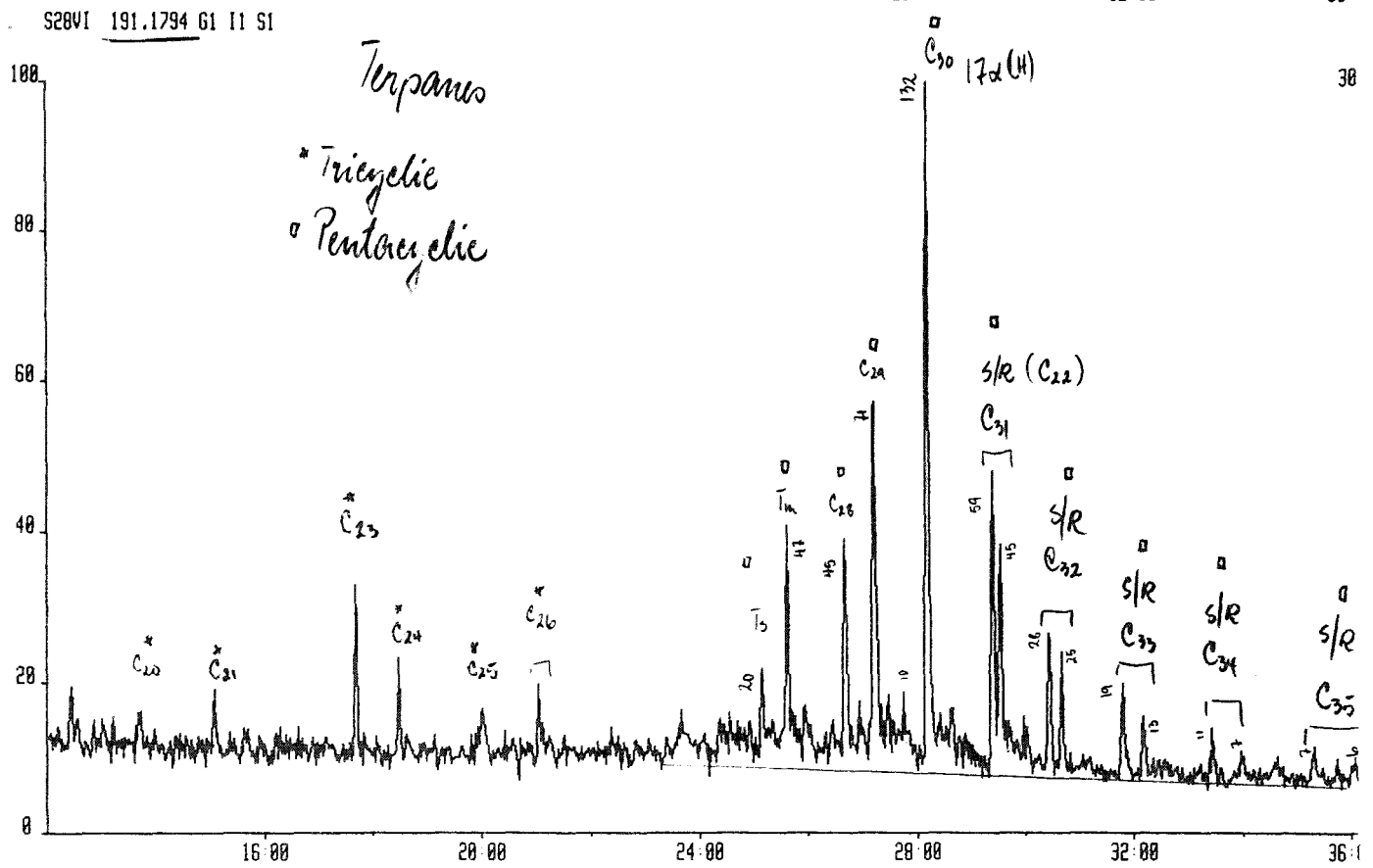
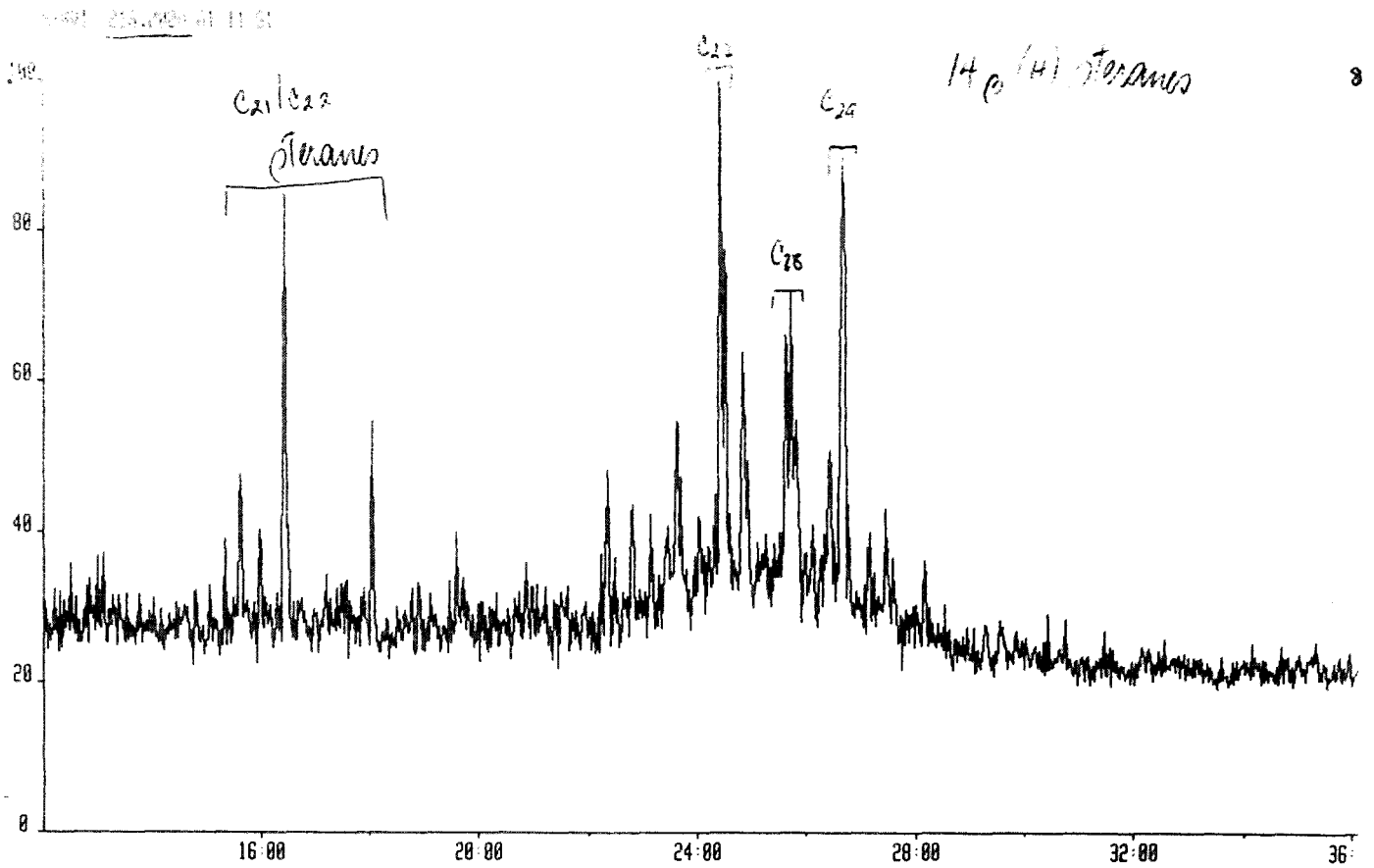


Fig. 3A

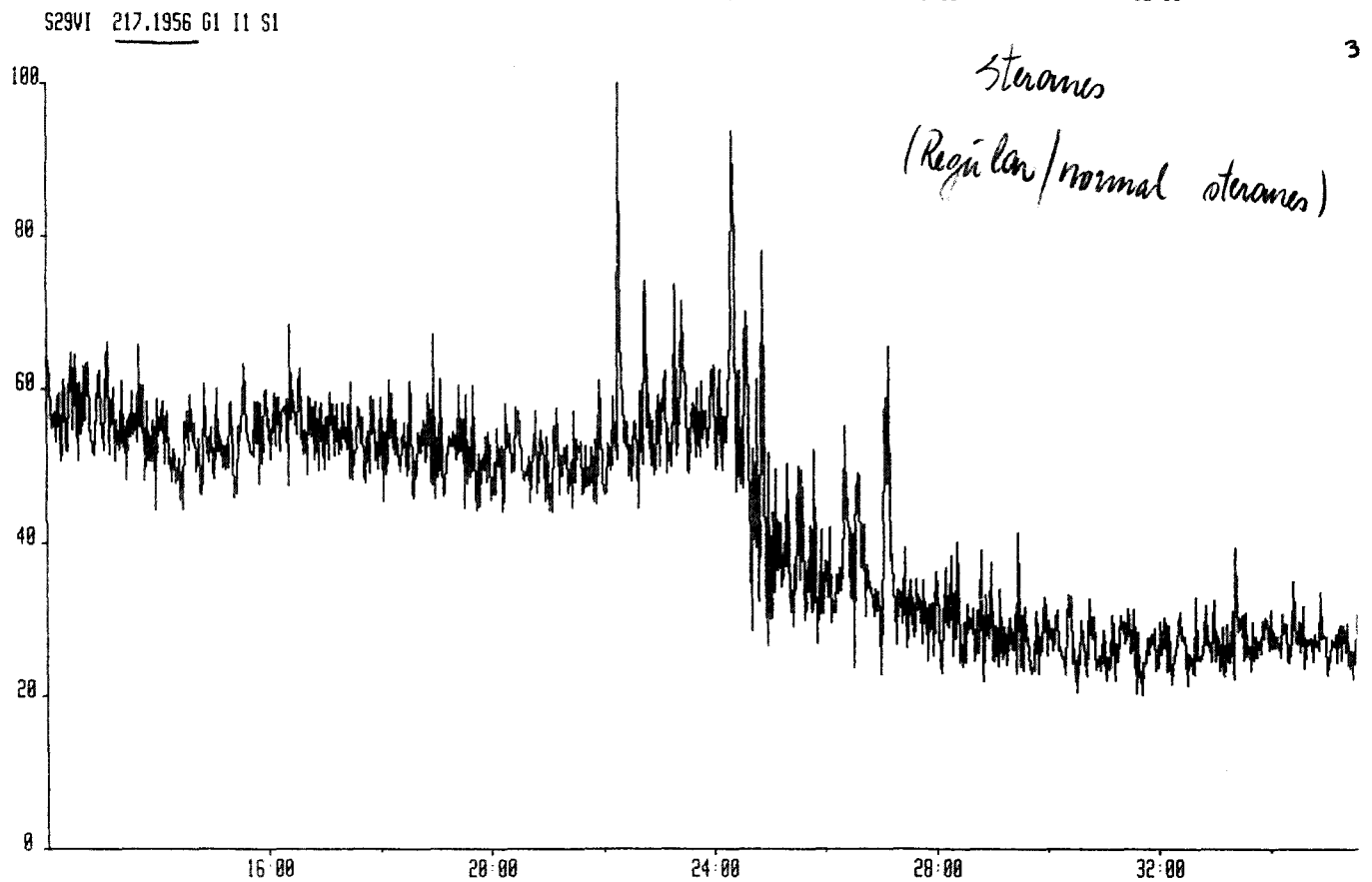
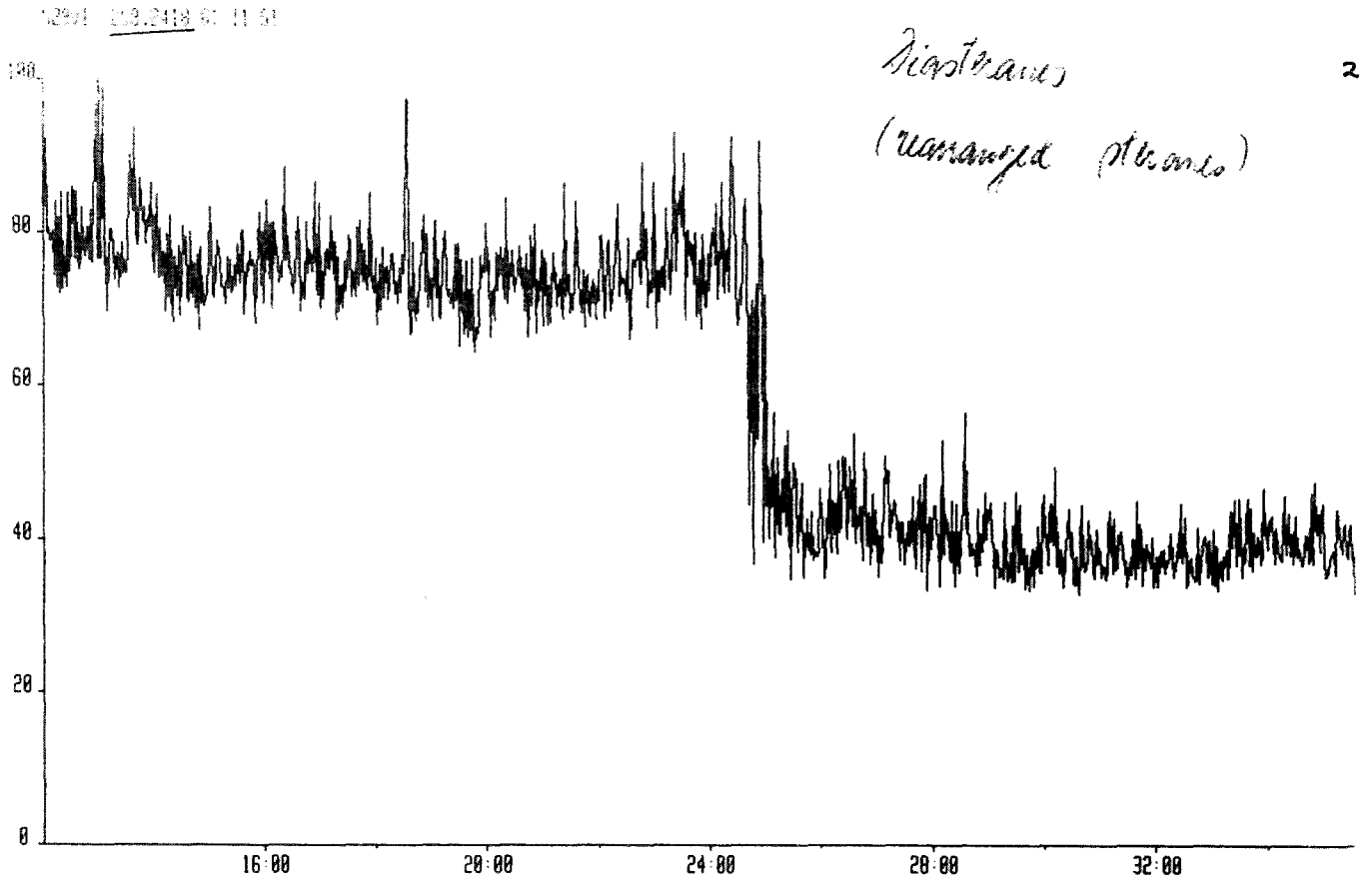
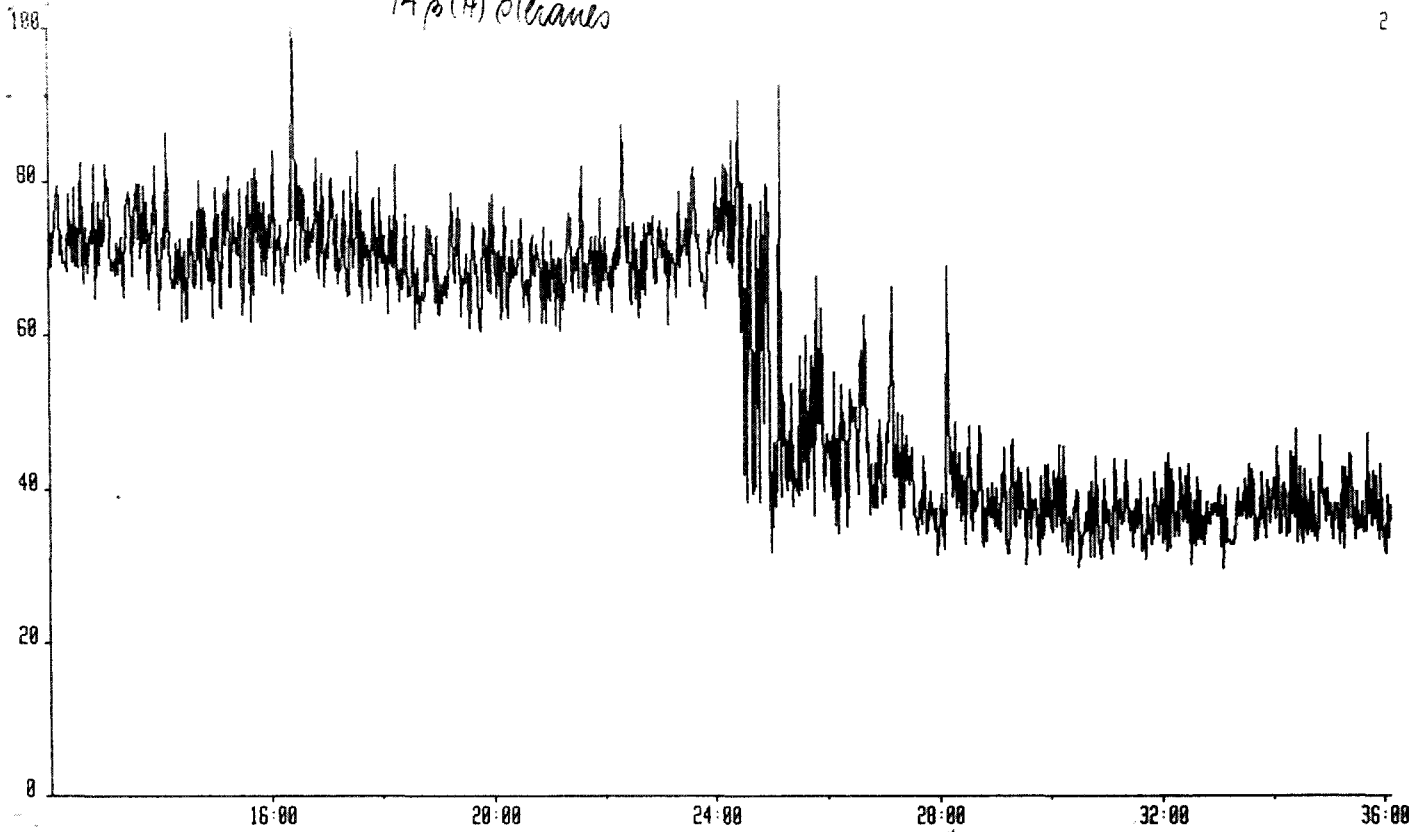


Fig. 3b

S29VI 218.3828 G1 I1 S1

14 α (H) steranes

2



S29VI 191.1794 G1 I1 S1

17 α (H)

22

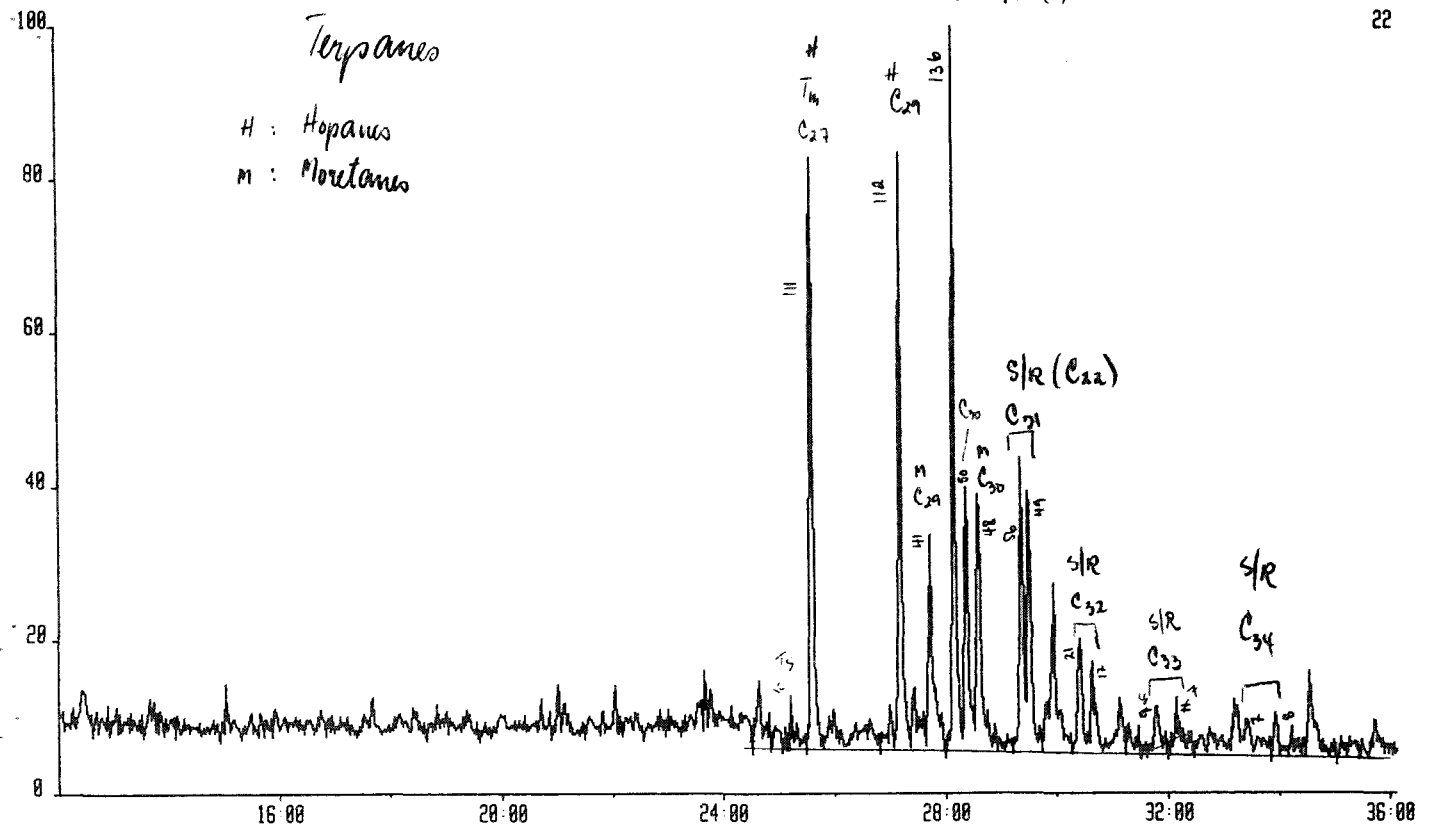


Fig. 4A

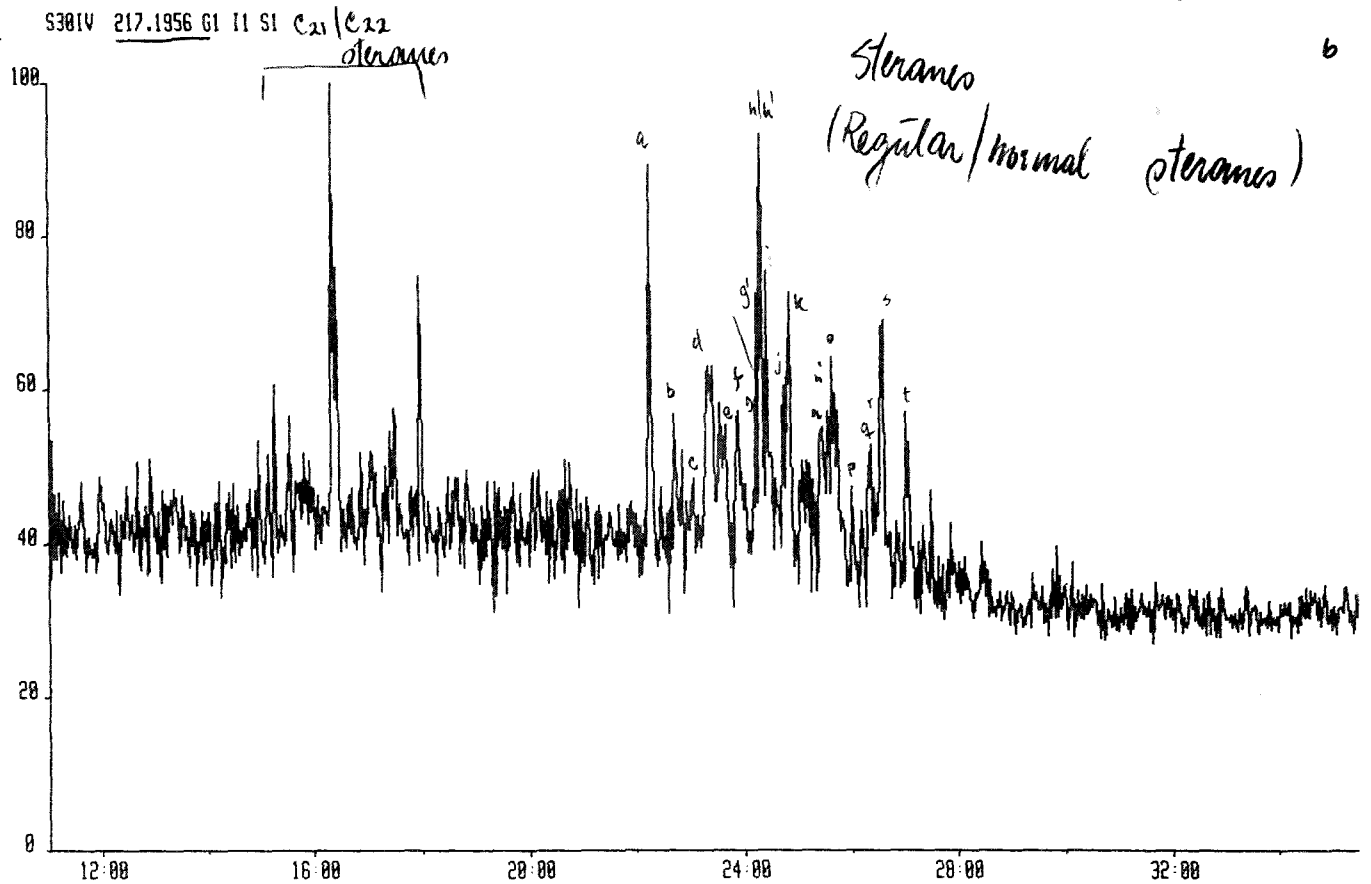
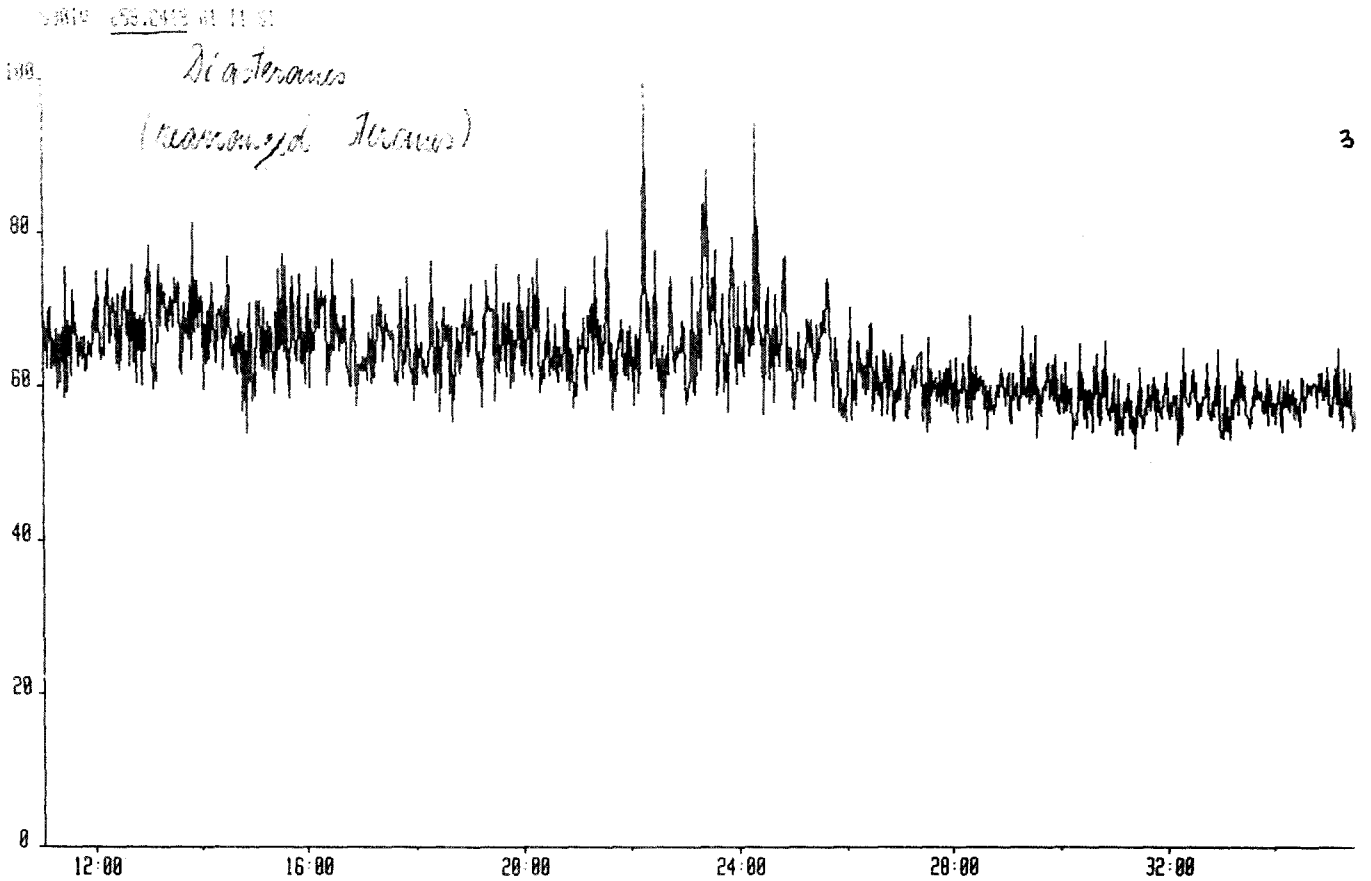


Fig. 4a

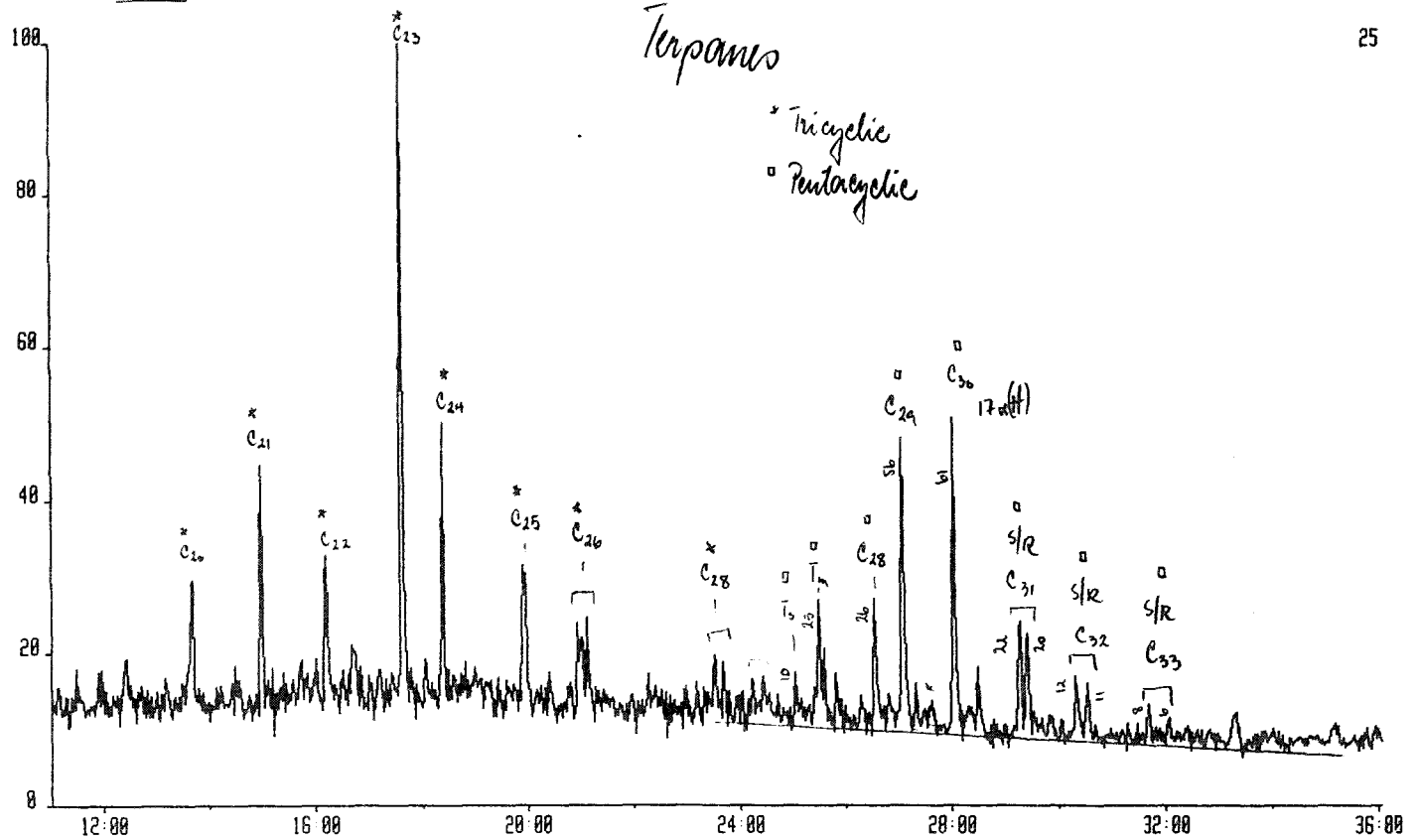
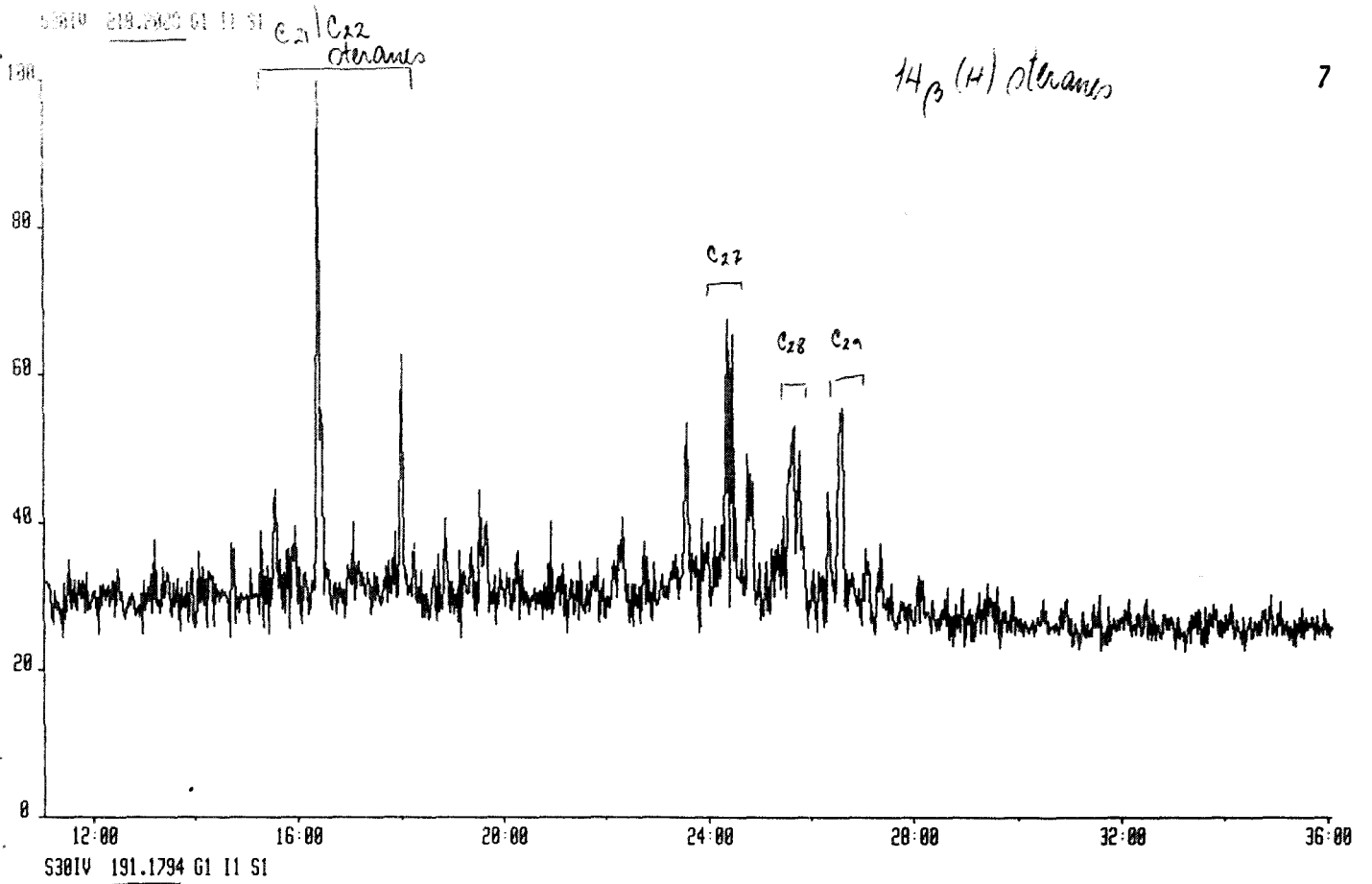
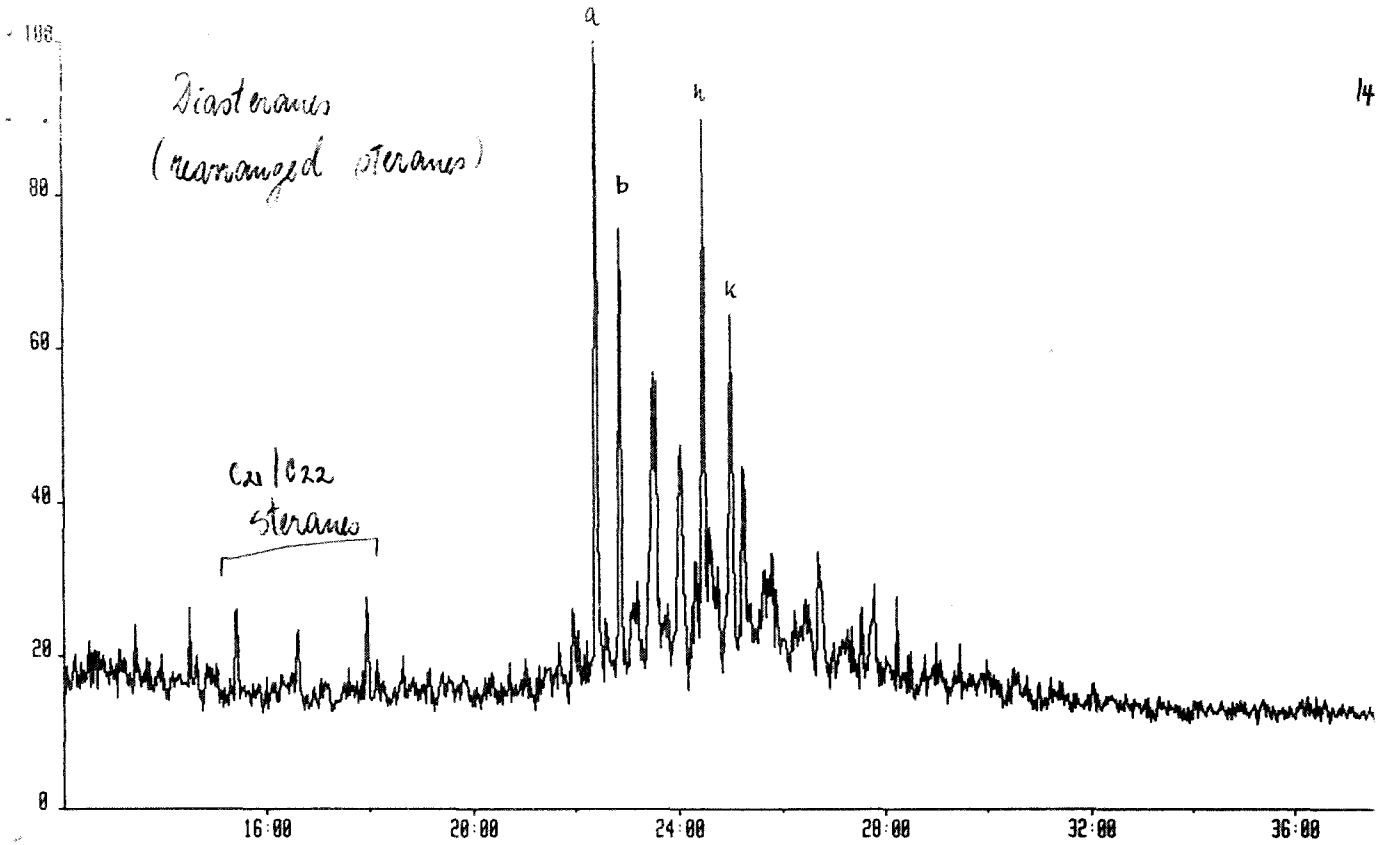


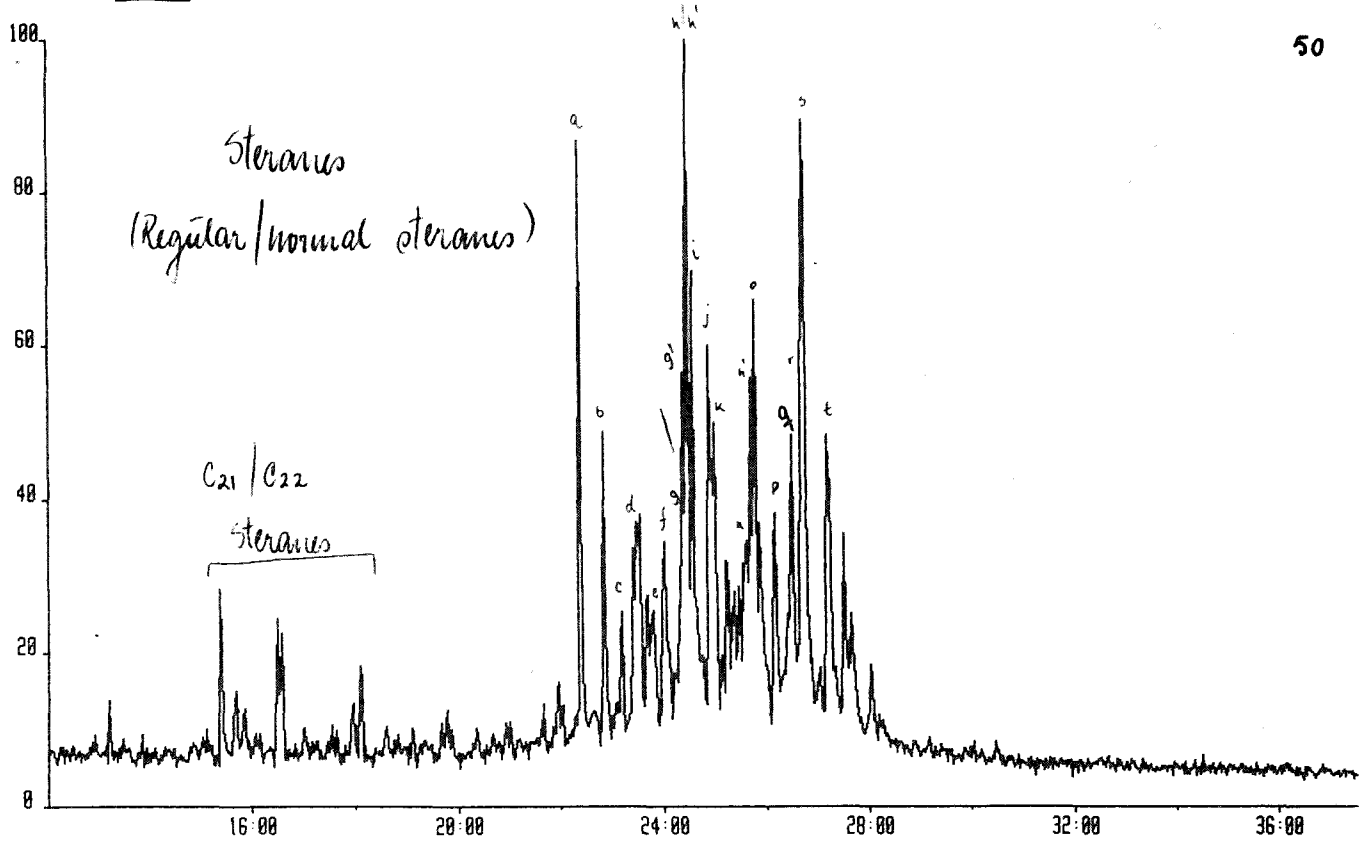
Fig. 5A

S311V 259.2419 01 11 51



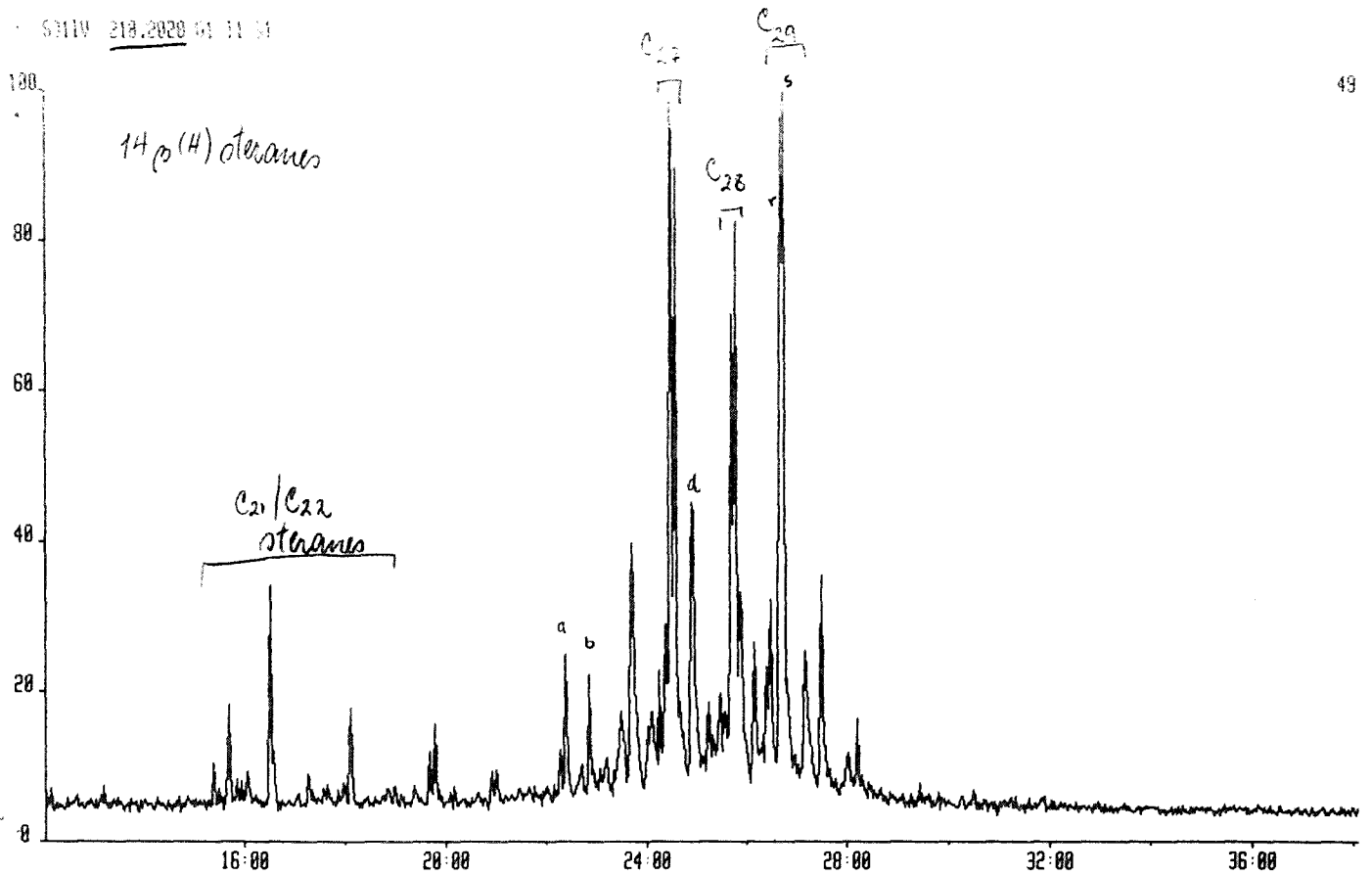
14

S311V 217.1956 01 11 51

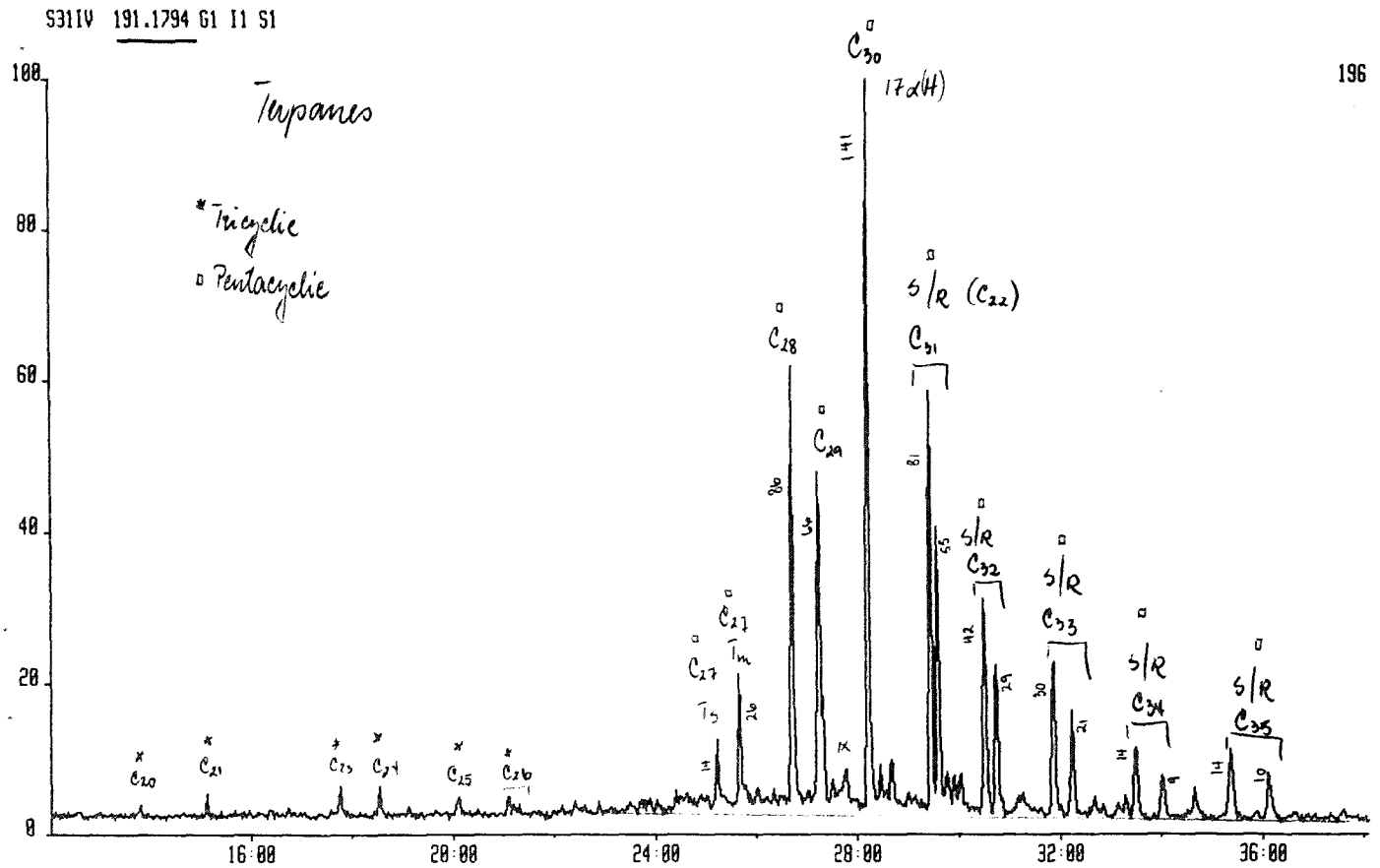


50

Fig. 5B



49



196

Fig. 6A

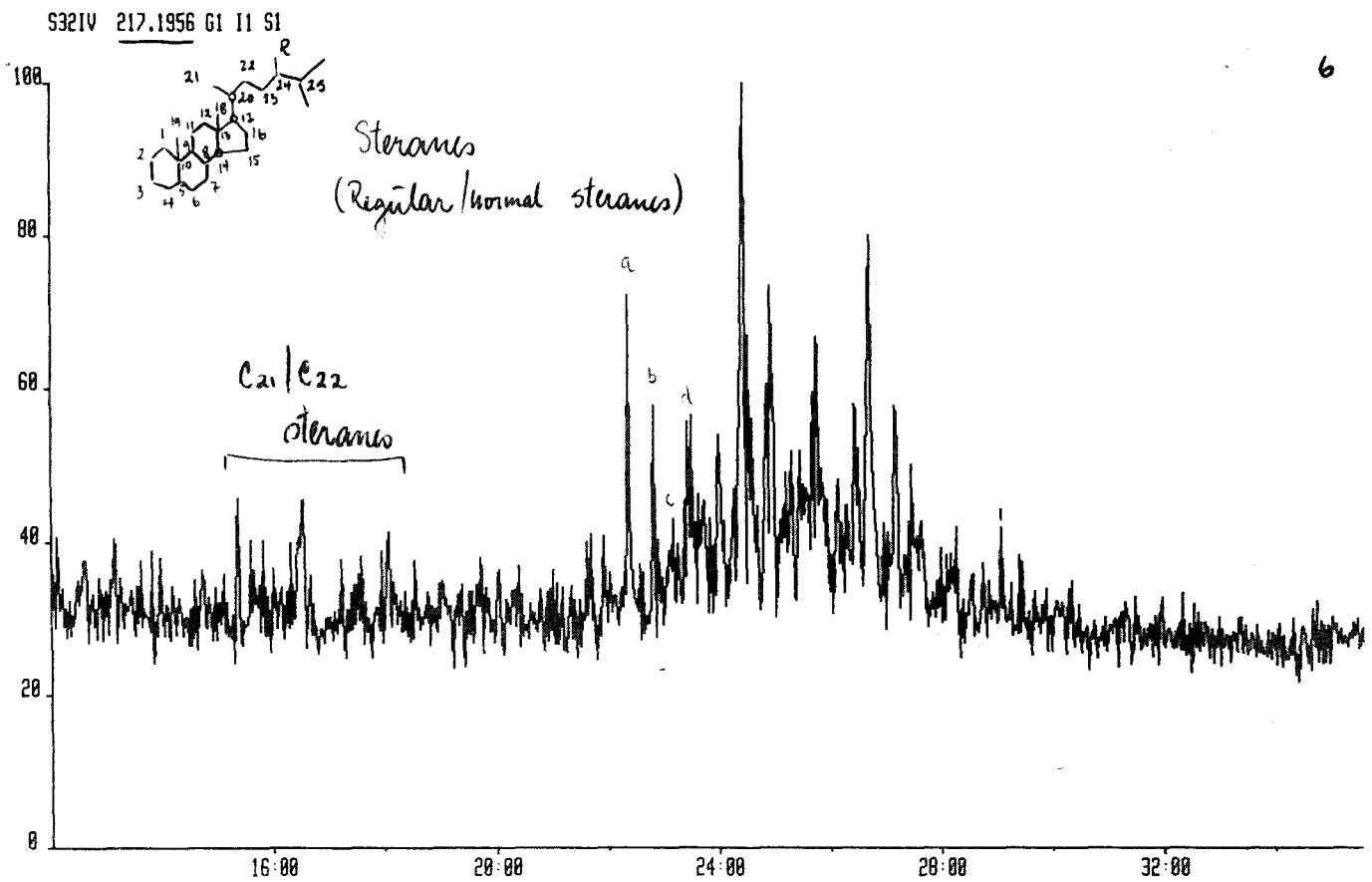
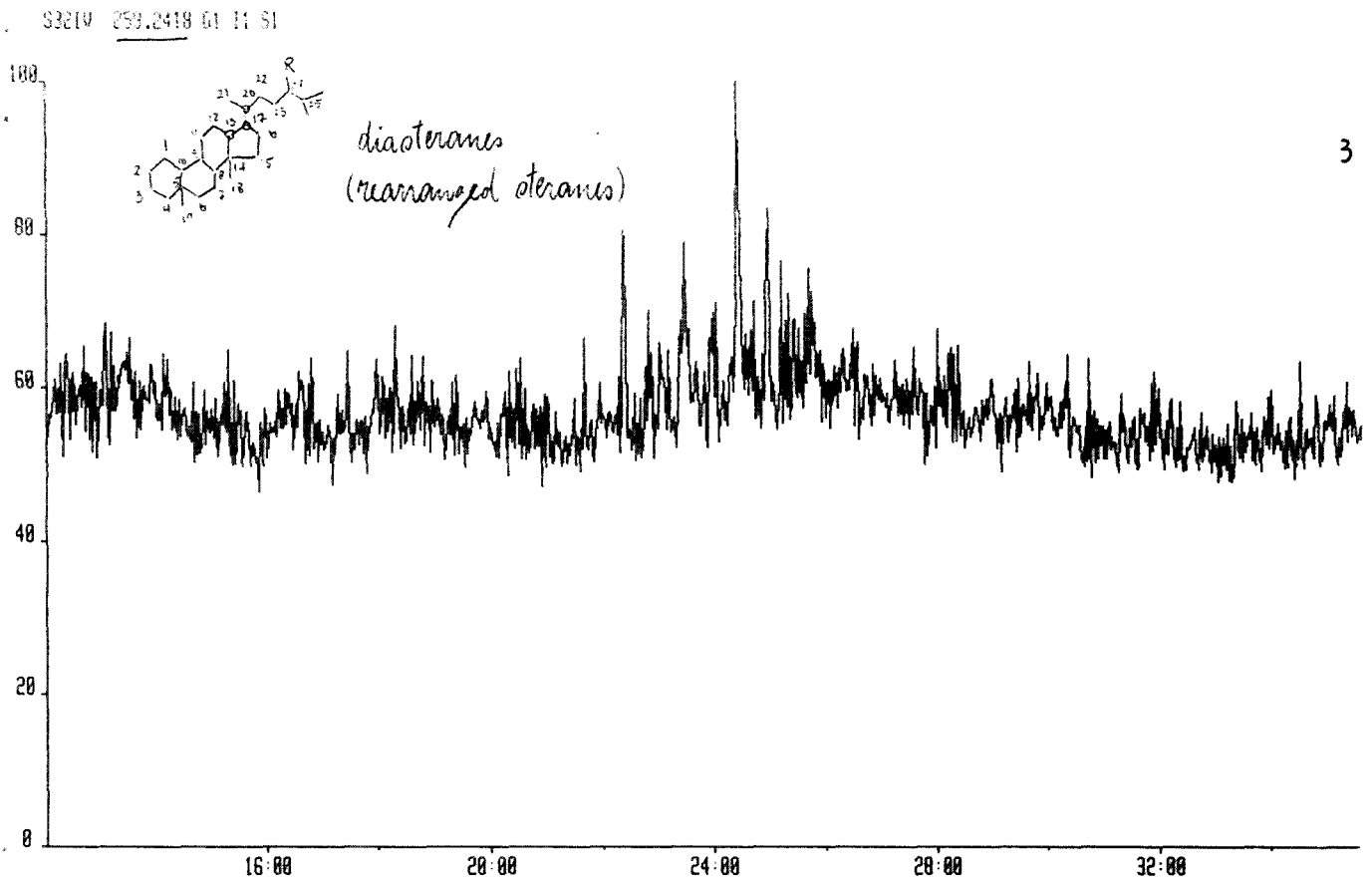


Fig. 6B

