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ANALYSIS OF 6 DEASPHALTED ROCK EXTRACTS

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**ORGANISK  
GEOKJEMI**

## ANALYSIS OF 6 DEASPHALTED ROCK EXTRACTS

### 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 table*

* SYSTEM:BIOMARKER		Parameters for Selective Ion Recording [G# 1]			(Sector)		
IAV	Maximum volts	4000	GTM Time(h:mm:ss) 0:00:05 to 1:00:00			Mode EI+	
IMR	Maximum mass at IAV	870	CHN	M(amu)	S(ms)	D(ms)	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: <b>EXTRACTS FROM SOURCE AND SAMPLE</b>							
'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 14β(H) steranes
- F Regular steranes
- G Monoaromatic steranes (ring A/B)
- H Methylated hopanes (ring A/B)
- I Terpanes (mainly hopanes)
- J (Reference mass from Perfluorokerosene (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), ©  $T_t \# 5$ , 0.1 - 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.

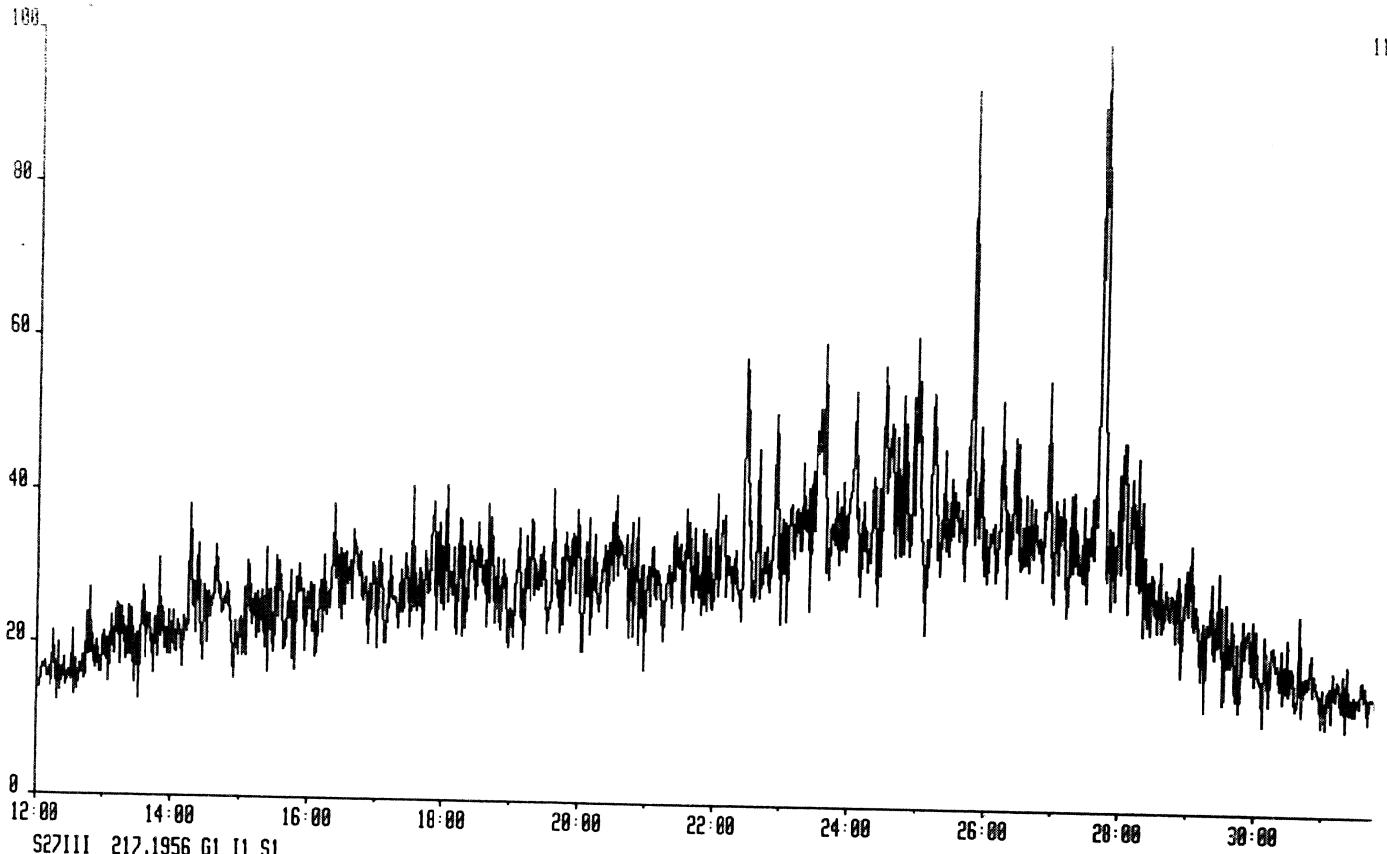
The first striking feature of the present samples is that the content of terpanes appear to be much higher than the content of steranes. Secondly, some of the samples (S27, S28, S30, S31) contain series of tri- and tetracyclic terpanes of which the tricyclic ones are pointed out as being indicative of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

#### References

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- J.K. Volkmann, R. Alexander, R.I. Kagi, J. Rullkötter: *Geochim. Cosmochim. Acta*, 47 (1983) 1033.

Fig. 1A

S27111 259.2419 G1 I1 S1



S27111 217.1956 G1 I1 S1

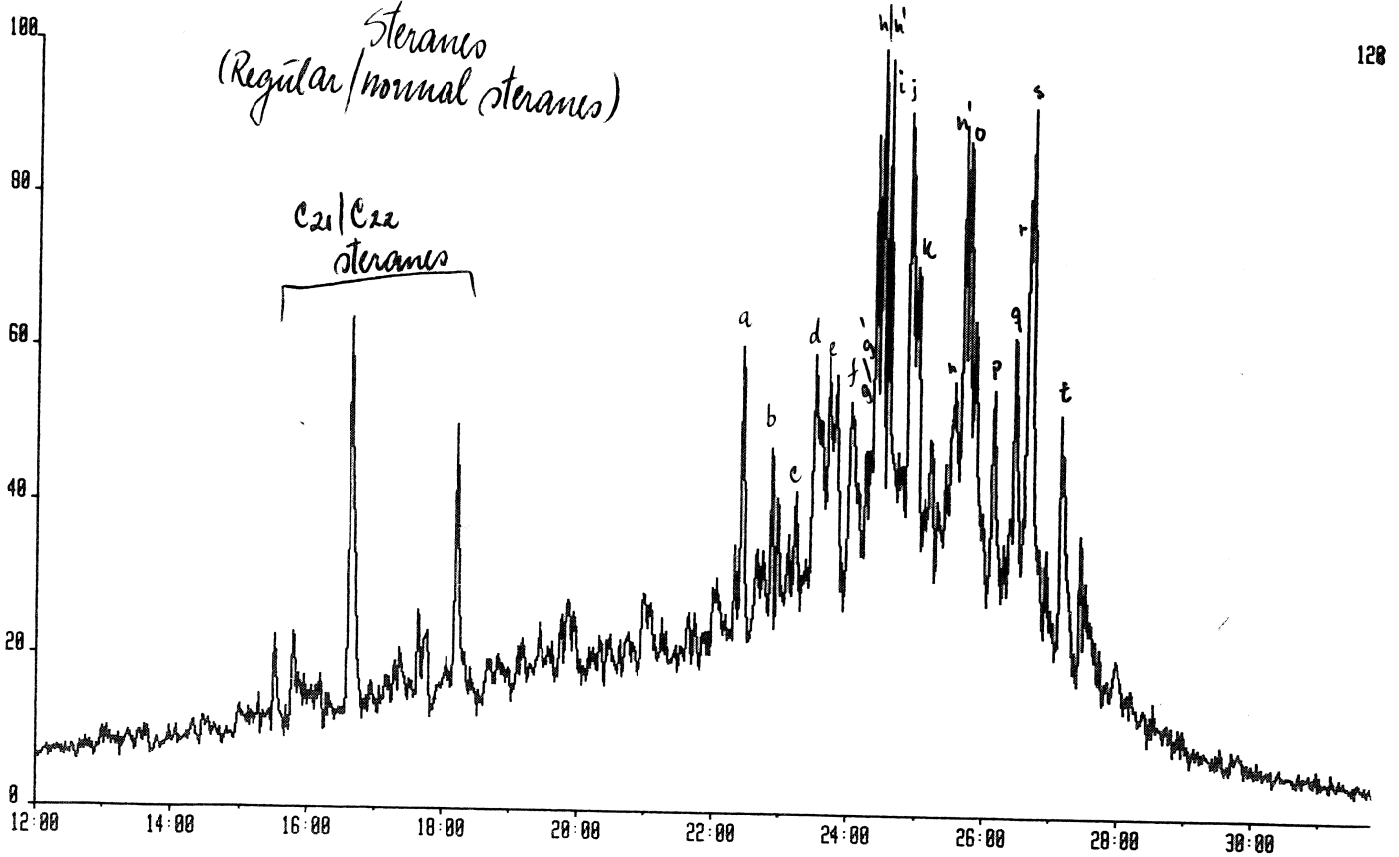


Fig. 1B

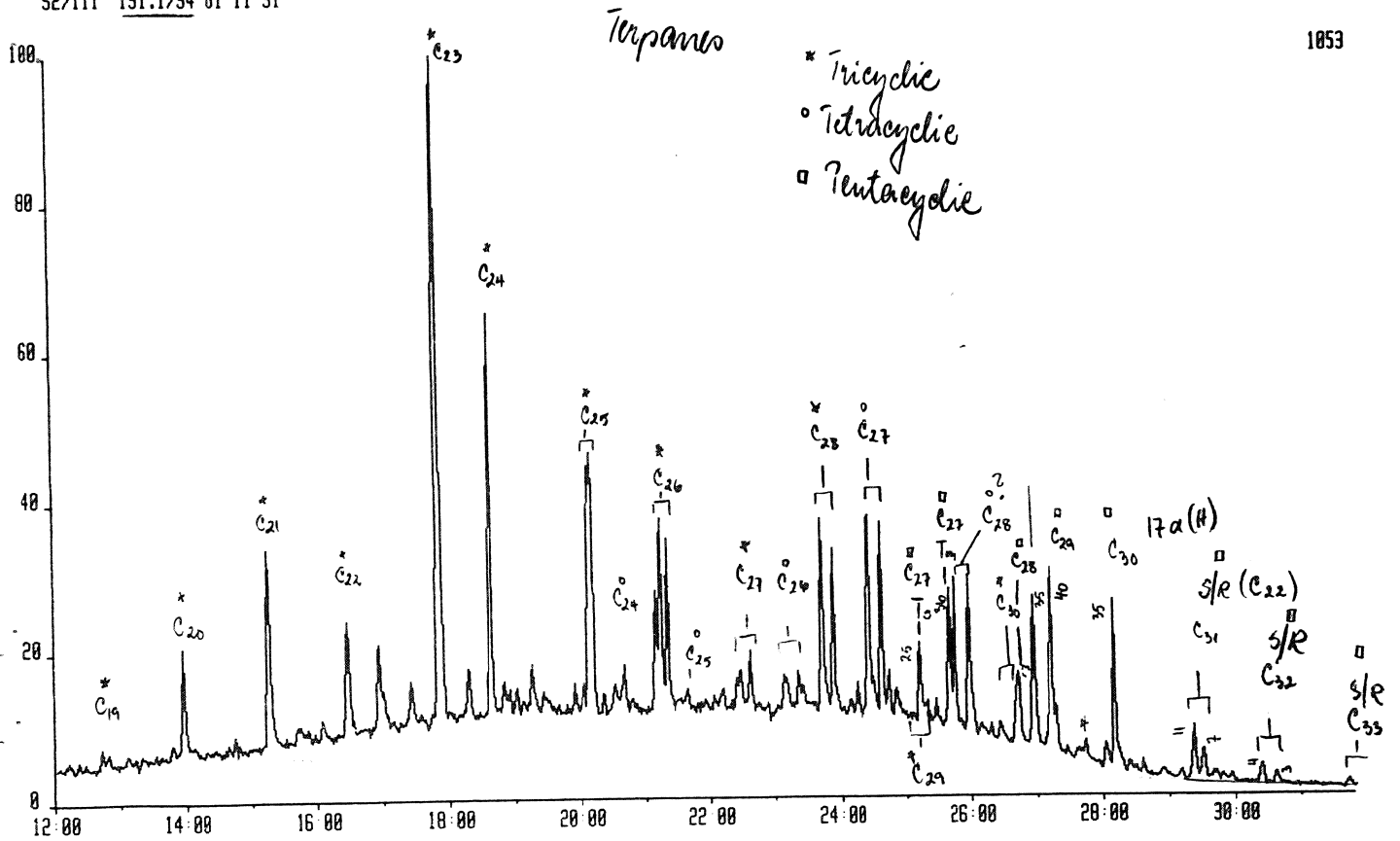
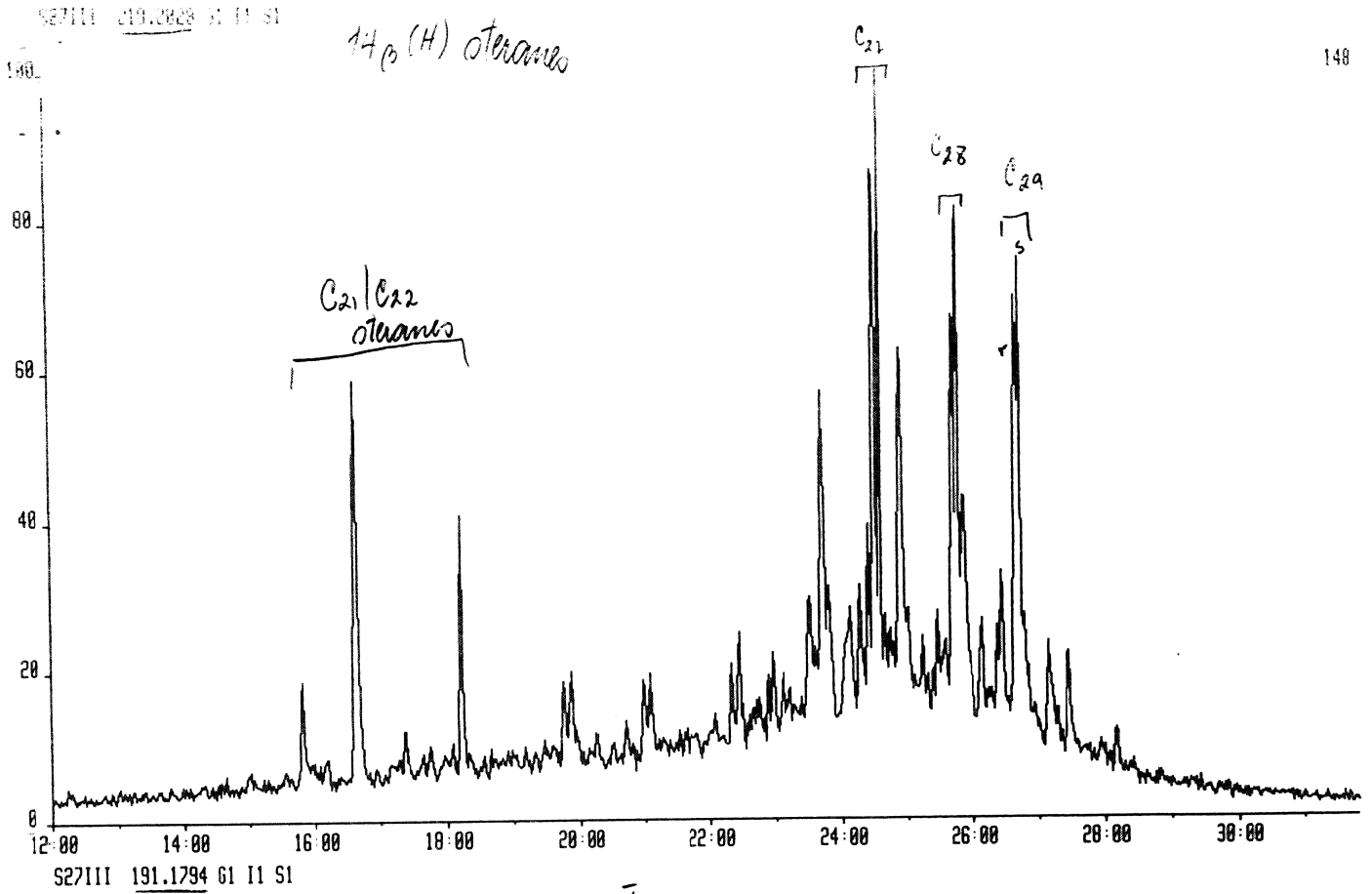
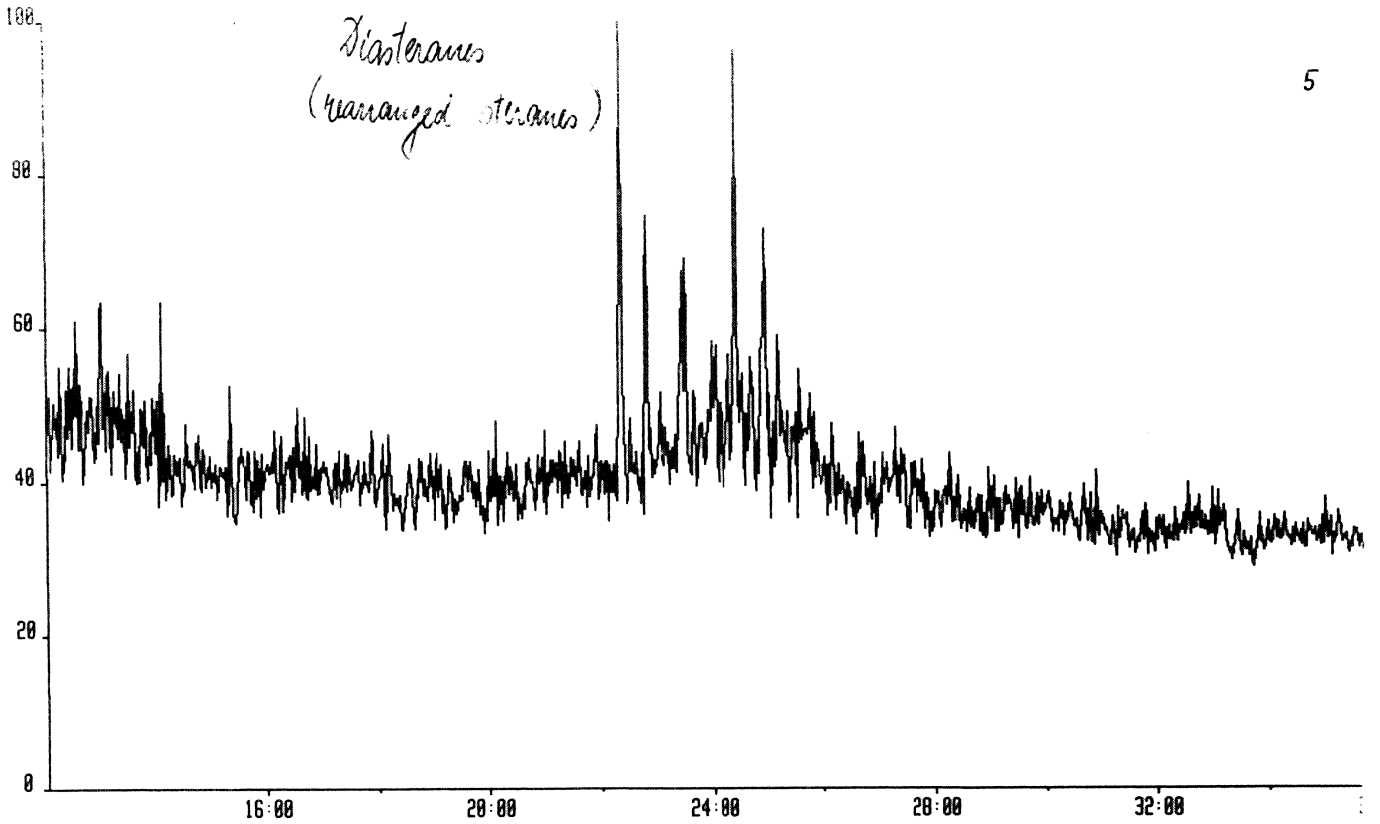


Fig. 2A

S28V1 259.2419 01 11 01



S28V1 217.1956 01 11 01

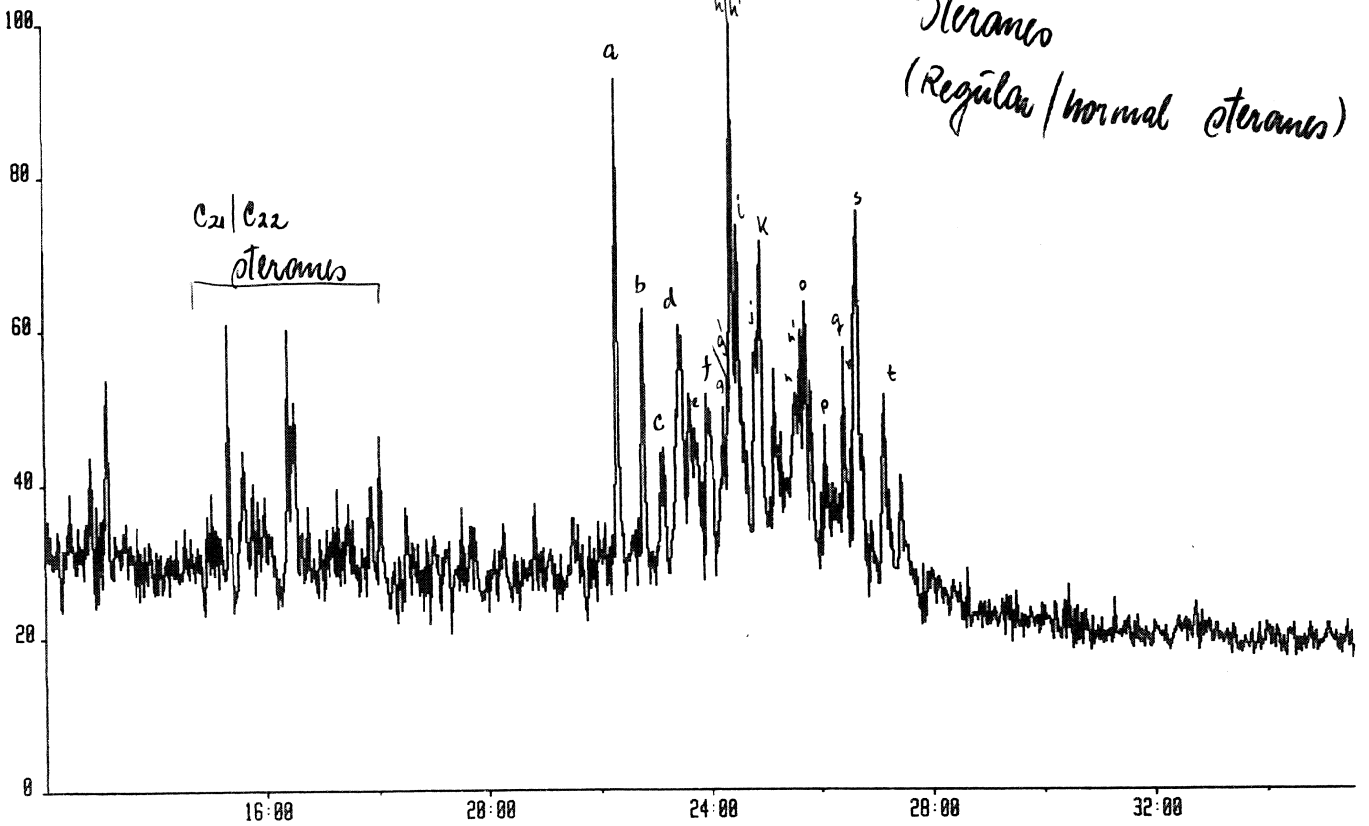




Fig. 2b

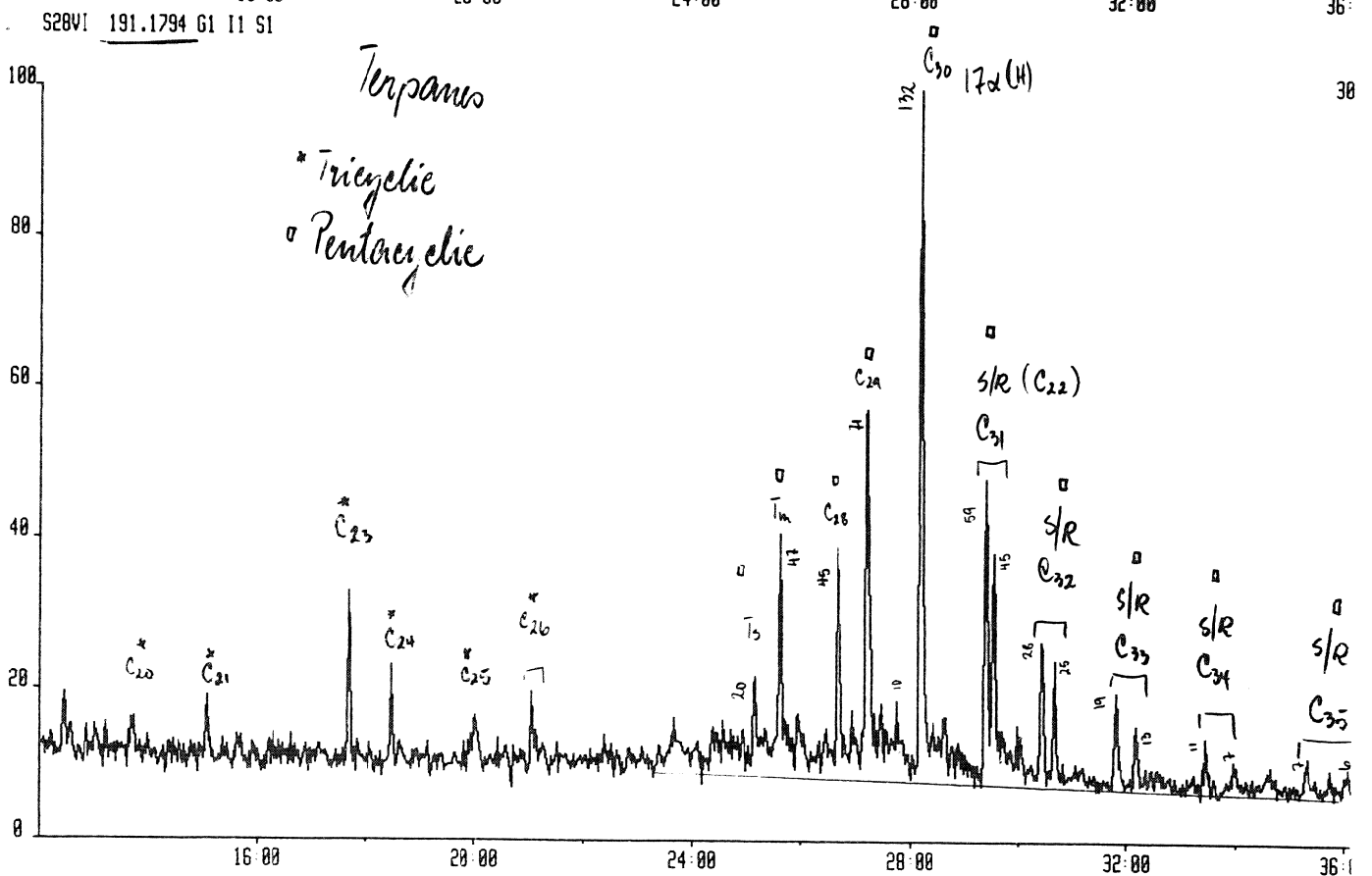
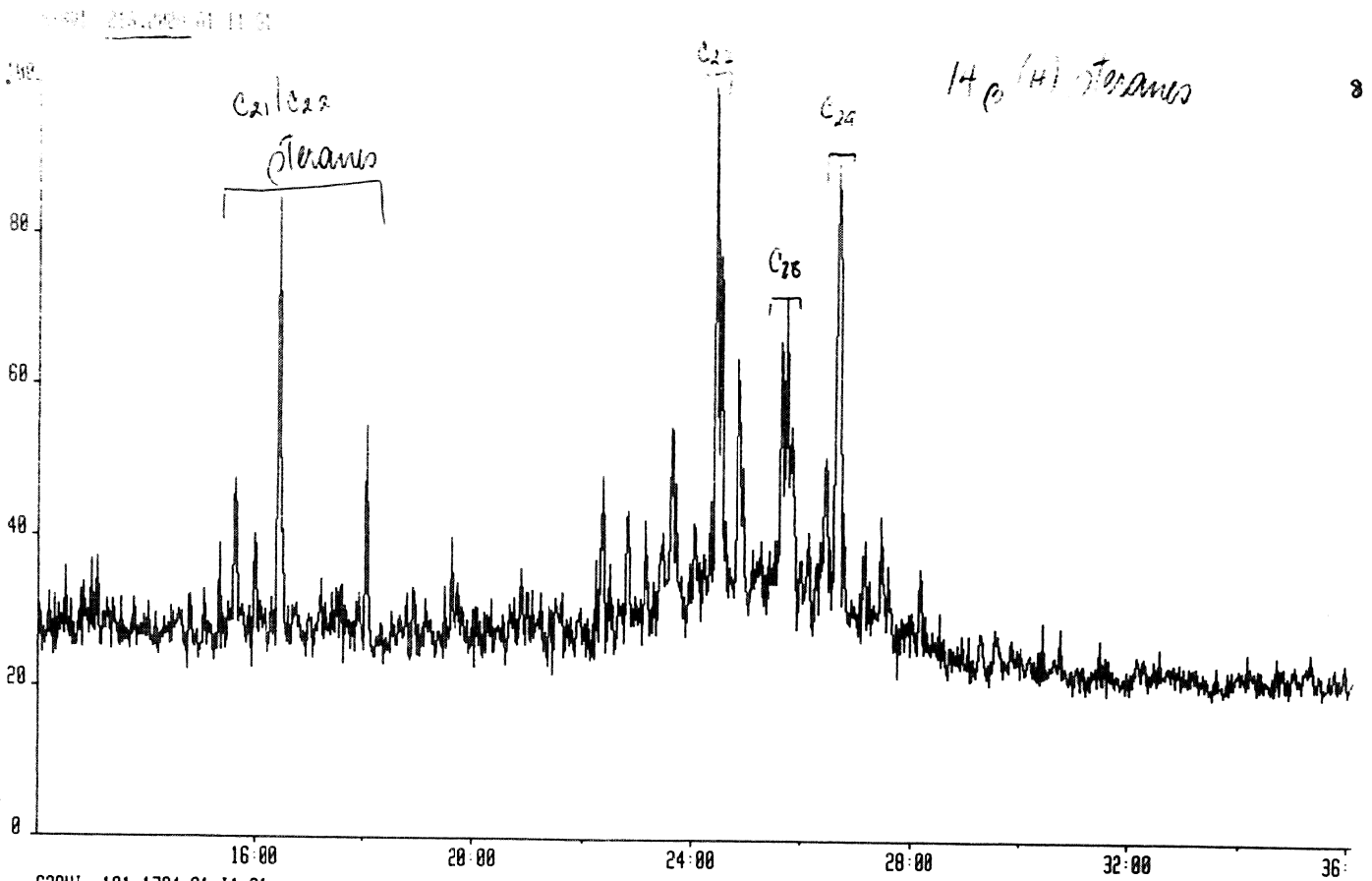


Fig. 3A

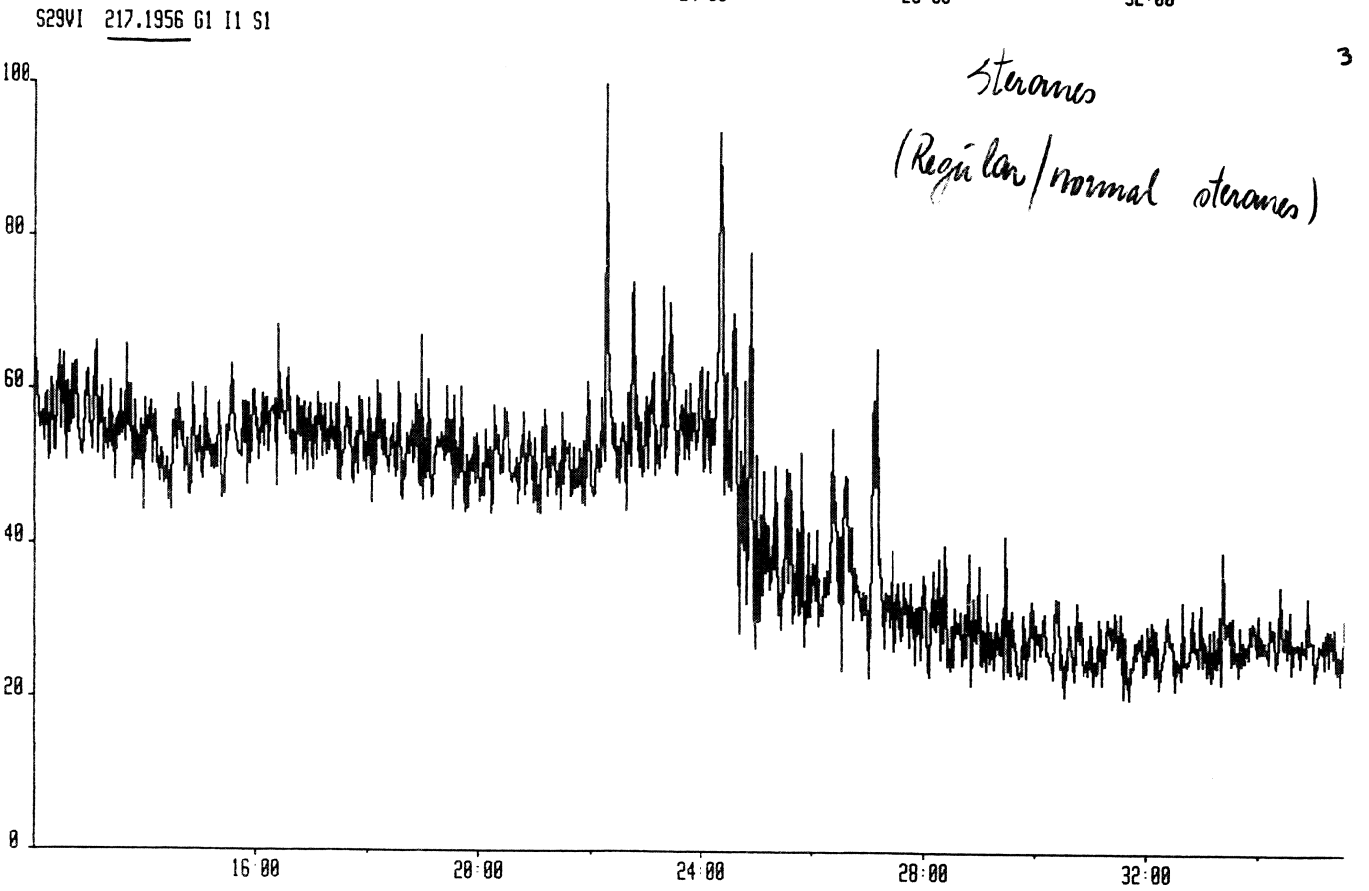
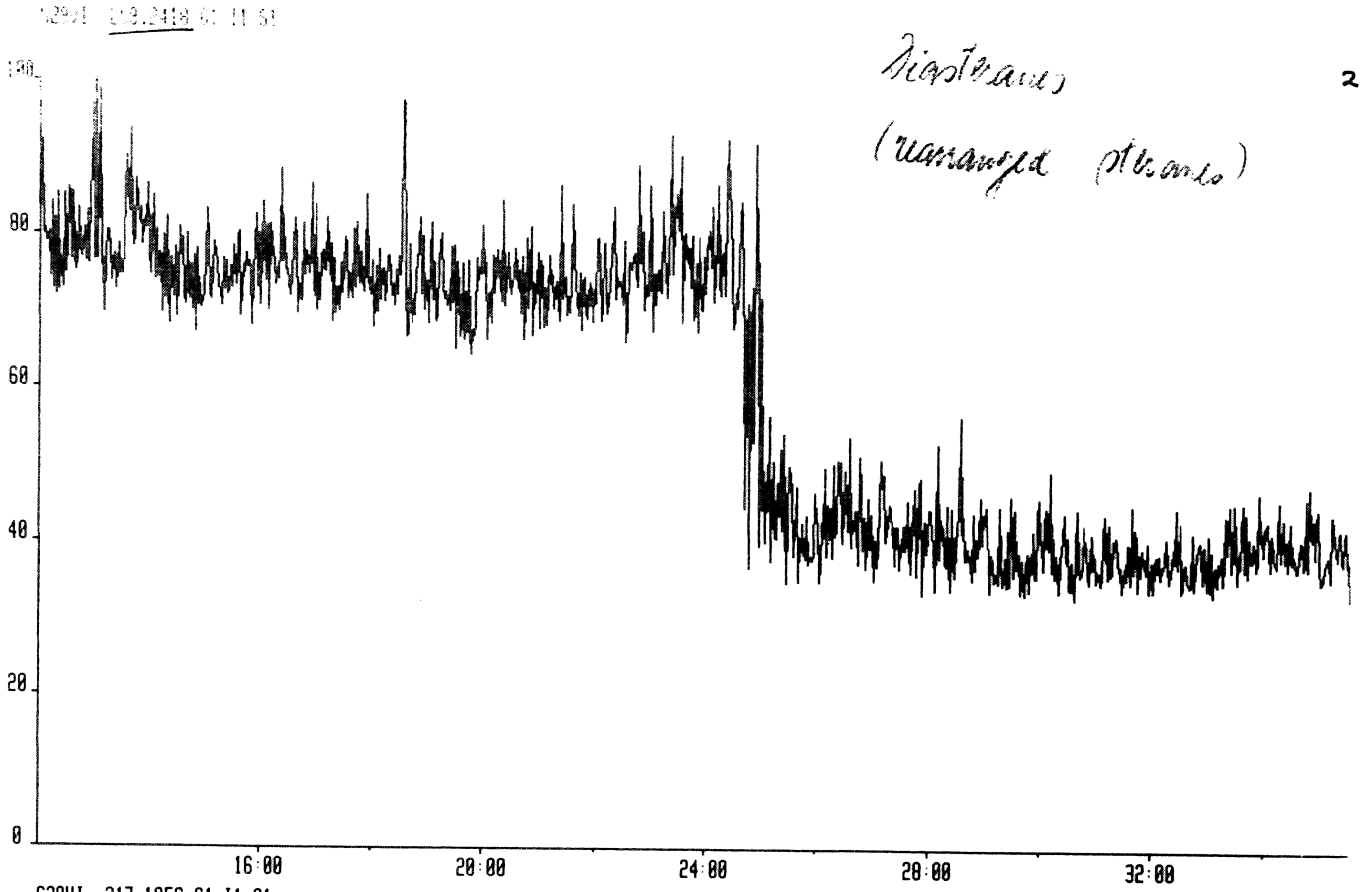
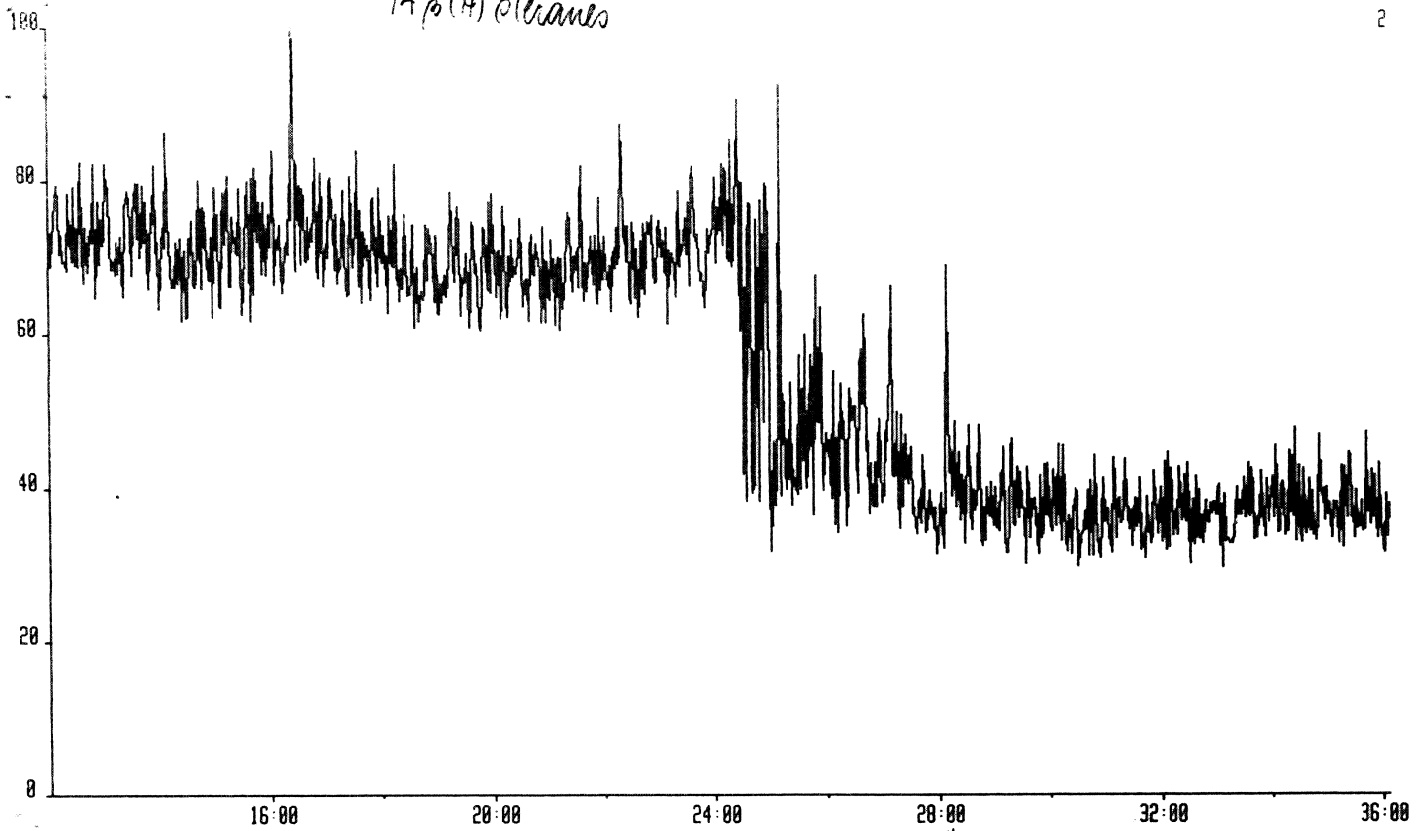


Fig. 3b

S29V1 218.2028 G1 I1 S1

*14 $\alpha$ (H) steranes*

2



S29V1 191.1794 G1 I1 S1

*17 $\alpha$ (H)*

22

*Terpanes*

*H: Hopanes  
M: Moretanes*

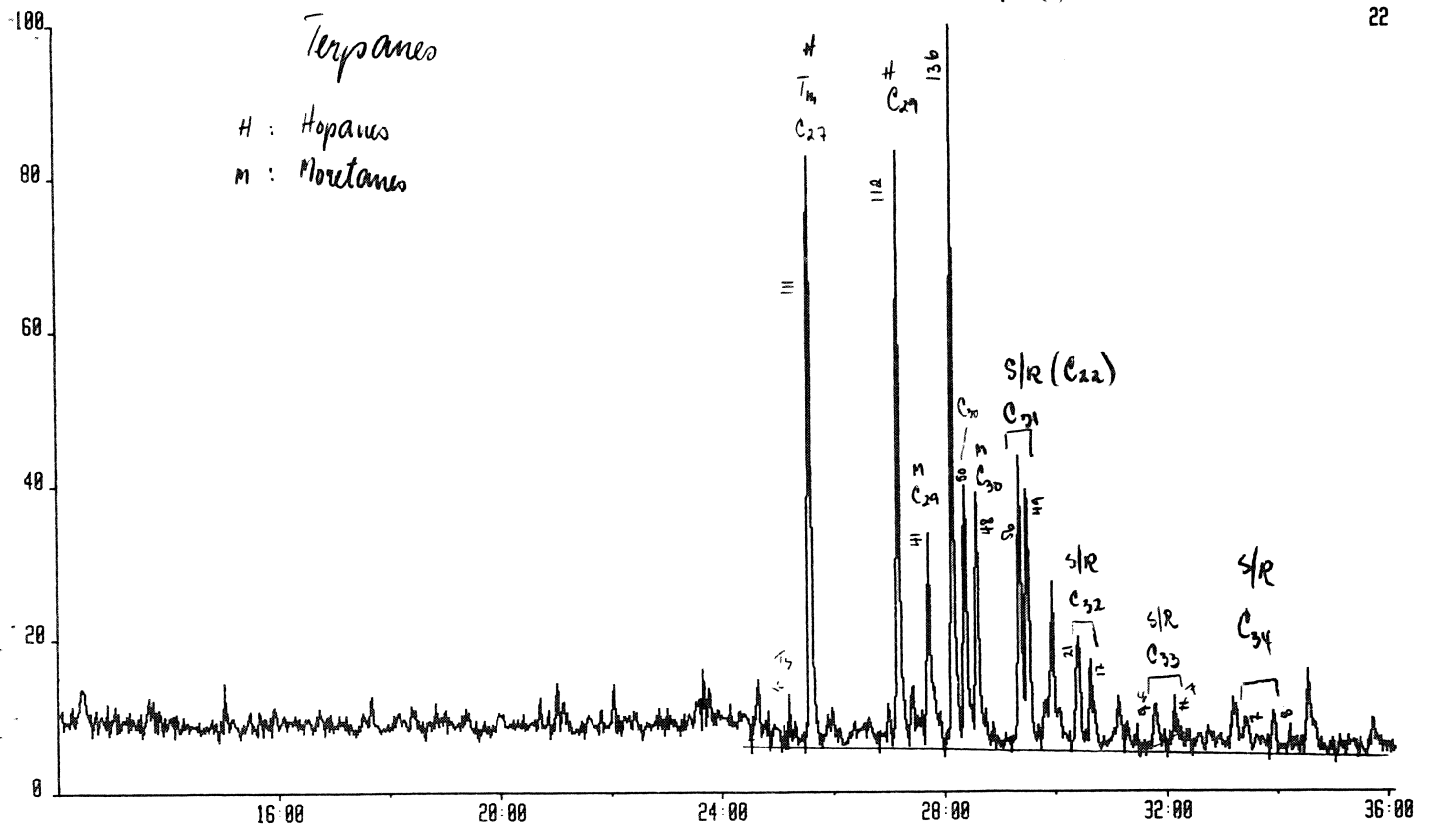
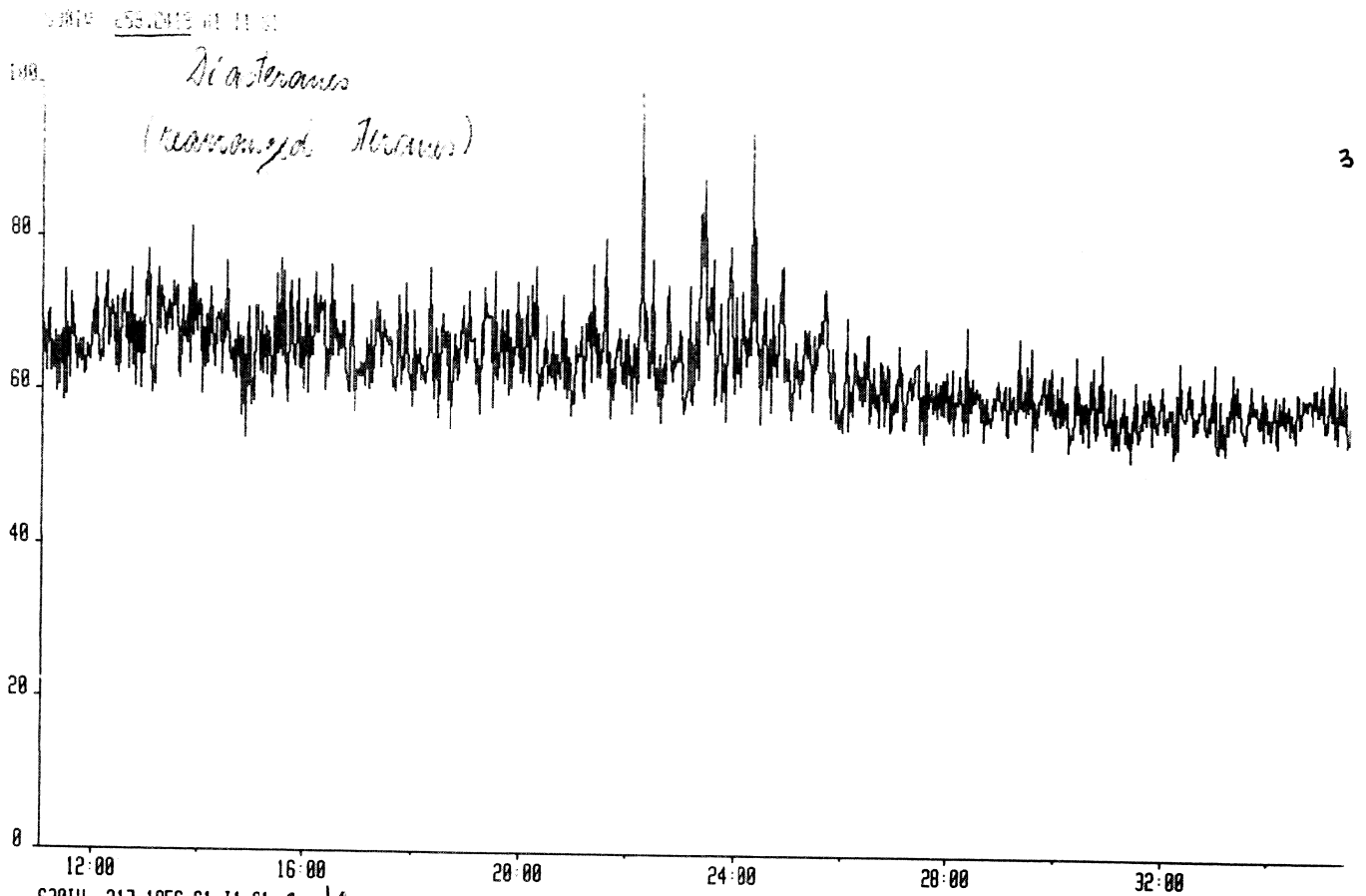
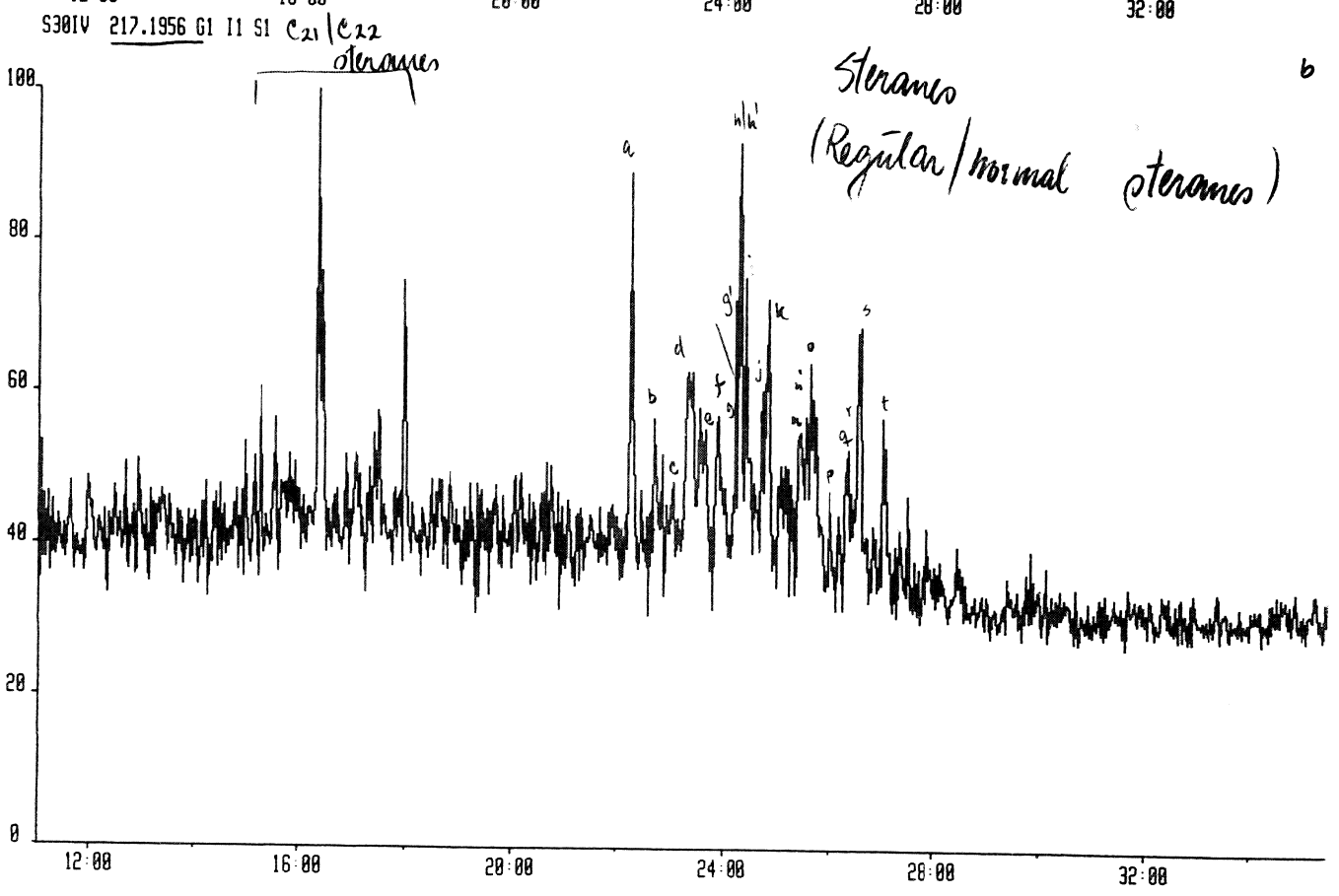


Fig. 4A



3



b

Fig. 4b

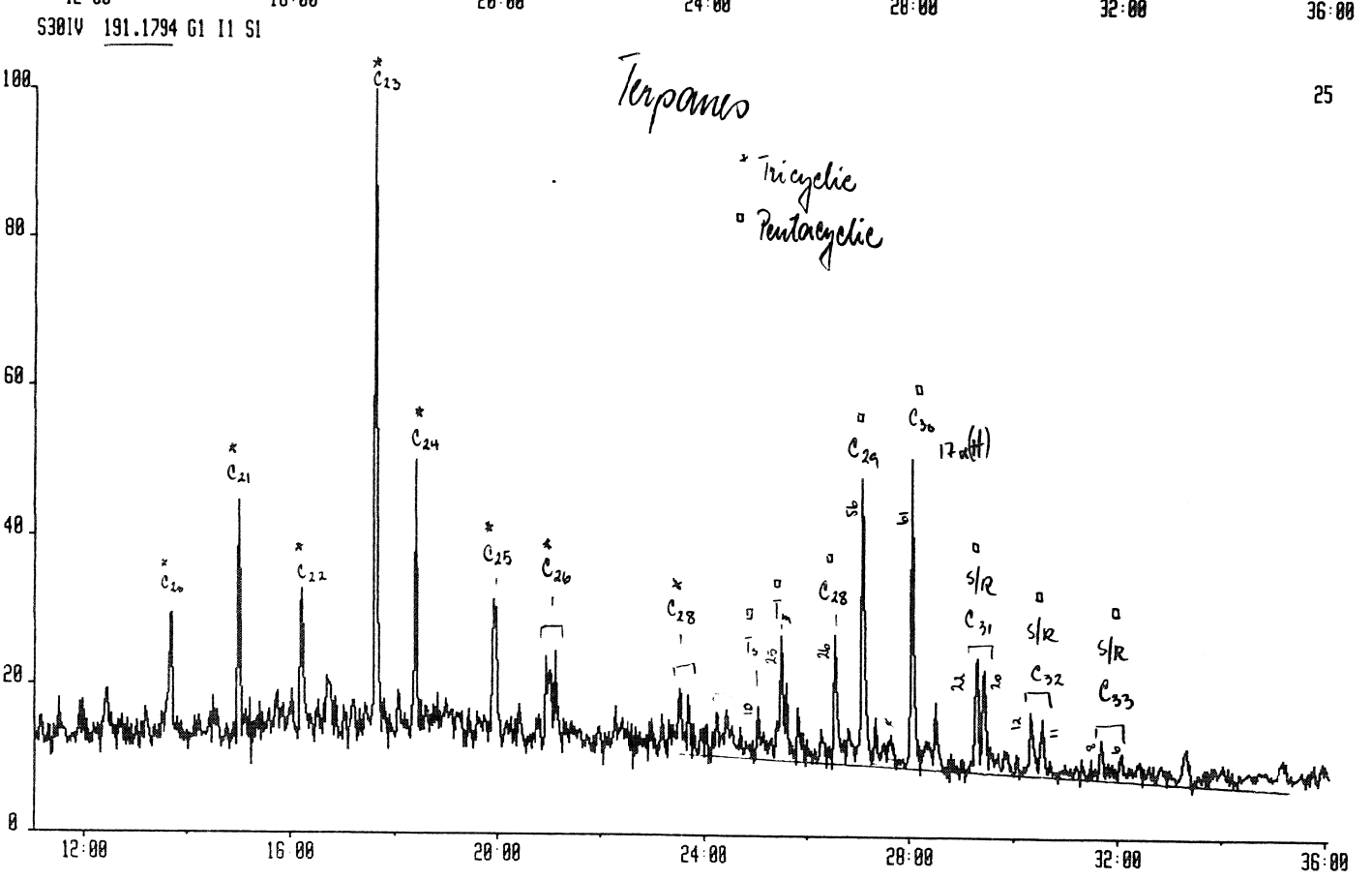
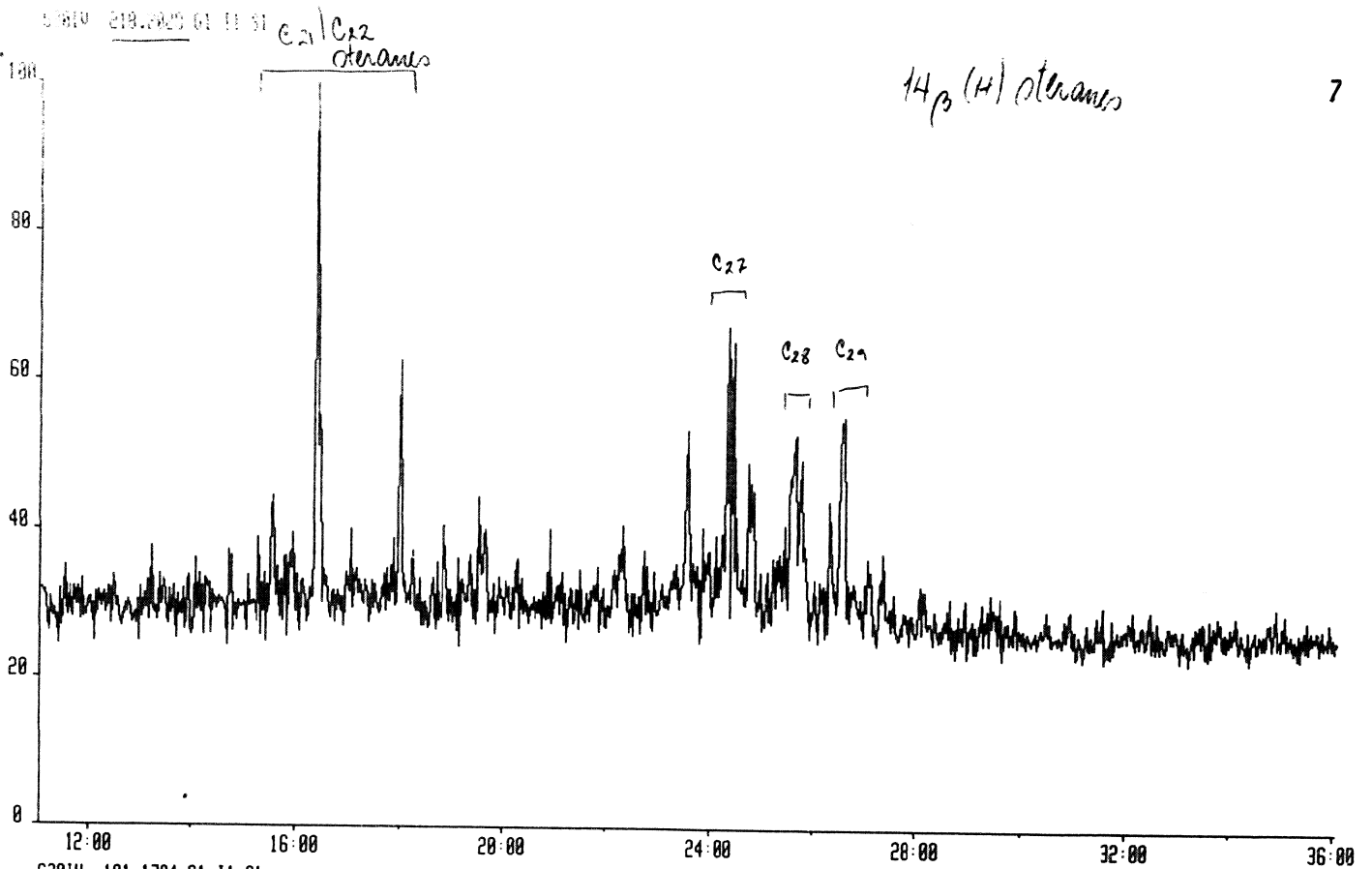
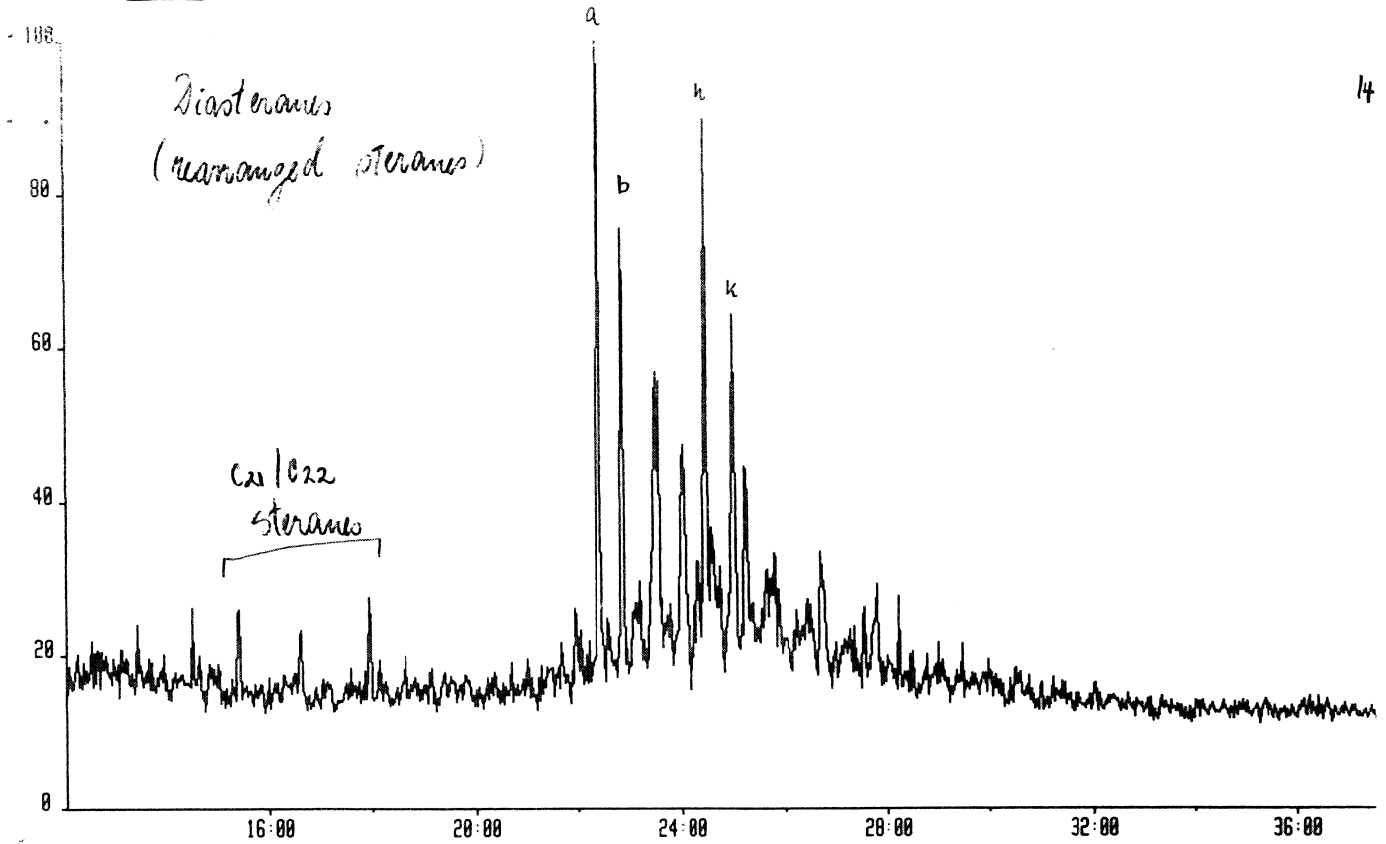


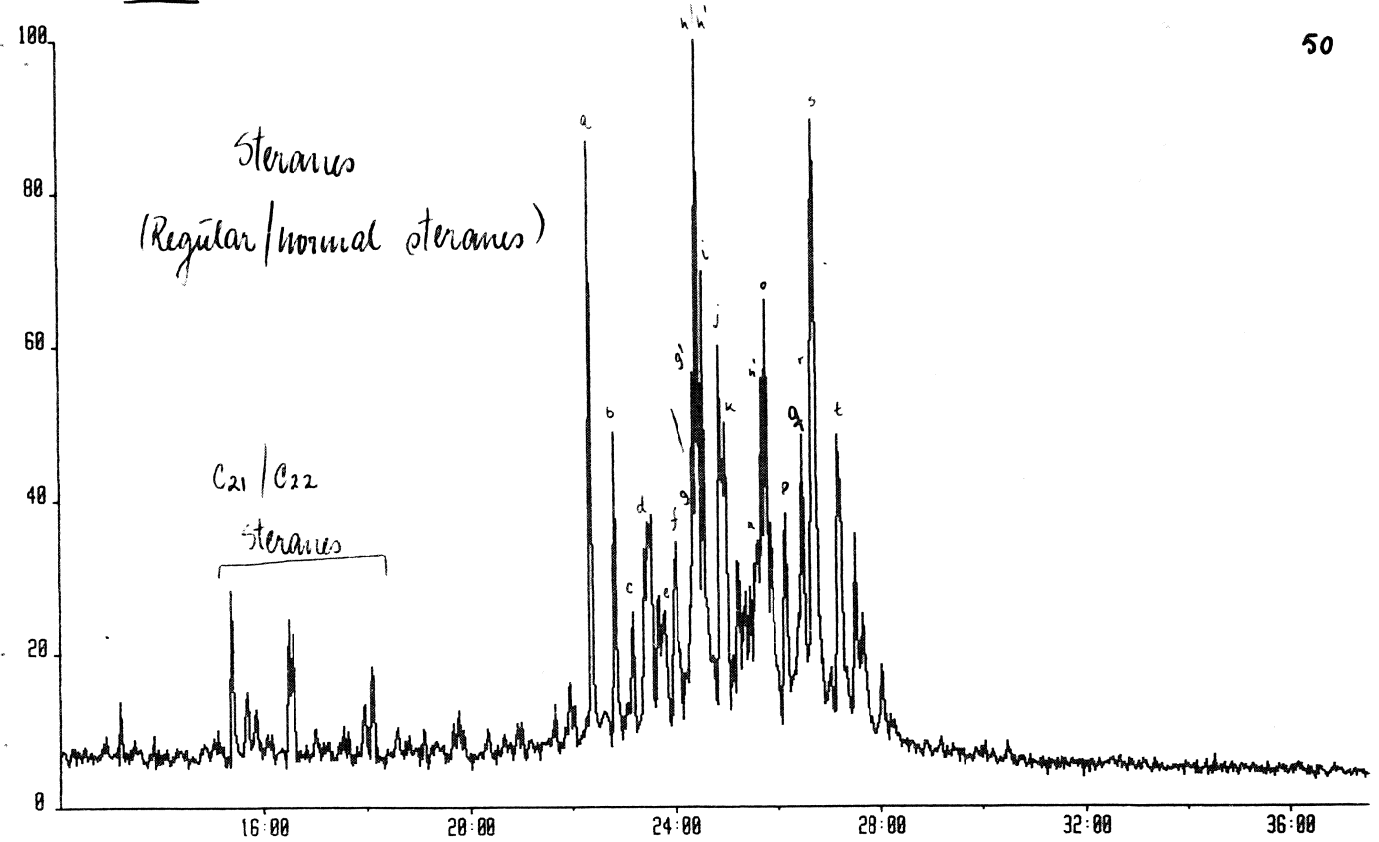
Fig. 5A

S311V 253.2419 G1 11 S1



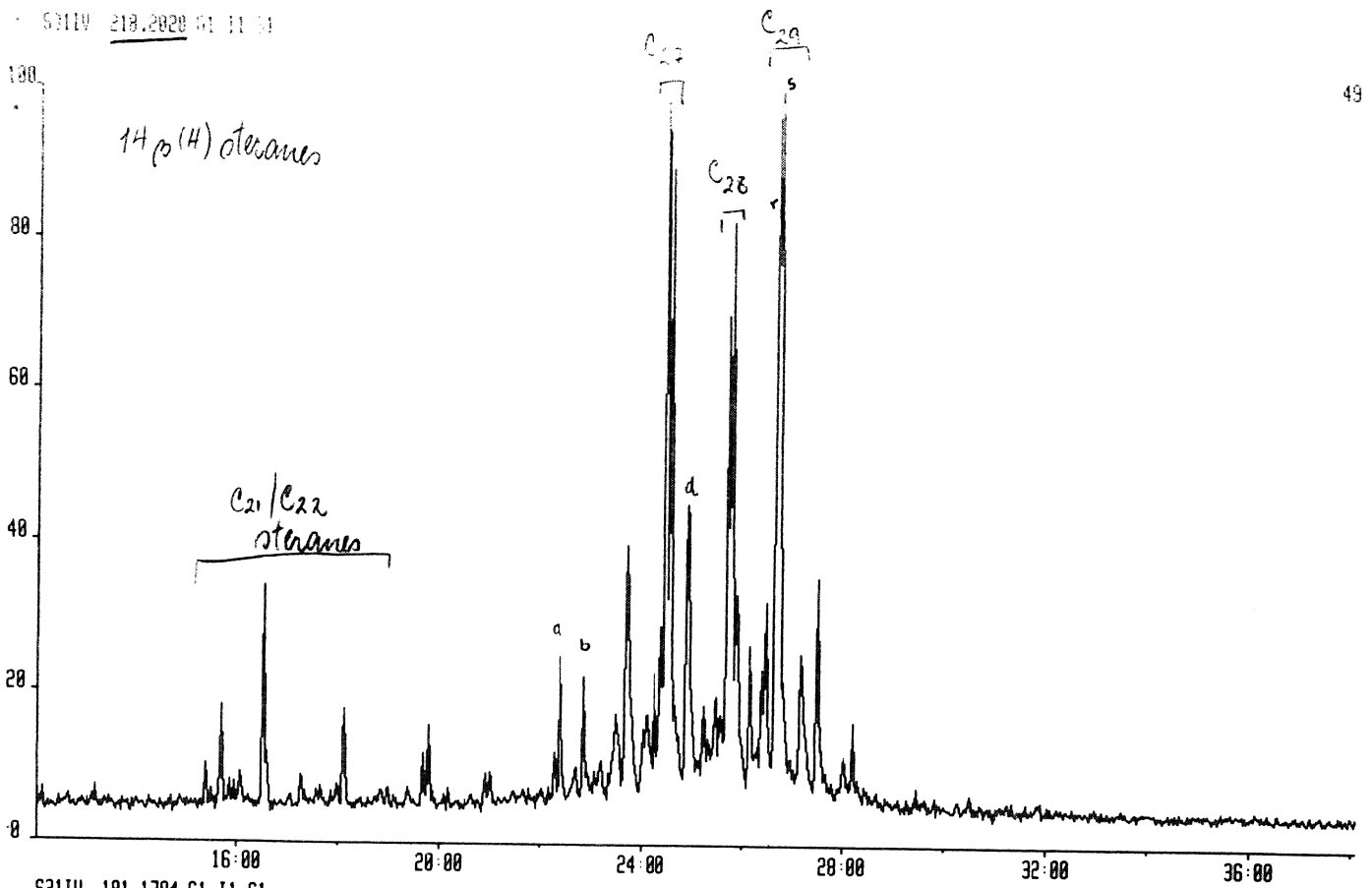
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S311V 217.1956 G1 11 S1

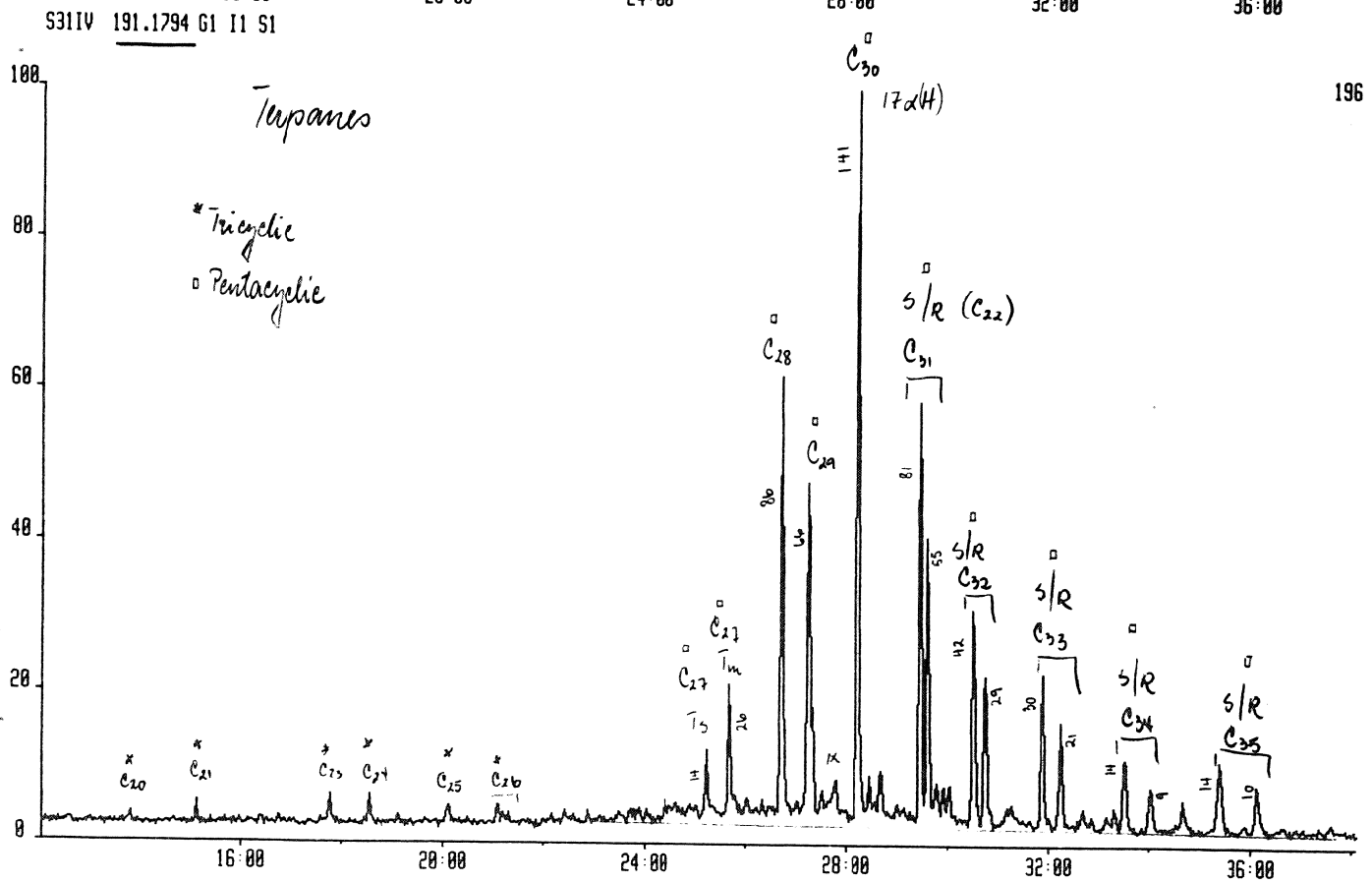


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Fig. 5B



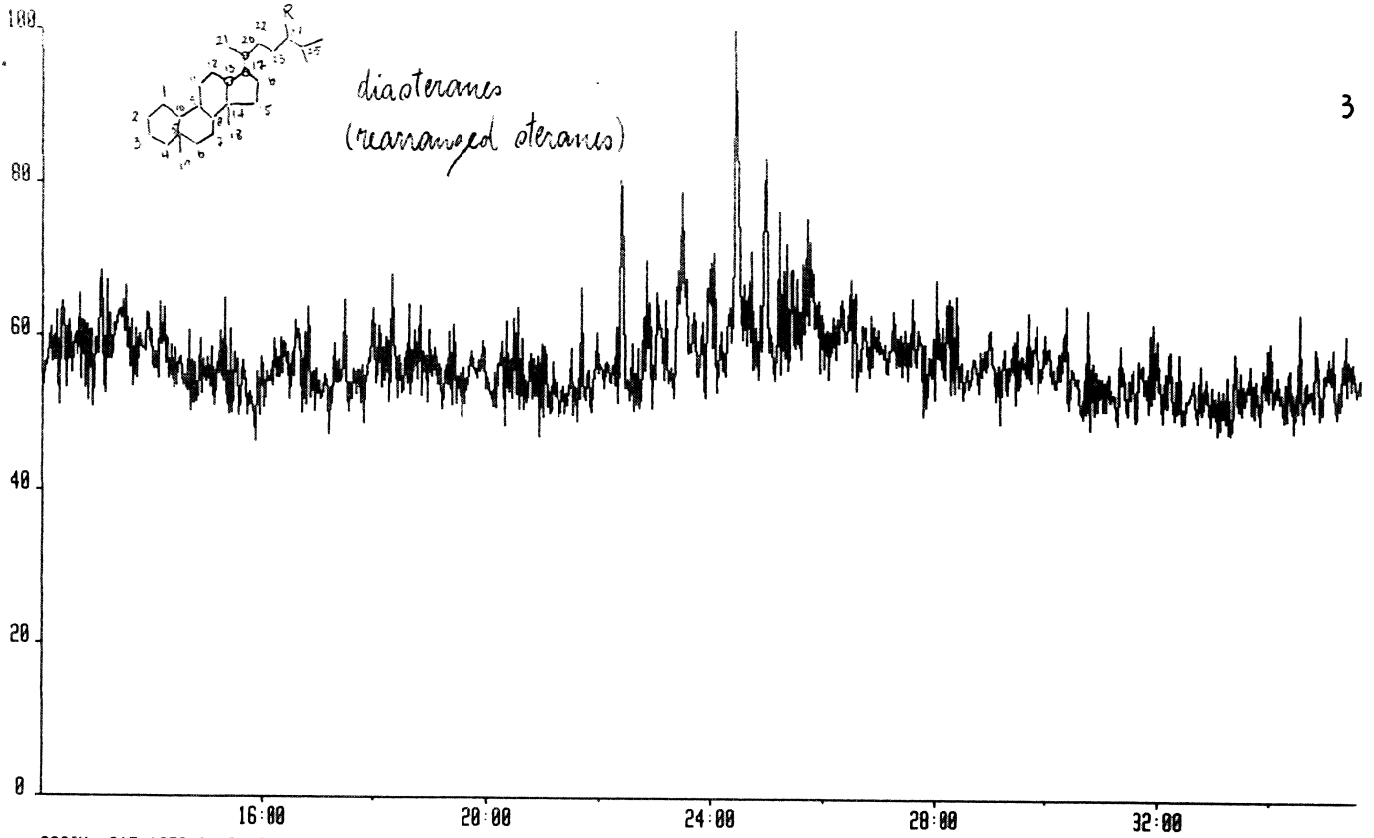
49



196

Fig. 6A

S321V 259.2419 G1 I1 S1



S321V 217.1956 G1 I1 S1

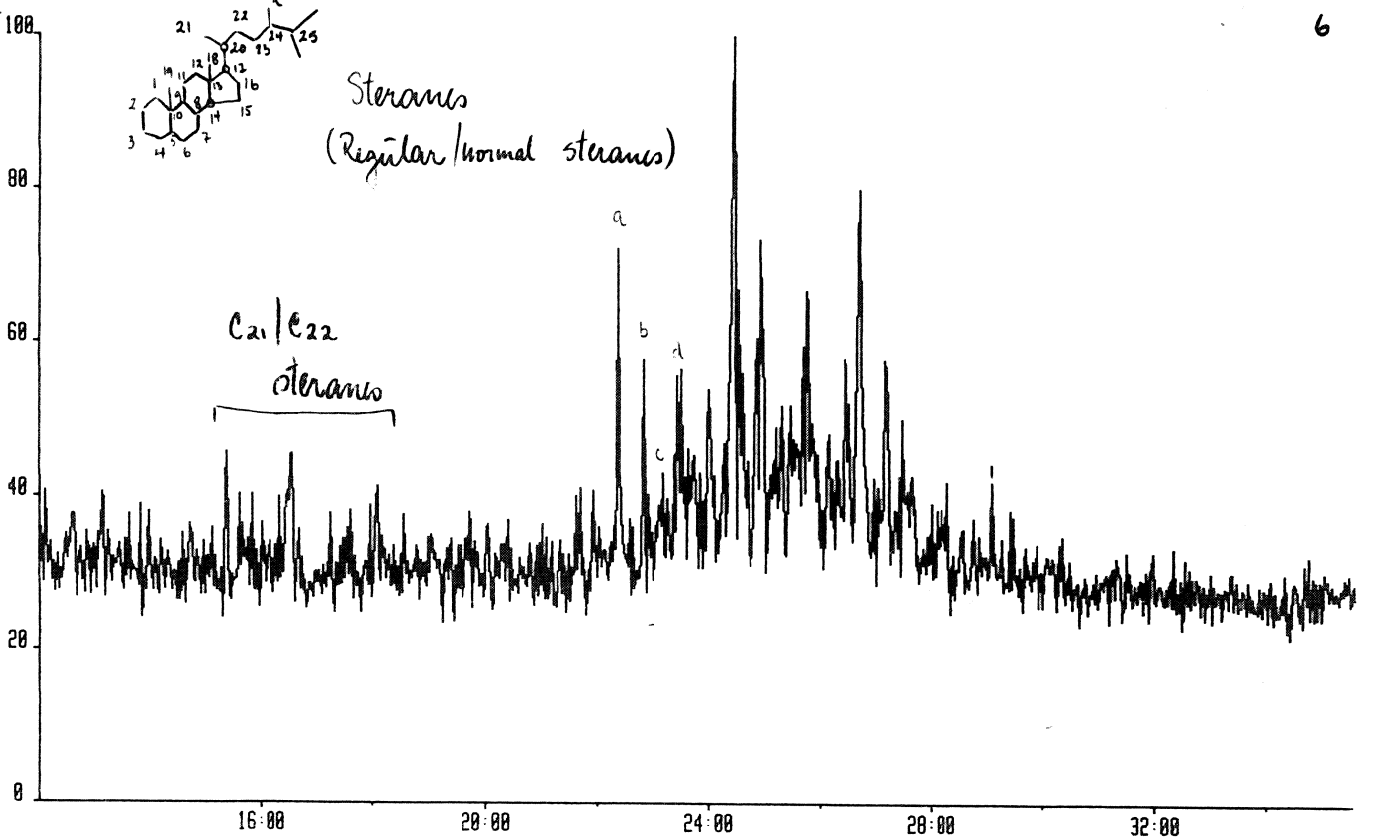




Fig. 6B

