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GEOCHEMICAL INVESTIGATION OF A CRUDE OIL
FROM WELL 6407/9-4, Norway
by

J.M.A. Buiskool Toxopeus & F.M. van der Veen

Sponsor: Shell Risavika EP

Code: 774.10.300



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KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM

RIJSWIJK, THE NETHERLANDS

(Shell Research B.V.)

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Investigation: 8.122.03811

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GEOCHEMICAL INVESTIGATION OF A CRUDE OIL FROM WELL 6407/9-4,
NORWAY

1.0 INTRODUCTION

A geochemical investigation has been carried out on the following crude oil sample:

- 6407/9-4, 1662-1667 m, PT-2E.

The results are shown in Table 1 and in Figures 1-5.

2.0 RESULTS AND CONCLUSIONS

The C₇-distribution (Fig. 3) of the crude does not indicate bacterial degradation. However, the gaschromatograms (Figs. 1-2) of the sample show a gap between nC₉ and nC₁₄. This gap is rather unusual and can be explained by either bacterial degradation in the specific nC₉ to nC₁₄ region or more probable by a mixture of an extremely light, condensate like crude oil to a (slightly) bacterial degraded crude*.

The C₇-alkane/naphthene distribution (Fig. 3) indicates that the oil was derived from a shaly source rock.

The crude was generated from a mature source rock (API gravity; grosscomposition; gaschromatograms, Figs. 1-2; complete sterane isomerisation, Fig. 5).

The source rock of the crude contained predominantly SOM (sterane/triterpane fragmentograms, Fig. 5). The relatively high amounts of C₂₉-rearranged steranes may indicate an additional landplant contribution.

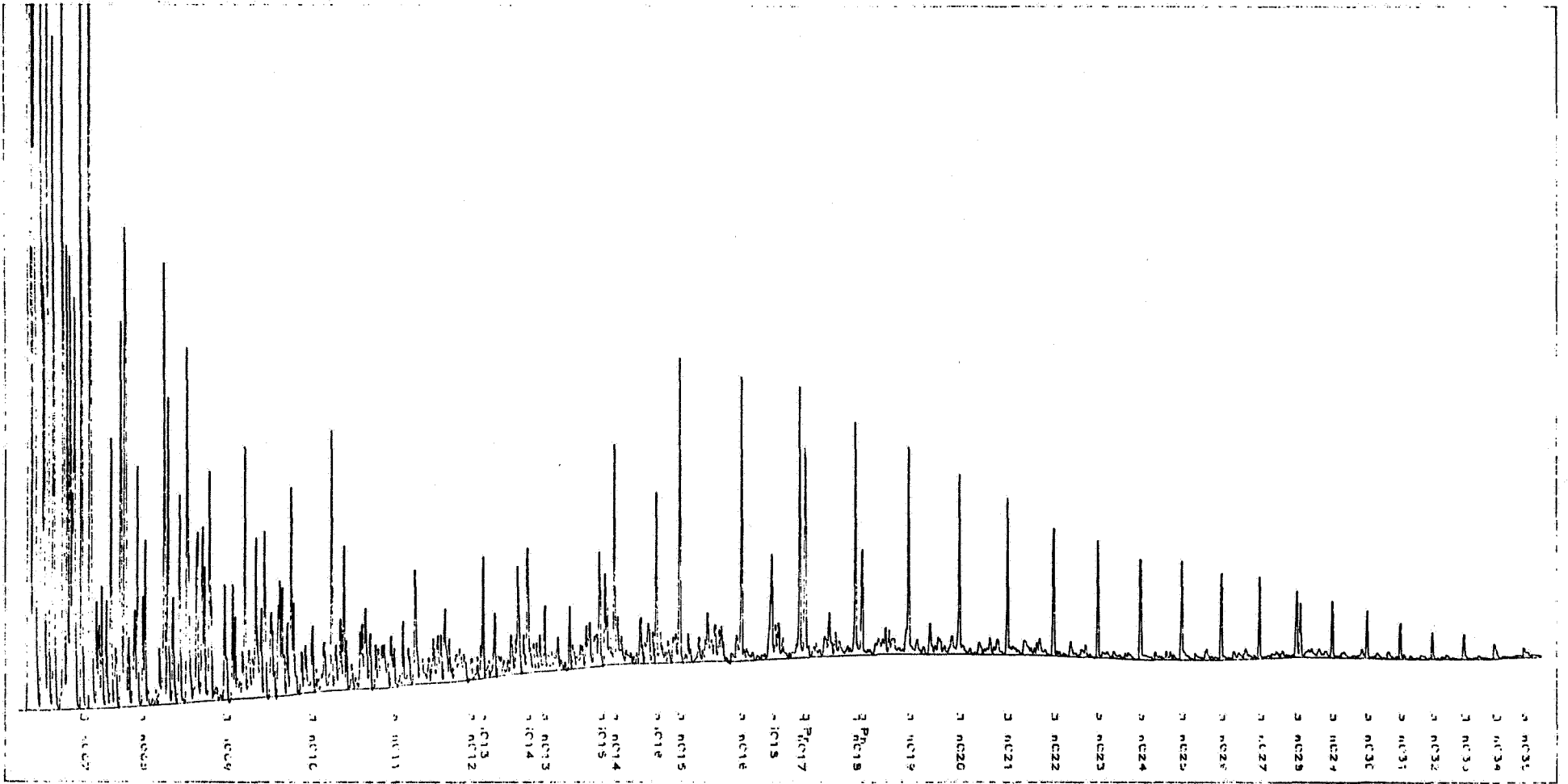
* During the following interpretation it has been assumed that the crude oil fraction and the very light fraction of the sample are of the same origin.

Table 1 - GEOCHEMICAL DATA OF OILS

Sample	Norway 6407/9-4 1662-1667 m PT-2E
API	39.6
specific gravity	0.8269
%w. boil. <120°C	12.3
% sulphur	0.3
ppm V as metals	0.7
ppm Ni as metals	0.9
pristane/phytane	2.1
pristane/nC17	1.0
phytane/nC18	0.6
C ₇ -distribution	
C ₇ -alkane	
nC7	45
monobranched	44
polybranched	11
C ₇ -alk/naphthene	
nC7	17
naphthenes	63
branched alkanes	21
C ₇ -alk/naphth/arom	
nC7	35
naphthenes	59
aromatics	5
C ₁₅ distribution	
1-ring	
2-ring	
3-ring	
C ₃₀ distribution	
3-ring	
4-ring	
5-ring	
C ₂₉ VR/E	
% asphaltenes	0.4
% saturates*	67
% aromatics	30
% heterocompounds	3
δ ¹³ C ^o /oo (whole oil)	-28.7
" (saturates)	
" (aromatics)	

*) Determined by thin-layer chromatography.
 ND = not detectable.

GAS CHROMATOGRAM OF WHOLE CRUDE

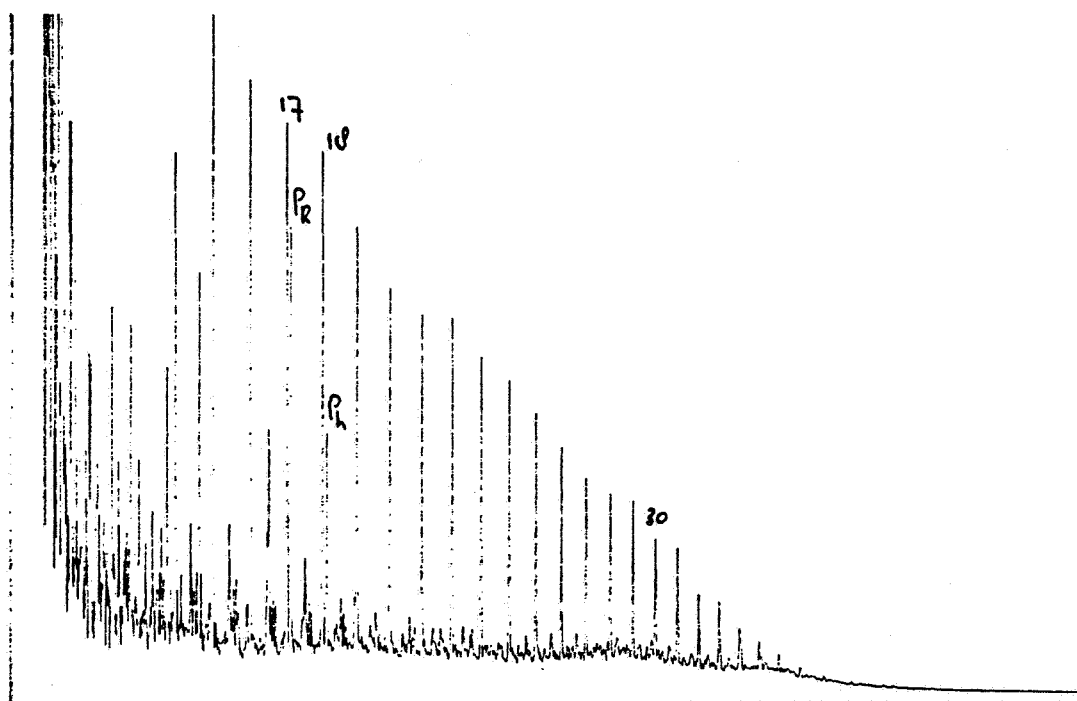


HALFIRANKEN, 6-107/9 -4

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FIG. 1.

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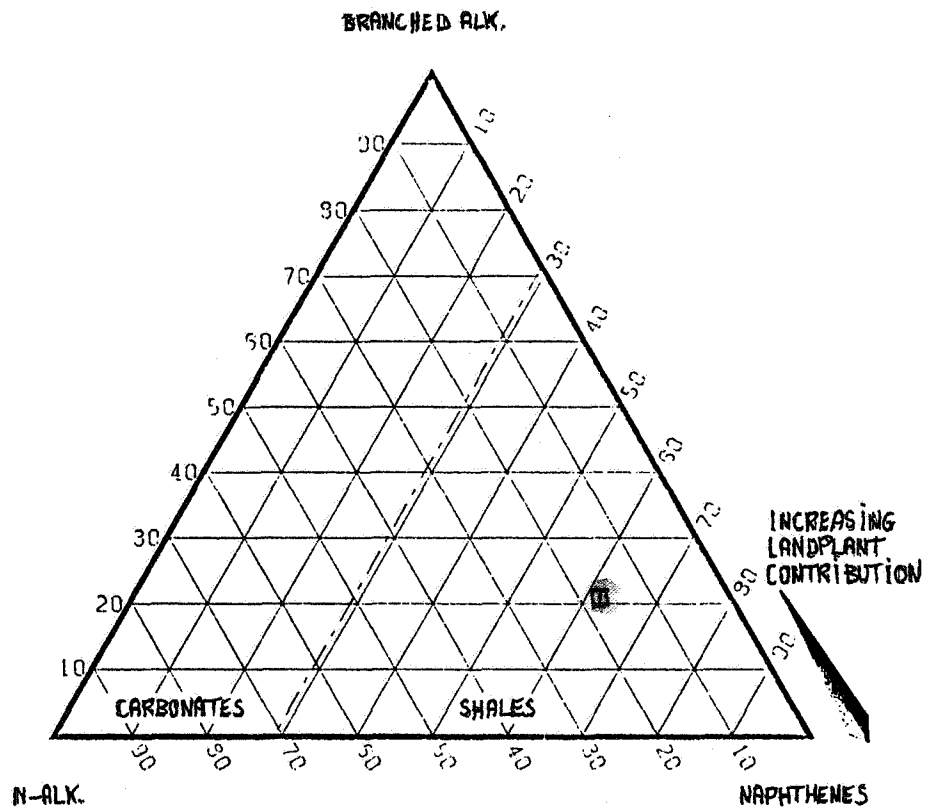
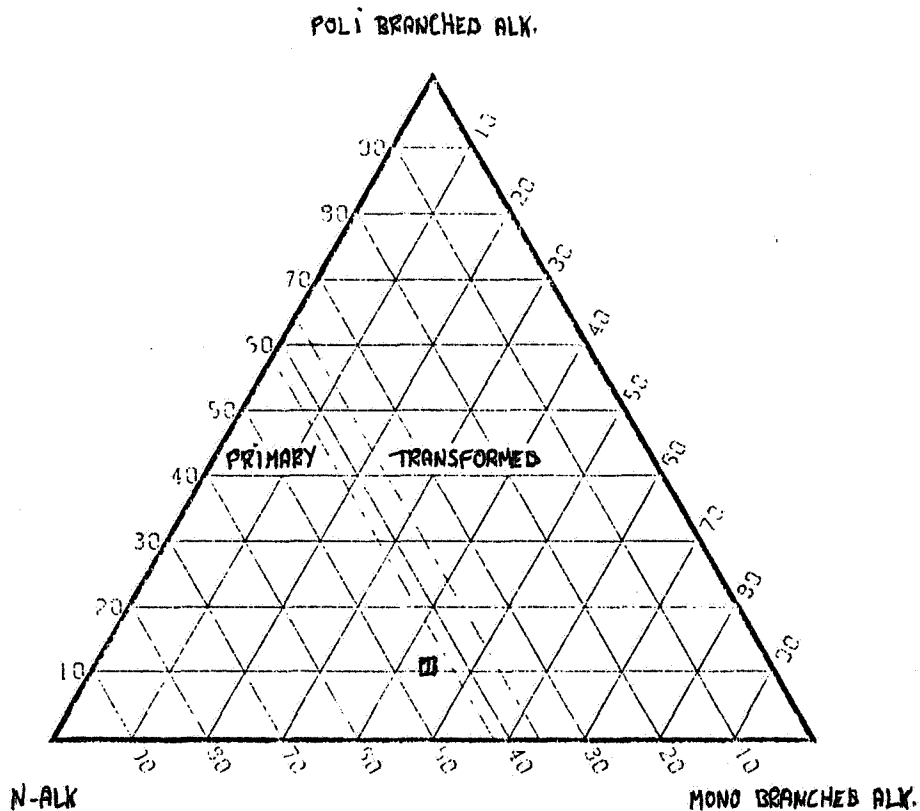
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

FIGURE, NORWAY HALTENBALKEN 6407/9-4

C7-ALKANE DISTRIBUTION

C7-ALKANE/NAPHTHENE DISTRIBUTION

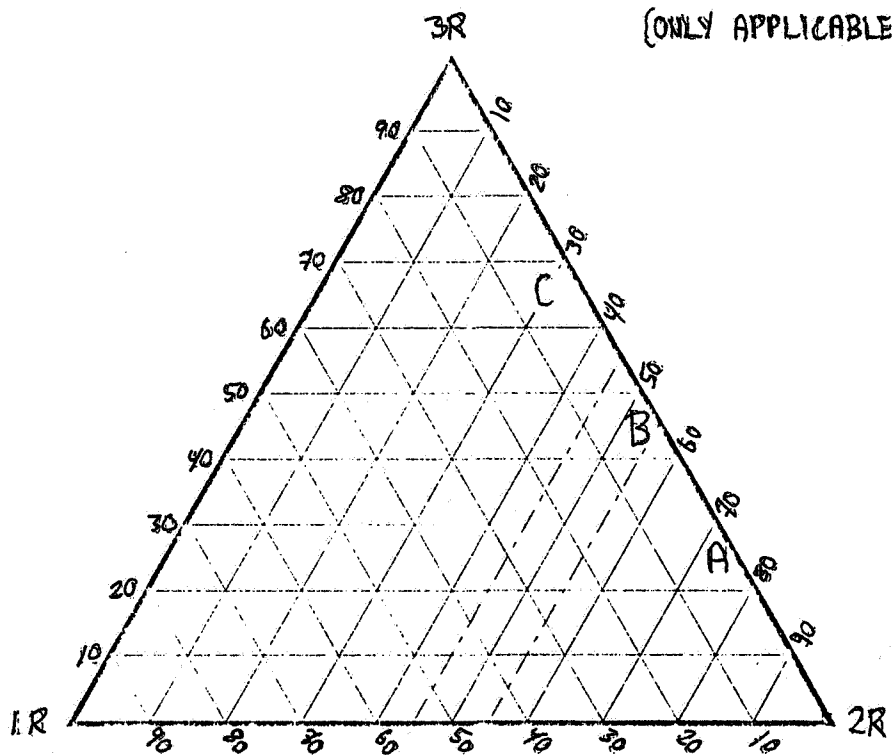
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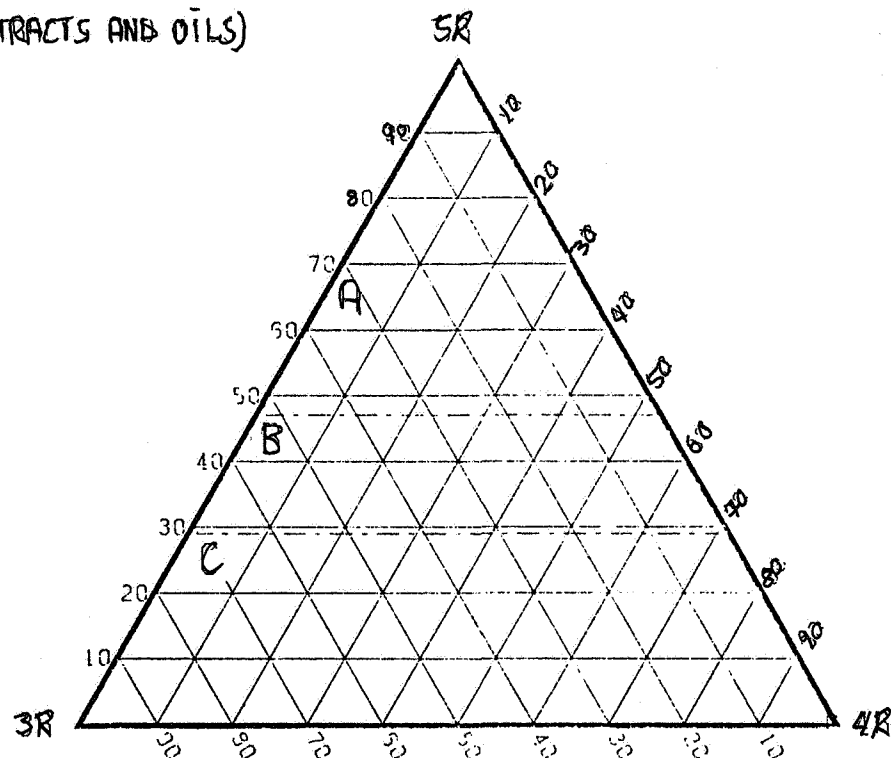
LEGEND
□ - 6407/9-4. 1662-1667 M

C₁₅ RING DISTRIBUTION

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C₃₀-RING DISTRIBUTION



- A. ORGANIC MATTER WITH SUBSTANTIAL LANDPLANT RESIN CONTRIBUTION
- B. MIXED LANDPLANT RESIN/SOM OR MIXED ALGAL/SOM
- C. STRUCTURELESS ORGANIC MATTER (SOM)

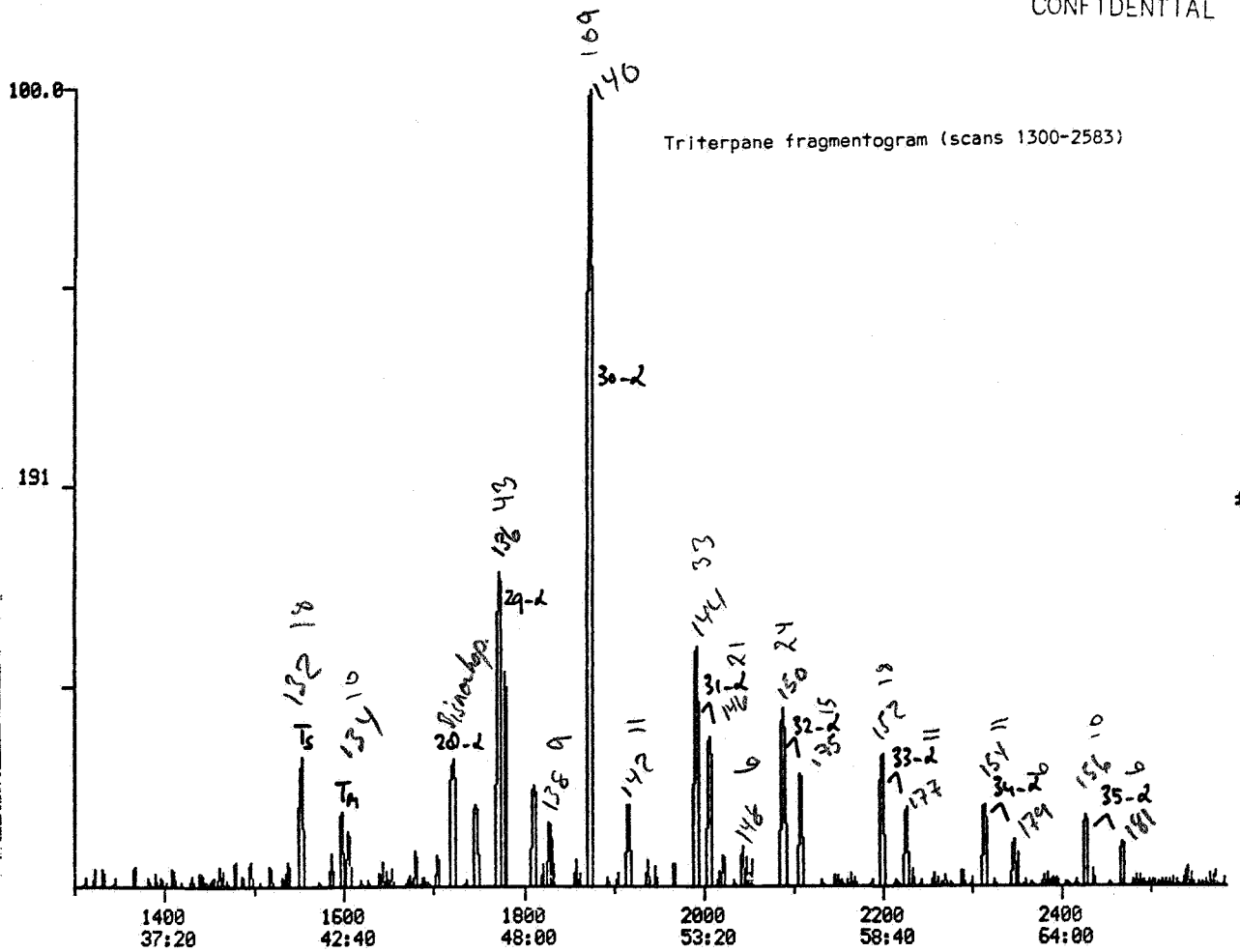
LEGEND

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FIG. 1

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16992.



5200.

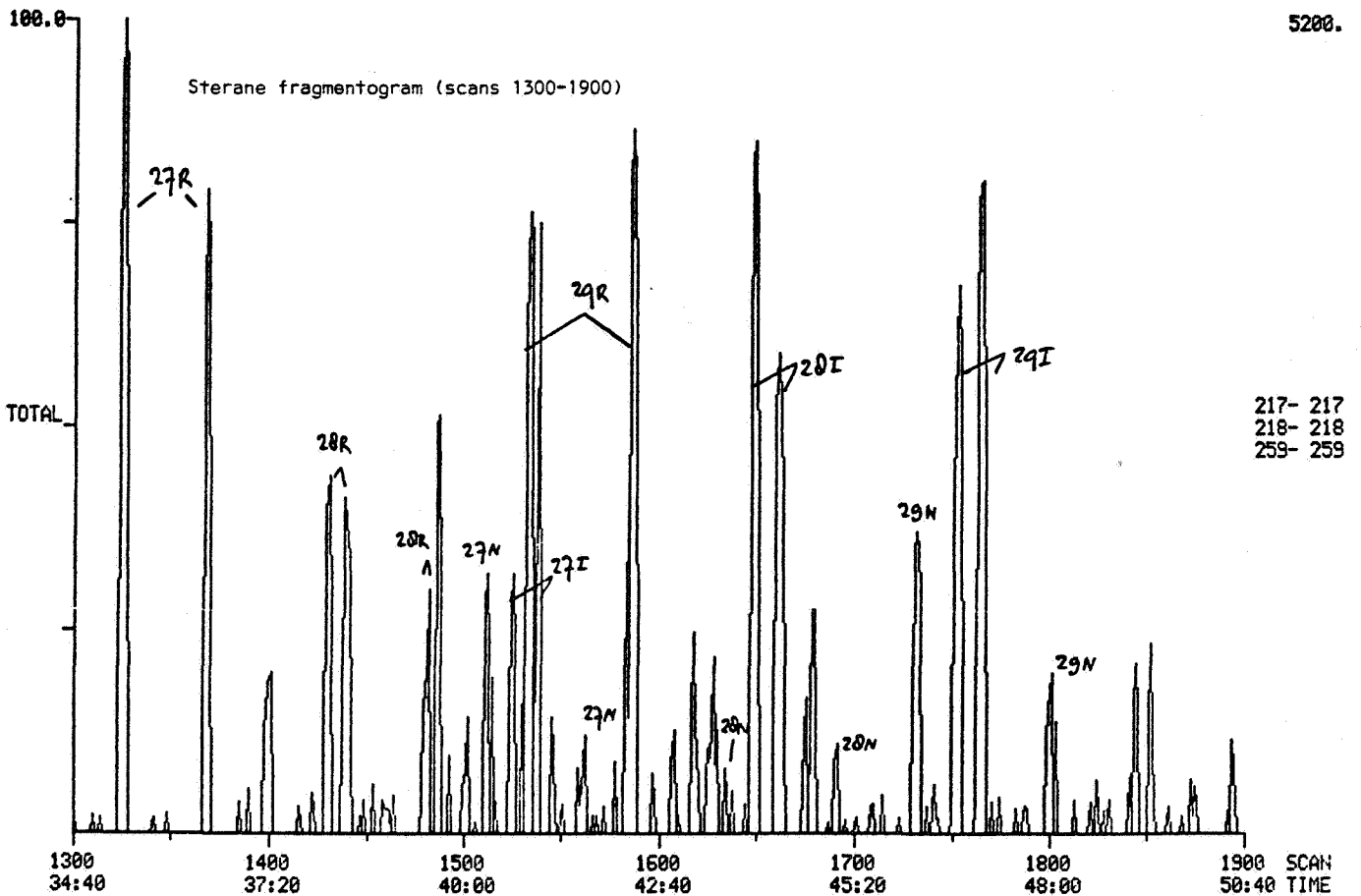
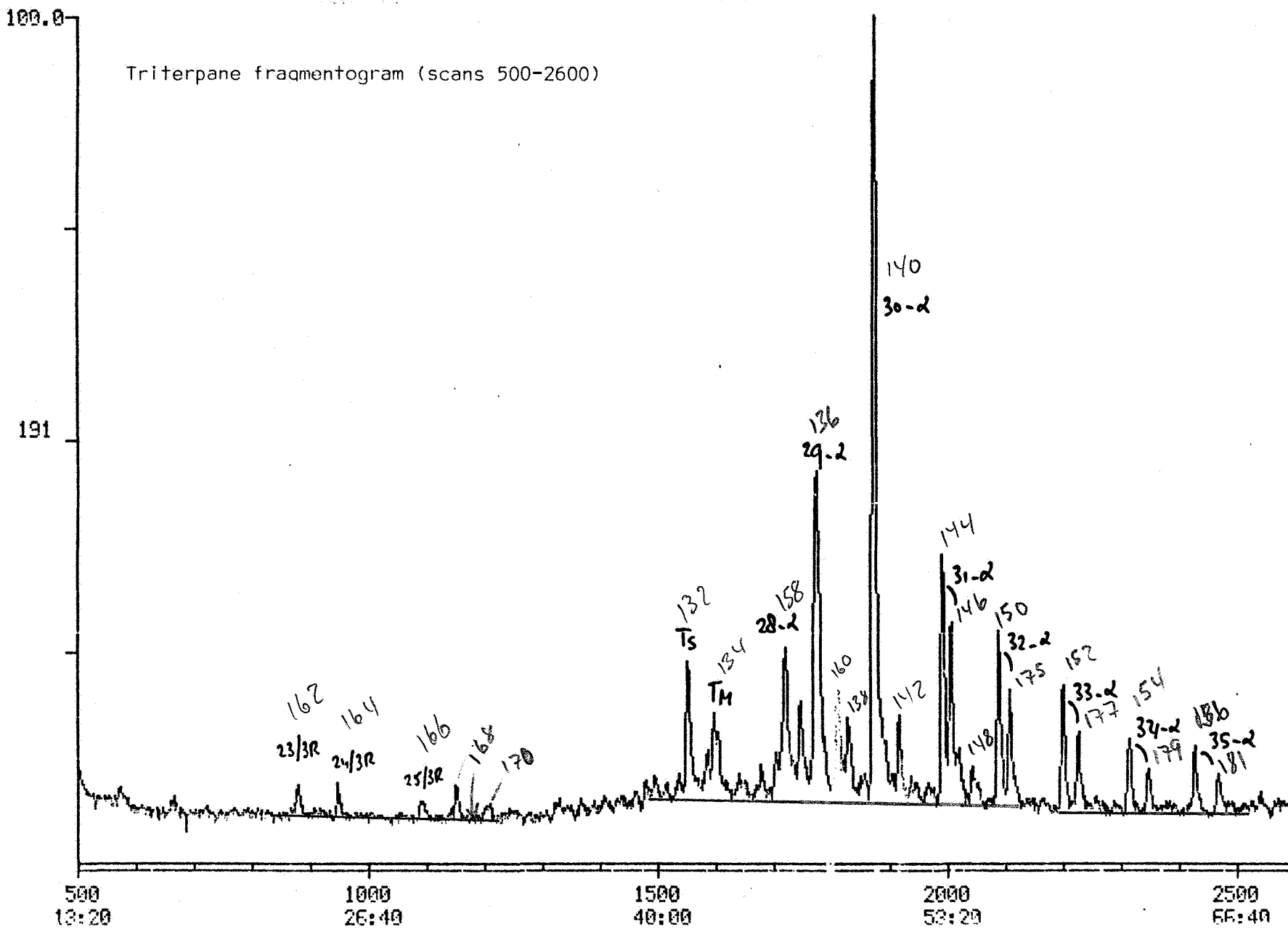


FIG. 5A. GC-MS analysis 6407/9-4, 1662-1667 m, crude oil.

18912.

Triterpane fragmentogram (scans 500-2600)



191.057
± 0.500

FIG. 5B. GC-MS analysis 6407/9-4, 1662-1667 m, crude oil.

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