

### **Wireline Run 1B**

Fourteen pre-tests were requested to be able to define the fluid gradients in the well and sixteen were attempted to fulfil the programme. Thirteen good tests were recorded. An attempt to obtain a fluid sample in the gas zone was unsuccessful due to a seal failure in the pumpout module when pumping started. The MDT was pulled out of hole and the pumpout module replaced, but a seal was still not obtained. The decision was then taken to run the VSP while the MDT was investigated.

### **Wireline Run 1C**

A zero offset VSP was recorded at 15 m intervals from 1905 – 1470m MD RKB (31 levels). A further 11 levels were recorded at 100 m intervals to 400m MD RKB. There were no problems during acquisition.

### **Wireline Run 1D**

The MDT pump seal failure that occurred during Run 1B was caused by particles in the flowline, so this was filled with water and the pump initialised on surface. The gravel pack in the single probe module, a potential contributing factor to the seal failure, was removed and replaced with a coarser mesh filter. The MDT was then run in hole and this time a seal was obtained. Sampling took place in the gas column at 1736.1m MD RKB. A 1 gallon chamber was opened on the rig to confirm hydrocarbons had been sampled. Three additional 250cc Single Phase Multi-Chamber (SPMC) bottles were planned to be filled at the same sampling depth, but it was later discovered that the third bottle had failed to fill and thus close. Apparently the sampling time had been insufficient, even though data available to the engineer indicated that sampling was successful. On attempting to move to the second sampling depth at 1746.5m MD RKB it was found that both the tool and cable were stuck. It was not possible to pull free, so the tool was fished.

### **Wireline Run 1E**

The same MDT configuration as for Run 1D was used to obtain oil samples at a depth of 1746.5m MD RKB. A 1 gallon chamber was filled to allow confirmation that hydrocarbons had been sampled on the wellsite, and three 250cc SPMC bottles were run to obtain PVT quality samples. Once again, the third bottle failed to fill despite indications to the contrary and the tool had to be fished having become differentially stuck.

Test No.	Depth MDRT (m)	Depth TVDSS (m)	Initial Hydrostatic Pressure (BARS)	Formation Pressure (BARS)	Final Hydrostatic Pressure (BARS)	Temp. (C)	Remarks/Permeability
1	1728.9	1704.5	a) 236.43	174.142	236.42	62.9	Good Test, Good mobility – 345mD
			b) 237.44	175.22	237.42		
2	1731.8	1707.4	a) 236.80	174.180	236.80	62.7	Good Test, Good mobility – 212mD
			b) 237.81	175.25	237.81		
3	1733.4	1709.0	a) 237.04	174.209	237.03	62.7	Good Test, Good mobility – 277mD
			b) 238.05	175.28	238.05		
4	1736.1	1711.7	a) 237.41	174.252	237.38	62.9	Good Test, Excellent mobility – 839mD
			b) 237.42	175.33	238.40		
5	1739.0	1714.5	a) 237.82	174.311	237.81	63.1	Good Test, Good mobility – 173.6mD
			b) 238.83	175.38	238.82		
6	1741.0	1716.5	a) 238.08	174.345	238.07	63.4	Good Test, Good mobility – 440mD
			b) 239.10	175.42	239.10		
7	1742.5	1718.0	a) 238.30	174.435	238.30	63.7	Formation Pressure slightly unstable +/-0.01 Bar Check Correlation & retake pretest
			b) 239.31	175.50	239.32		
8	1742.5	1718.0	a) 238.29	174.410	238.312	64.2	Good Test, stabilised out after 4mins 20secs. Mobility – 43mD
			b) 239.31	175.47	239.32		
9	1744.0	1719.5	a) 238.51	174.502	238.52	64.4	Good Test, Good mobility – 377mD
			b) 239.53	175.57	239.53		
10	1746.5	1722	a) 238.88	174.662	238.90	64.6	Good Test, Good mobility – 211mD
			b) 239.88	175.72	239.90		
11	1749.3	1724.8	a) 239.27	174.876	239.28	65.0	Good Test, Poor mobility – 3.8mD
			b) 240.27	175.90	240.27		
12	1752.7	1728.2	a) 239.73	175.177	239.73	65.3	Good Test, Poor mobility – 13mD
			b) 240.72	176.21	240.72		
13	1754.2	1729.7	a) 239.97	175.850	239.98	65.7	Very Poor Permeability, abort test after 10 min build up, unstable Formation pressure. Mobility – 0.7mD.
			b) 240.98	176.86	240.95		
14	1753.7	1729.2	a) 239.40	175.505	239.97	66.0	Poor Permeability, 5 min build up, slightly unstable pressure +/- 0.003 Bar. Mobility – 4.4mD. Perform depth correlation
			b) 240.94	176.54	240.95		
15	1774.8	1750.2	a) 242.73	177.876	242.74	67.3	Good Test, Good mobility – 787mD
			b) 243.73	1768.93	243.73		
16	1777.3	1752.7	a) 243.07	178.118	243.07	67.4	Good Test, Very good mobility – 503mD.
			b) 244.08	179.18	244.08		

a) CQG Gauge b) Strain gauge

**MDT RESULTS - WELL HASSELMUS 6407/9-9-T2**  
**RUN No. 1B/D**

Test No.	Depth MDRT (m)	Depth TVDSS (m)	Initial Hydrostatic Pressure (BARS)	Formation Pressure (BARS)	Final Hydrostatic Pressure (BARS)	Temp. (C)	Remarks/Permeability
17	1736.1 (sample)	1711.7	a) -	174.253	-	67.1	Mobility – 193mD. Losing seal on pump, abort sampling operation, POOH to replace pump.
18	1736.1 (sample)	1711.7	a) -	174.500	-	-	Initial mobility was poor. Retracted & checked depth correlation before resetting probe.
19	1736.1 (sample)	1711.7	a) -	174.27	-	-	Mobility – 243mD. Start clean up, lose seal on pump seal – abort sampling.
20	1736.1 (sample)	1711.7	a) -	174.319	-	-	Mobility 48mD – poor permeability, move probe up 0.5m to improve Pretest.
21	1735.6 (sample)	1711.1	a) -	174.310	-	-	Poor mobility of 21.8mD, reset probe and observed 106.7mD. Started sample pump for clean up. Seal failed on pump. POOH.
22	1736.1 (sample)	1711.7	a) -	174.346	-	68.1	Run 1D - Perform pretest prior to pumping fluid & taking samples. Mobility – 375mD. Filled 1 gal chamber & 3x250cc SPMC bottles.
<b>Sequence of Events:</b>			<b>Sample No 1 @ 1736.1m</b>		<b>Run 1B</b>		<b>Sample Recovery Details:</b>
17:24, 01/7/99	Conduct Pretest to check mobility.						<b>1 Gallon Chamber:</b> Surface Pressure 2800psi.
17:29	Start pump and observe sample clean up.						<b>Recovered:</b> 35.9 cuft of gas (@ 16 deg C) and 93cc of fluid.  <b>Gas Analysis:</b> H2S : none detected, CO2 : 0.12%  <b>Chromatograph Analysis:</b> A sample of gas was analysed by Sperry Sun's Chromatograph and gave:- TG: 30.96%, C1 : 226000, C2 : 25600, C3 : 14300, IC4 : 2320, NC4 : 4350 PPM Ratio's: C1/C2 : 8.8, C1/C3 : 15.8, C1/C4 : 33.9 <b>Fluid Analysis:</b> Total fluid recovered from tool chamber : 93cc. Comprised approximately 83cc light oil/condensate and 10cc mudfiltrate/water. <b>Oil:</b> Density measured at 0.78sg at 18deg C, ie 50 API Gravity. The fluid was pale yellowish brown, translucent & gave a bright bluish white to milky fluorescence.  <b>SPMC's Opening Pressures:</b> 6290 psi SPMC(007), 6230psi SPMC (011), 10750psi SPMC (012). Transfer volumes for (007) & (011) SPMC'S were 178 & 198cc respectively. SPMC (012) was found to be empty  Estimated GOR : 68765 Cuft/bbl
18:08	Start to fill 1 gallon chamber (132), Fm Pressure : - 169.078bar.						
18:15	Closed 1 gallon chamber. Continue to observe clean up.						
18:32	Start filling bottle No.1, SPMC (07) - Temp 68.2deg C						
18:34	Bottle filled.						
18:35	Start filling bottle No.2, SPMC (11) - Temp 68.2 deg C						
18:38	Bottle filled.						
18:39	Start filling bottle No.3, SPMC (12) – Temp 68.2 deg C						
18:41	Bottle filled.						
18:42	Stop pump. Total volume pumped 69030cc.						
18:45	Retract probe – Tool stuck. Attempt to free tool.						
23:00	M/U overshot, strip into hole and free tool. POOH.						
00:00, 02/07/99	On Surface with tool.						
13:00	Sample chambers laid down on pipe deck. 1 gallon chamber opened and the contents analysed – see opposite.						
14:20							

a) CQG Gauge

Test No.	Depth MDRT (m)	Depth TVDSS (m)	Initial Hydrostatic Pressure (BARS)	Formation Pressure (BARS)	Final Hydrostatic Pressure (BARS)	Temp. (C)	Remarks/Permeability
23	1746.5 (sample)	1722.0	a) -	174.730	-	65.3	Run 1E – performed pretest prior to formation sampling operations. Mobility – 282mD. Filled 1 Gal chamber & 3x250cc SPMC bottles.
<b>Sequence of Events:</b>			<b>Sample No 2 @ 1746.4m</b>		<b>Run 1C</b>	<b>Sample Recovery Details: : Opened on pipe deck.</b>	
18:03 02/07/99		On sample depth.				<b>1 Gallon Chamber.</b> Surface pressure: 1860psi	
18:05		Conduct Pretest to check mobility.				<b>Recovered:</b> 18.1cuft of gas (@ 18 deg C) and 2.35ltr of fluid.	
18:10		Start pump and observe sample clean up.				<b>Gas Analysis:</b> H2S : None detected, CO2 : 0.17%	
19:47		Start to fill 1 gallon chamber (175), Fm Pressure : - 172.9 bar (C.2bar drawdown). – Temp 70.8 deg C.				<b>Chromatograph Analysis:</b> A sample of gas was analysed by Sperry Sun's Chromatograph and gave.-	
19:57		Closed 1 gallon chamber. Continue to observe clean up.				TG: 15.9 %, C1 : 71500, C2 : 19200, C3 : 16800, IC4 : 3340, NC4 : 6800 PPM	
20:00		Start filling bottle No.4, SPMC (013)				Ratio's: C1/C2 : 3.7, C1/C3 : 4.3, C1/C4 : 7.1	
20:01		Bottle filled.				<b>Fluid Analysis:</b> Total fluid recovered from tool chamber : 2.35 ltr.	
20:02		Start filling bottle No.5, SPMC (015)				Comprised approximately 235cc of light oil with an apparent trace of mudfiltrate/water.	
20:04		Bottle filled.				<b>Oil:</b> The density was 0.811sg at 18deg C, ie 43 API Gravity.	
20:06		Start filling bottle No.6, SPMC (016) – Temp 70.7 deg C				The fluid was opaque & dark yellowish brown. It gave a bright yellowish white direct fluorescence & bright light blue white cut fluorescence with acetone.	
20:09		Bottle filled. Stop pump. Total volume pumped 87165cc. Formation pressure 274.67 bar.				<b>SPMC's Opening Pressures:</b> 7040psi SPMC(013), 8580psi SPMC (015), 8580 psi SPMC (016). Transfer volumes for (013) & (015) SPMC'S were 238cc & 233cc respectively. SPMC (016) was found to be empty.	
20:10		Retract probe.				Estimated GOR : 12245 cuft/bbl	
20:12		Tool stuck. Attempt to free tool.					
21:00		R/U to fish MT. M/U overshot, strip into hole and free tool.					
24:00 03/07/99		POOH					
11:45		On surface.					
13:00		Sample chambers laid out on deck					
		NB: The bottles were filled using the sample pump rather than by flow control. This was to prevent re-invasion of mudfiltrate into the sample. No gas phase was observed.					

a) CQG Gauge

## 1.2 Casing Summary

Size inch	Weight Lbs/ft	Grade	Connection	Casing shoe mbdf	Comments
30"	310	X-52	SL-60	356	7 joints including wellhead joint
9 5/8"	53.5	P-110	NSCC	1050	Weight in slips 116 MT. String run on wellhead with 20" extension X/O to 9 5/8".

## 1.3 Mud

Section	Details
36" top hole:	Drilled Riserless, Sea water with Bentonite Hi-Vis pills as required. 1.20sg Hi-Vis mud left in hole for casing run
12.1/4" intermediate hole:	Drilled Riserless, Sea water with Bentonite Hi-Vis pills as required. 1.20sg Hi-Vis mud left in hole for casing run
8.1/2" production hole:	BARASILC (sodium silicate) mud at 1.35sg,
Abandonment:	1.35sg mud left in hole

## 1.4 Cementing

### 36" hole / 30" Conductor

Type and density:	55m3, 1.90sg, "G" slurry (200% excess)
Top of cement:	Seabed, 271mBDF
Casing shoe:	356mBDF

### 9.5/8" Surface Casing

Type and density:	61m3, 1.56sg, "G" Lead 13.5m3, 1.90sg, "G" Tail
Top of cement:	Seabed, 271mBDF (observed returns to seabed)
Casing shoe:	1050mBDF
Displacement:	29.5m3, no bump. Tested casing after WOC.

## 1.5 Side-track

Due to a stuck pipe incident while pulling out of hole after reaching TD, a side-track was performed.

Kick off plug 1730 – 1580 mbdf 5,5 m3 1.93sg slurry

The hole was subsequently side-tracked and drilled to TD successfully using one BHA.

To help reduce the risk of getting differentially stuck, Baracarb 5 was added to the mud system at 15 ppb

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Geochemical investigation of two crude oil samples from  
well 6407/9-9, Norway

by

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Sponsor: Shell Risavika

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## *Geochemical investigation of two crude oil samples from well 6407/9-9, Norway*

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### 1.0 Introduction

A geochemical investigation has been carried out on the following two crude oil samples from well 6407/9-9T2 (Hasselmus), Norway (request ref. e-mail of 21.07.99):

- 1736.1 m, bottom hole retrograde condensate sample, MDT sample 1.3 (OMC 8742);
- 1746.5 m, bottom hole oil sample, MDT sample 1.6 (OMC 8741).

The geochemical parameters are shown on pages 2 to 15, analysis results are presented on the yellow pages.

**Correlation table  
well 6407/9-9, Norway**

	6407/09-09 T2 1736.1 m S193381/1	6407/09-09 T2 1746 m S193380/1
OMC	8742	8741
API	48.9	45.6
Sulphur (%)	0.2	0.1
Vanadium (ppm)	0.0	0.0
Nickel (ppm)	14.0	5.0
Pristane/Phytane	2.40	1.93
Pristane/n-C17	0.89	0.85
Phytane/n-C18	0.53	0.51
Gasoline fraction (%)	32.0	20.3
C7 ALKANES:		
normal	50	53
monobranched	39	37
polybranched	11	10
C7 ALKANES/CYCLOALKANES:		
normal	23	24
cycloalkanes	54	55
branched	23	21
C7 ALKANES/AROMATICS:		
alkanes	45	43
cycloalkanes	52	53
aromatics	3	4
AROMATIC FRACTION:		
MNR	not detectable	1.27
DNR-1	not detectable	2.02
TNR-1	not detectable	0.46
TNR-2	not detectable	1.16
MPI-1	not detectable	0.33
MPI-2	not detectable	0.35
F-1	not detectable	0.37
F-2	not detectable	0.20
MONOAROMATIC STEROIDS:		
C27	24	20
C28	50	59
C29	25	20
C28TA/(C29MA+C28TA)	0.43	0.47
MA(I)/MA(I+II)	0.24	0.16
TA(I)/TA(I+II)	0.24	0.16
MA C27 V/(I+V) 20S	0.72	0.78
TA C26 20S/C28 20S	0.55	0.52
TA C27 20R/C28 20R	1.17	1.10
TA Dinosteroid index	0.94	0.76
STERANES/TRITERPANES:		
iso steranes	23	26
rearranged steranes	63	62
triterpanes	14	12
STERANE CONVERSION:		
iso steranes	29	32
rearranged steranes	54	51
normal steranes	17	17
STERANE CARBON NUMBERS:		
C27 steranes	31	33
C28 steranes	36	33
C29 steranes	33	34
3R/(3R+5R) terpanes	0.18	0.13
Ts/Tm	0.92	1.28
20S/20(R+S) C29 steranes	0.53	0.56
Iso/(iso+normal) C29 steranes	0.61	0.62
CARBON ISOTOPE RATIOS (per mil):		
total oil	-30.0	-29.6
saturates	-29.3	-29.8
aromatics	-27.8	-29.0



**Summary of the geochemical data of the oil sample from  
well 6407/09-09 T2 (1736.1 m), Norway**

**Gravity and Gross Composition**

API gravity (degrees) :	48.9
Specific gravity (g/ml) :	0.784
Viscosity (centipoise) :	1.29
Pourpoint (degrees C) :	-51
Total Acid Number (mgKOH/g) :	0.27
Wax content (%) :	no data
<b>Gross Composition (wt%)</b>	
Weight lost on topping :	75.7
Saturates :	21
Aromatics :	5
Heterocompounds :	73
Rest (high molecular) :	1
Gasoline fraction (%) :	32.0
Sulphur (%) :	0.2
Vanadium (ppm) :	0.0
Nickel (ppm) :	14.0

**Saturates Distribution***(Gas Chromatography)*

Pristane / Phytane :	2.40
Pristane / n-C17 :	0.89
Phytane / n-C18 :	0.53
ACI :	38
Corr. Coeff. :	-0.9988

**C7 Distribution***(Gas Chromatography)*

<b>C7 Alkanes (%)</b>	
Normal C7 :	50
Monobranched :	39
Polybranched :	11
<b>C7 Alkanes / Cycloalkanes (%)</b>	
Normal C7 :	23
Cycloalkanes :	54
Branched Alkanes :	23
<b>C7 Alkanes / Aromatics (%)</b>	
Alkanes :	45
Cycloalkanes :	52
Aromatics :	3

**Biomarkers Distribution***(Gas Chromatography / Mass Spectrometry)*

<b>Steranes/Triterpanes (%)</b>	
Iso Steranes :	23
Rearranged Steranes :	63
Triterpanes :	14
<b>Sterane Conversion (%)</b>	
Iso Steranes :	29
Rearranged Steranes :	54
Normal Steranes :	17
<b>Steranes Carbon Numbers (%)</b>	
C27 :	31
C28 :	36
C29 :	33
<b>Triterpanes (%)</b>	
C30 Hopane :	100
Oleanane ( $\alpha + \beta$ ) :	0
W + T :	0
<b>C29 Sterane Ratios</b>	
20S / (20R + 20S) :	0.53
Iso / (Iso + Normal) :	0.61
<b>Triterpane Ratios</b>	
Ts / Tm :	0.92
Ts / (Ts + Tm) :	0.48
3R / (3R + 5R) :	0.18

**Aromatics Distribution***(Gas Chromatography / Mass Spectrometry)*

<b>Monoaromatic Steroids (%)</b>	
C27 :	24
C28 :	50
C29 :	25
<b>Phenanthrene Ratios</b>	
MPI-1 :	not detectable
F-1 :	not detectable
F-2 :	not detectable

**Carbon Isotope Ratios***(Mass Spectrometry)*

Total Oil (topped) :	-30.0
Saturates :	-29.3
Aromatics :	-27.8

**Summary of the geochemical data of the oil sample from  
well 6407/09-09 T2 (1746 m), Norway**

**Gravity and Gross Composition**

API gravity (degrees) :	45.6
Specific gravity (g/ml) :	0.799
Viscosity (centipoise) :	4.05
Pourpoint (degrees C) :	-15
Total Acid Number (mgKOH/g) :	0.23
Wax content (%) :	no data
<b>Gross Composition (wt%)</b>	
Weight lost on topping :	54.4
Saturates :	66
Aromatics :	29
Heterocompounds :	4
Rest (high molecular) :	1
Gasoline fraction (%) :	20.3
Sulphur (%) :	0.1
Vanadium (ppm) :	0.0
Nickel (ppm) :	5.0

**Saturates Distribution**
*(Gas Chromatography)*

Pristane / Phytane :	1.93
Pristane / n-C17 :	0.85
Phytane / n-C18 :	0.51
ACI :	15
Corr. Coeff. :	-0.9963

**C7 Distribution**
*(Gas Chromatography)*

<b>C7 Alkanes (%)</b>	
Normal C7 :	53
Monobranched :	37
Polybranched :	10
<b>C7 Alkanes / Cycloalkanes (%)</b>	
Normal C7 :	24
Cycloalkanes :	55
Branched Alkanes :	21
<b>C7 Alkanes / Aromatics (%)</b>	
Alkanes :	43
Cycloalkanes :	53
Aromatics :	4

**Biomarkers Distribution**
*(Gas Chromatography / Mass Spectrometry)*

<b>Steranes/Triterpanes (%)</b>	
Iso Steranes :	26
Rearranged Steranes :	62
Triterpanes :	12
<b>Sterane Conversion (%)</b>	
Iso Steranes :	32
Rearranged Steranes :	51
Normal Steranes :	17
<b>Steranes Carbon Numbers (%)</b>	
C27 :	33
C28 :	33
C29 :	34
<b>Triterpanes (%)</b>	
C30 Hopane :	100
Oleanane ( $\alpha + \beta$ ) :	0
W + T :	0
<b>C29 Sterane Ratios</b>	
20S / (20R + 20S) :	0.56
Iso / (Iso + Normal) :	0.62
<b>Triterpane Ratios</b>	
Ts / Tm :	1.28
Ts / (Ts + Tm) :	0.56
3R / (3R + 5R) :	0.13

**Aromatics Distribution**
*(Gas Chromatography / Mass Spectrometry)*

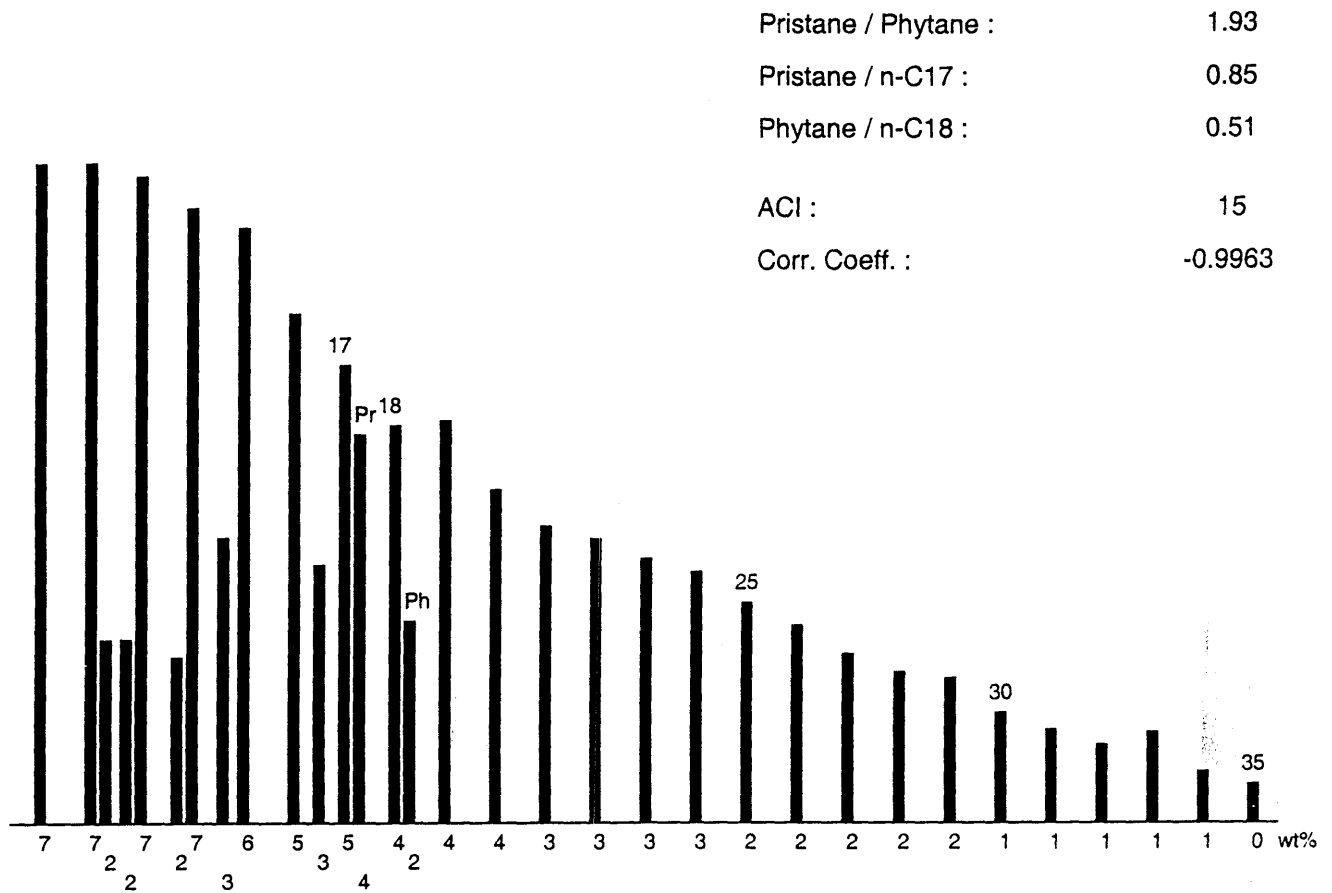
<b>Monoaromatic Steroids (%)</b>	
C27 :	20
C28 :	59
C29 :	20
<b>Phenanthrene Ratios</b>	
MPI-1 :	0.33
F-1 :	0.37
F-2 :	0.20

**Carbon Isotope Ratios**
*(Mass Spectrometry)*

Total Oil (topped) :	-29.6
Saturates :	-29.8
Aromatics :	-29.0

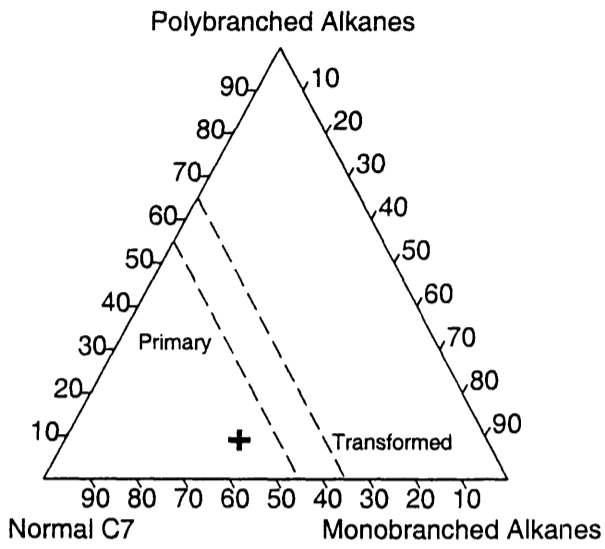


Bar diagram of normal alkanes & isoprenoids of the oil sample from well 6407/09-09 T2 (1746 m), Norway

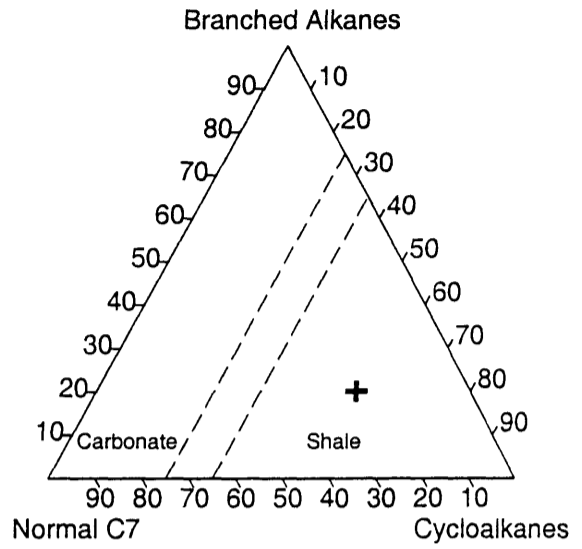


The light fraction (< 120 C) of the oil sample from well 6407/09-09 T2 (1746 m), Norway

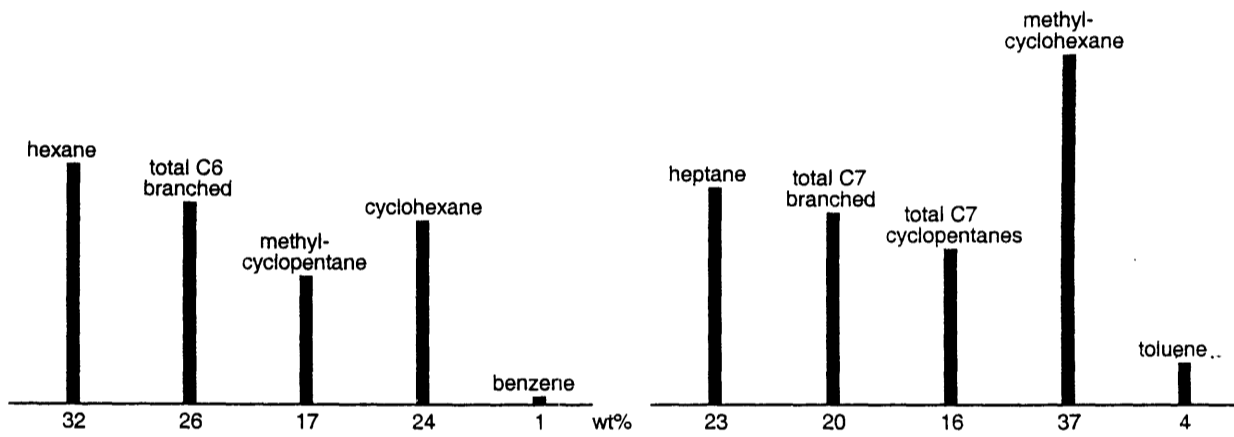
Alkane Distribution



Alkane/Cycloalkane Distribution



C6 and C7 Distributions



C7 ALKANES (%)

Normal C7 :	53
Monobranched :	37
Polybranched :	10

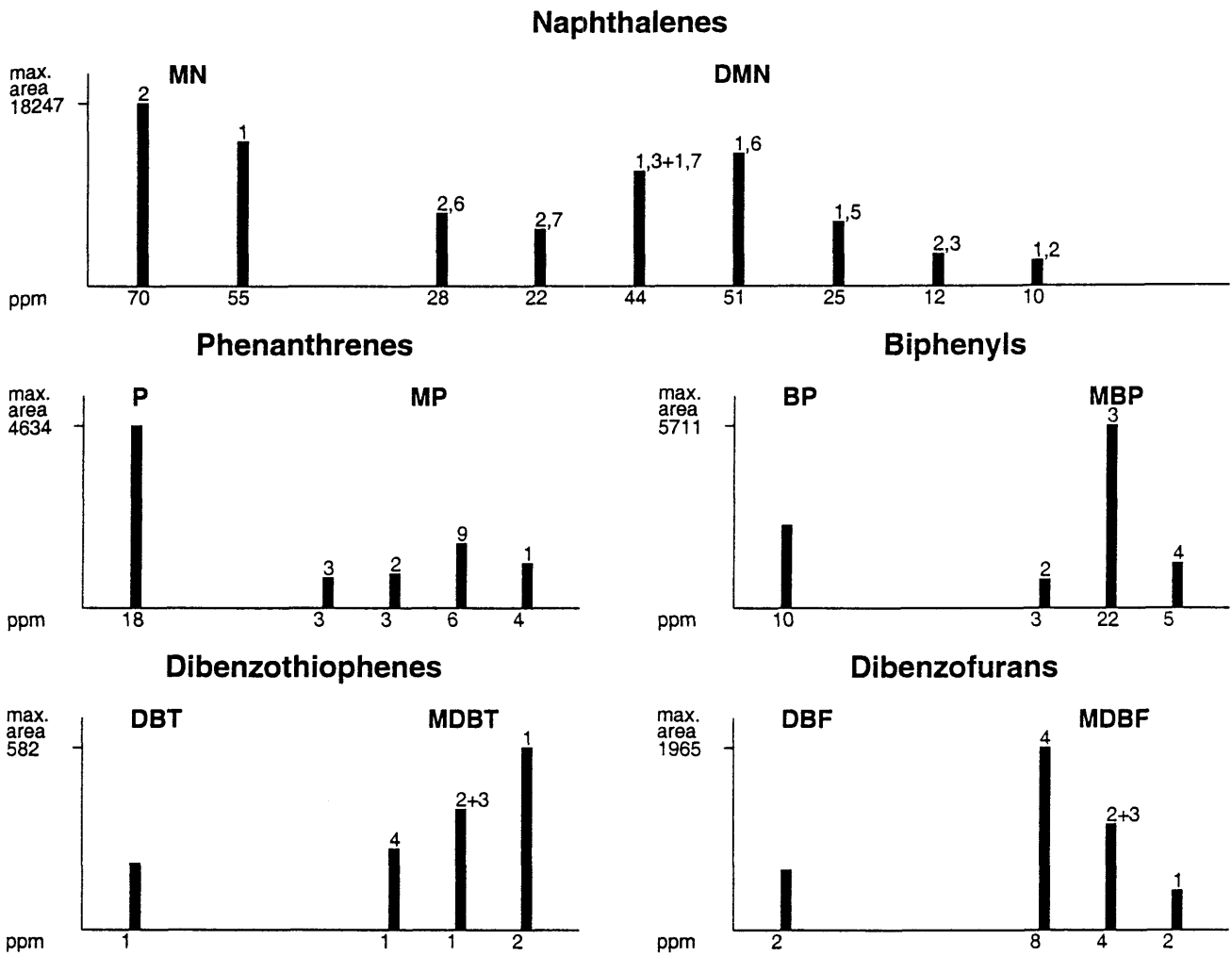
C7 ALKANES / CYCLOALKANES (%)

Normal C7 :	24
Cycloalkanes :	55
Branched Alkanes :	21

C7 ALKANES / AROMATICS (%)

Alkanes :	43
Cycloalkanes :	53
Aromatics :	4

**GC/MS of the aromatic fraction of the oil sample from well 6407/09-09 T2 (1746 m), Norway**

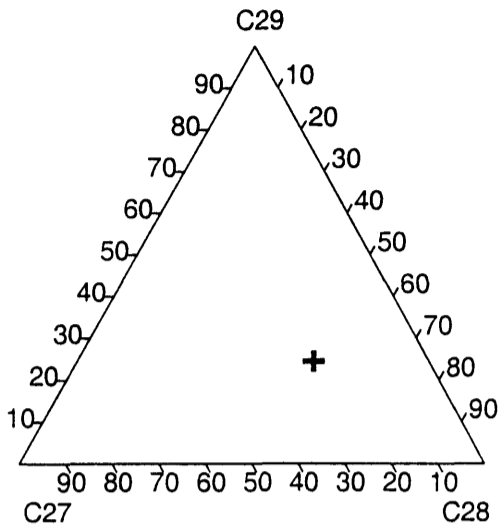


RATIOS	(value)	(VR/E*)
<i>Naphthalenes</i>		
MNR :	1.27	1.04
DNR-1 :	2.02	0.98
TNR-1 :	0.46	0.46
TNR-2 :	1.16	no data
<i>Phenanthrenes</i>		
MPI-1 :	0.33	0.57
MPI-2 :	0.35	0.60
F-1 :	0.37	0.67
F-2 :	0.20	0.63
<i>Overall ratios</i>		
Biphenyls/Naph. :	0.32	
Dibenzothiophenes/Naph. :	0.04	
Dibenzofurans/Naph. :	0.13	

\* Calibration based on literature values

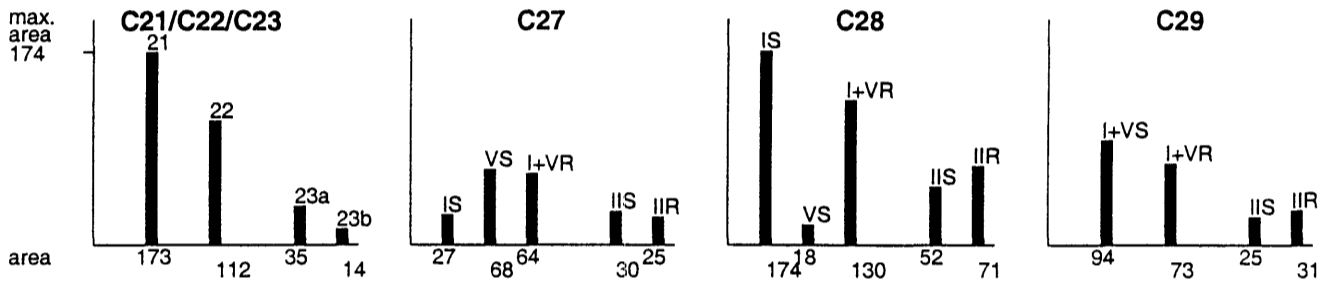
**GC/MS of the aromatic steroids of the oil sample from well 6407/09-09 T2 (1736.1 m), Norway**

**Monoaromatic Steroids**

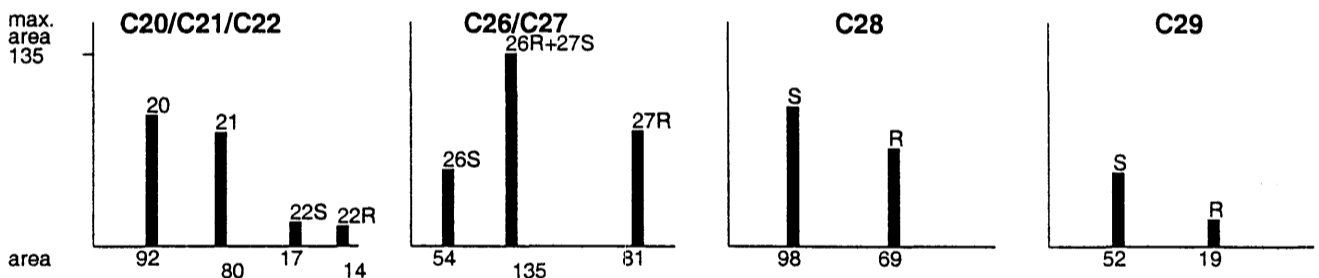


MONOAROMATIC STEROIDS	(ppm)	(%)
C27 :		24
C28 :		50
C29 :		25
<b>RATIOS</b>		
C28TA/(C29MA+C28TA) :		0.43
MA(I)/MA(I+II) :		0.24
TA(I)/TA(I+II) :		0.24
MA C27 V/(I+V) 20S :		0.72
TA C26 20S/C28 20S :		0.55
TA C27 20R/C28 20R :		1.17
3MeTA C28 20R/C29 20R :		2.80
(3/(3+4))MeTA C29 20R :		0.36
(3+4)MeTA C27 20S/C29 20S :		3.64
(3+4)MeTA C28 20R/C29 20R :		2.36
TA Dinosteroid index :		0.94

**Monoaromatic Steroids**

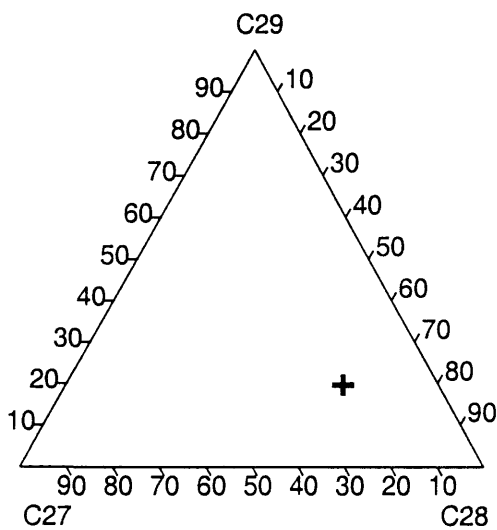


**Triaromatic Steroids**



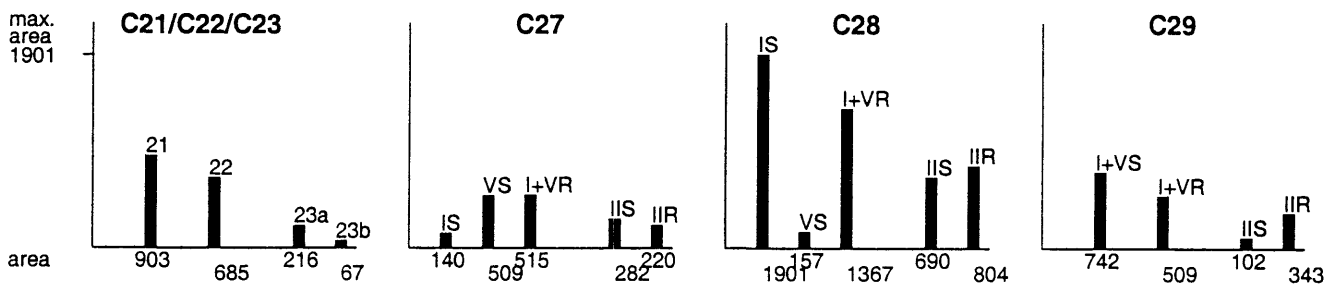
## GC/MS of the aromatic steroids of the oil sample from well 6407/09-09 T2 (1746 m), Norway

### Monoaromatic Steroids

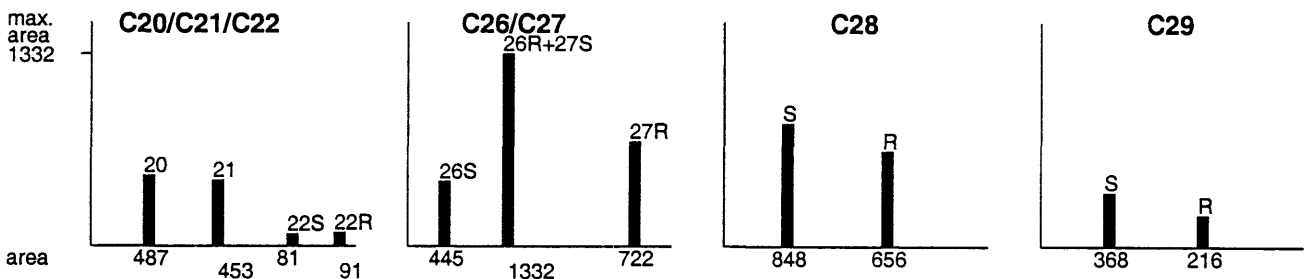


MONOAROMATIC STEROIDS	(ppm)	(%)
C27 :		20
C28 :		59
C29 :		20
<b>RATIOS</b>		
C28TA/(C29MA+C28TA) :		0.47
MA(I)/MA(I+II) :		0.16
TA(I)/TA(I+II) :		0.16
MA C27 V/(I+V) 20S :		0.78
TA C26 20S/C28 20S :		0.52
TA C27 20R/C28 20R :		1.10
3MeTA C28 20R/C29 20R :		1.18
(3/(3+4))MeTA C29 20R :		0.52
(3+4)MeTA C27 20S/C29 20S :		1.64
(3+4)MeTA C28 20R/C29 20R :		1.57
TA Dinosteroid index :		0.76

### Monoaromatic Steroids



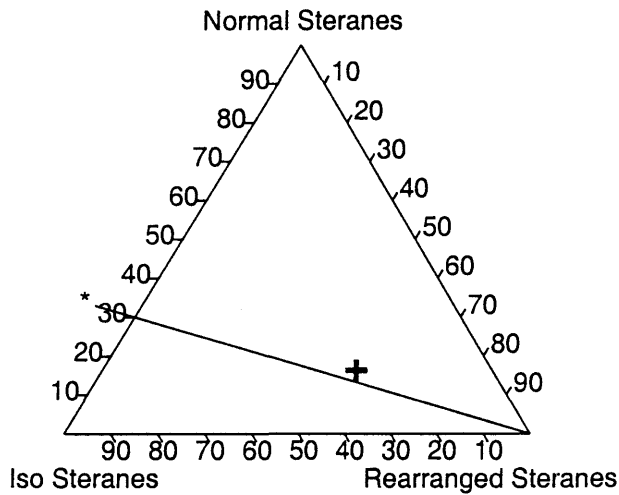
### Triaromatic Steroids



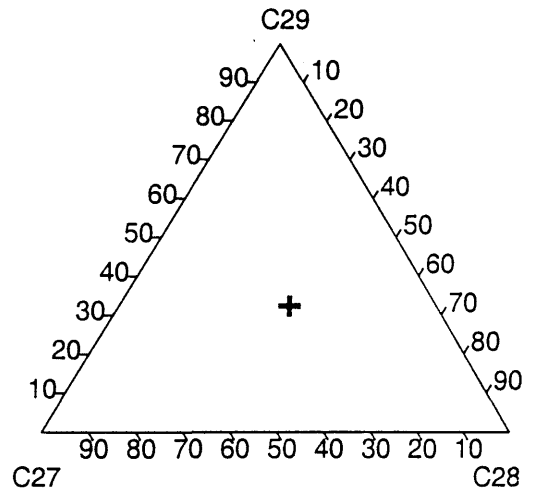


## GC/MS sterane typing of the oil sample from well 6407/09-09 T2 (1736.1 m), Norway

**Sterane Conversion Diagram**

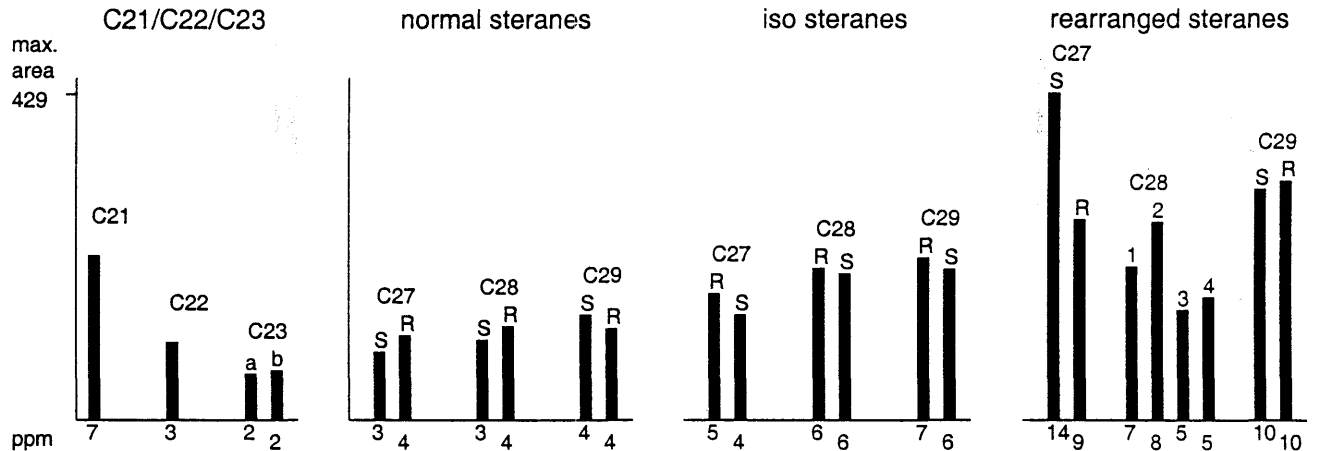


**Sterane Typing Diagram**



\* The line of complete sterane isomerisation indicating a mature character

### Sterane Distribution



STERANE DISTRIBUTION (ppm)	(%)
Iso Steranes :	36 29
Rearranged Steranes :	67 54
Normal Steranes :	22 17

**CARBON NUMBER DISTRIBUTION**

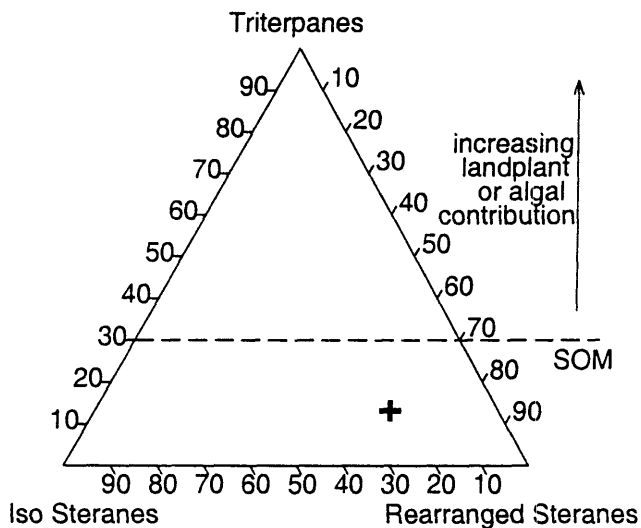
C27 :	39 31
C28 :	45 36
C29 :	42 33

**C29 STERANE CONVERSION RATIOS**

20S / (20R + 20S) :	0.53
Iso / (Iso + Normal) :	0.61

## GC/MS triterpane typing of the oil sample from well 6407/09-09 T2 (1736.1 m), Norway

### Sterane/Triterpane Diagram



#### STERANES/TRITERPANES (calculated %)

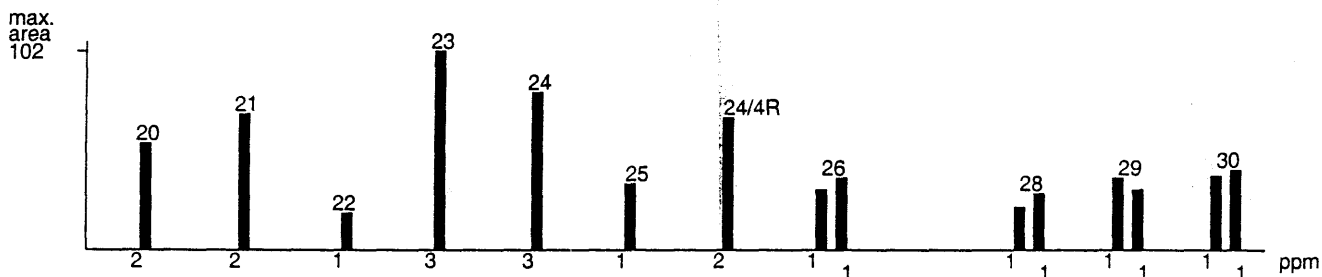
Iso Steranes :	23
Rearranged Steranes :	63
Triterpanes :	14

#### TRITERPANE CONVERSION RATIOS

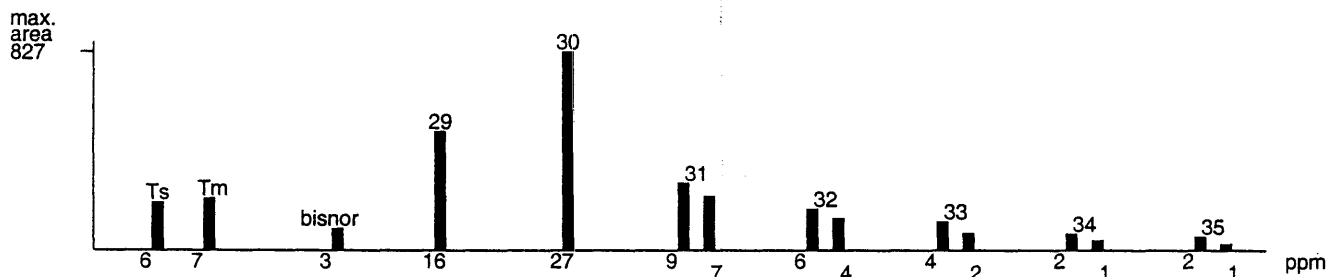
Ts / Tm :	0.92
Ts / (Ts + Tm) :	0.48
3R / (3R + 5R) :	0.18

C30 Hopane (ppm) : 27

### Tri- and Tetracyclic Terpanes

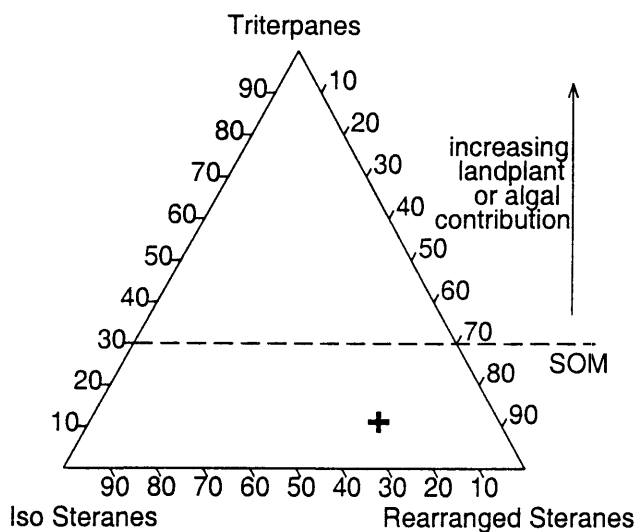


### Pentacyclic Terpanes



## GC/MS triterpane typing of the oil sample from well 6407/09-09 T2 (1746 m), Norway

### Sterane/Triterpane Diagram



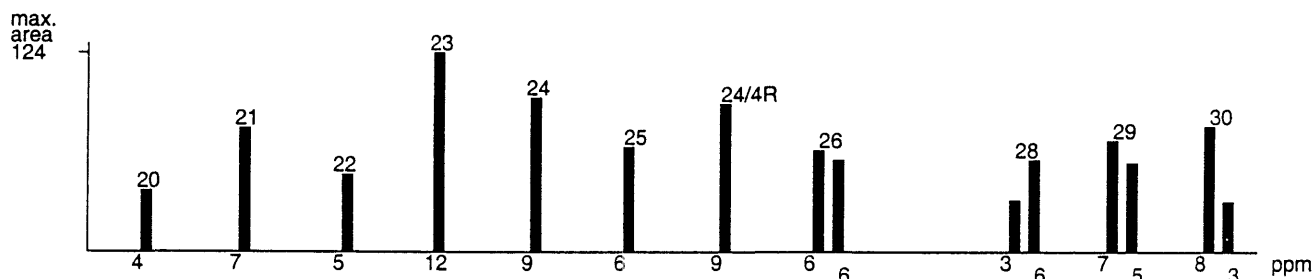
#### STERANES/TRITERPANES (calculated %)

Iso Steranes :	26
Rearranged Steranes :	62
Triterpanes :	12

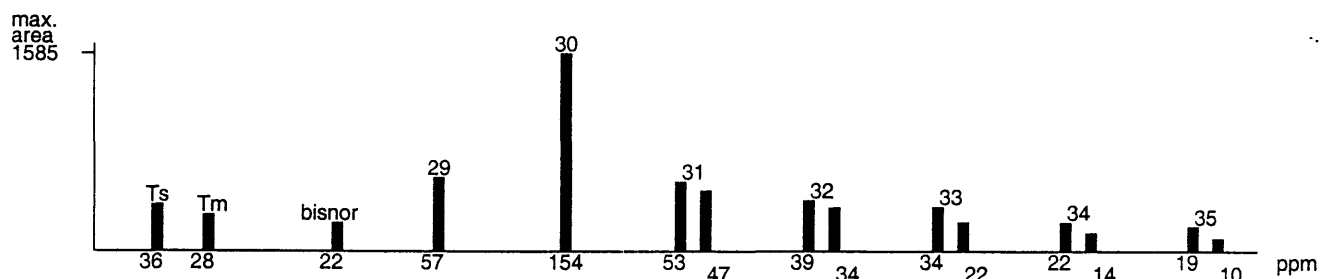
#### TRITERPANE CONVERSION RATIOS

Ts / Tm :	1.28
Ts / (Ts + Tm) :	0.56
3R / (3R + 5R) :	0.13
C30 Hopane (ppm) :	154

### Tri- and Tetracyclic Terpanes



### Pentacyclic Terpanes





**Data for the enlarged part of the whole oil gas chromatogram from  
well 6407/09-09 T2 (1736.1 m), Norway**

Retention Time	Area	Fit Height	Peak Name	Retention Time	Area	Fit Height	Peak Name
22.41	694.061	118.9295		32.55	152.115	26.4096	
22.57	124.069	23.7111		32.91	2139.205	224.3213	nC11
22.66	113.490	22.2684		33.06	14.546	2.8526	
22.87	392.246	72.3731		33.26	28.398	5.4766	
23.04	40.345	8.4432		33.43	51.371	5.9769	
23.19	341.661	63.0114		33.73	195.243	20.2757	
23.32	340.274	58.8669		34.19	203.754	22.2630	
23.50	386.339	60.7194		34.33	32.087	5.0660	
23.63	52.734	12.0383		34.47	9.932	2.0160	
23.73	86.442	16.0441		34.61	41.522	7.1005	
23.90	23.424	5.7025		34.84	468.229	53.8987	
24.21	217.750	29.0138		35.23	70.258	12.4070	
24.35	40.505	6.5172		35.36	51.900	9.0404	
24.52	239.303	32.1518		35.42	45.865	8.5247	
24.72	19.784	5.1368		35.57	31.895	5.7524	
24.83	59.399	9.6246		35.69	44.596	6.7220	
25.23	3031.229	299.1628	nC10	35.82	16.698	3.4417	
25.31	46.867	9.2939		36.04	60.235	8.9710	
25.49	102.520	17.5870		36.14	40.018	7.3559	
25.69	50.233	8.2809		36.41	67.292	7.0247	
25.83	28.271	4.0625		36.54	51.071	7.2762	
26.05	122.364	11.7439		36.74	33.090	4.5375	
26.26	242.134	37.7818		36.93	127.132	21.6712	
26.37	115.705	13.9690		37.01	122.948	22.8015	
26.67	107.174	15.0546		37.30	188.421	28.9352	
26.94	1077.124	178.7739		37.64	322.914	45.1734	
27.05	26.869	5.7601		37.88	56.586	7.0057	
27.32	280.838	28.9107		38.09	149.143	25.4055	
27.54	94.887	12.4697		38.24	20.204	3.1532	
27.70	272.101	35.7828		38.39	23.410	3.2247	
27.93	79.864	15.9042		38.62	82.372	10.0675	
28.04	226.527	34.1845		38.81	79.625	11.2275	
28.16	283.621	35.9055		38.97	52.469	8.9903	
28.31	81.157	14.6192		39.14	61.687	10.4962	
28.63	27.975	4.5088		39.24	93.947	9.5625	
28.74	91.083	11.9641		39.52	79.175	8.3842	
28.95	25.482	5.6338		39.70	37.349	5.5169	
29.05	82.913	8.8736		39.83	15.242	2.8024	
29.34	28.668	4.6350		39.99	0.964	0.3027	
29.51	256.058	36.8988		40.42	1385.277	158.9748	nC12
29.75	287.979	41.9135		40.57	26.831	4.2309	
30.05	387.728	63.3472		40.70	13.535	2.5091	
30.15	103.403	17.6595		40.85	61.899	6.9413	
30.49	308.980	46.3664		41.18	75.617	9.5408	
30.66	13.334	2.7799		41.46	432.117	65.2852	iC13
30.86	28.629	3.8392		41.69	35.873	5.4475	
31.06	147.494	23.4727		41.82	11.512	3.0978	
31.26	159.461	17.3536		41.94	64.256	8.7965	
31.47	93.527	15.8370		42.09	14.839	2.3187	
31.58	75.466	13.5406		42.36	70.220	7.4131	
31.74	135.302	15.0764		42.57	159.861	24.6514	
31.89	116.044	13.0709		42.89	78.473	9.4723	
32.09	36.869	7.7280		43.11	52.360	4.6036	
32.17	99.113	10.2234		43.35	31.539	5.1084	

## GC/MS data of the aromatic fraction from well 6407/09-09 T2 (1736.1 m), Norway

Report of sample: Norway 6407/09-09 T2 1736.1 m omc 8743

Acquired at : 10-Oct-1999

Standard used for calculations: PDP  
Discrimination factor : 0.59

### I) NAPHTHALENES

#### a) Concentrations (ppm)

2-MN  
1-MN  
2,6+2,7-DMN  
1,6-DMN  
1,5-DMN  
1,3,5+1,4,6-TMN  
2,3,6-TMN  
1,2,5-TMN  
C4-NAPH  
THN  
CAD  
Total Naphthalenes

#### b) Parameters

2-MN/1-MN (MNR) 1.31  
2,6+2,7-DMN/1,5-DMN (DNR-1) 2.26  
2,3,6-TMN/1,3,5+1,4,6-TMN (TNR-1) 0.52  
2,3,6-TMN/1,2,5-TMN (TNR-2) 1.51  
2,3,6-TMN/THN 0.57  
2,3,6-TMN/Cadelene 1.20

### II) PHENANTHRENES

#### a) Concentrations (ppm)

P  
3-MP  
2-MP  
9-MP  
1-MP  
Total Phenantrenes

#### b) Parameters

2-MP/1-MP 1.08  
1.5\*(2+3-MP/(P+1+9-MP)) (MPI-1) 0.59  
3\*(2-MP/(P+1+9-MP)) (MPI-2) 0.64  
2+3-MP/1+9-MP 0.88  
2+3-MP/1+9+2+3-MP 0.47

### III) DIBENZOTHIOPHENES

#### a) Concentrations (ppm)

DBT  
4-MDBT  
2+3-MDBT  
1-MDBT  
Total Dibenzothiophenes

MN = methylnaphthalene  
DMN = dimethylnaphthalene  
TMN = trimethylnaphthalene  
THN = tetrahyronaphthalene  
DBF = methyldibenzofuran  
MDBF = methyldibenzofuran  
NAPH\* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

#### b) Parameters

43 4-MDBT/2+3-MDBT 1.74  
33 4-MDBT/1-MDBT 4.36  
24 2+3-MDBT/1-MDBT 2.51  
23 4-MDBT/DBT 1.48  
11 2+3-MDBT/DBT 0.85  
12 1-MDBT/DBT 0.34

### IV) BIPHENYLS

#### a) Concentrations (ppm)

11 BP 6  
5 2-MBP 2  
175 3-MBP 10  
4-MBP 3  
Total Biphenyls 20

#### b) Parameters

3-MBP/BP 1.60  
3-MBP/4-MBP 3.57  
3-MBP/2-MBP 5.28  
1.20

### V) DIBENZOFURANS

#### a) Concentrations (ppm)

DBF 1  
8 4-MDBF 2  
3 2+3-MDBF 1  
3 1-MDBF 1  
4 Total Dibenzofurans 6  
3

#### b) Parameters

4-MDBF/2+3-MDBF 1.62  
4-MDBF/1-MDBF 3.37  
2+3-MDBF/1-MDBF 2.08  
4-MDBF/DBF 2.02  
2+3-MDBF/DBF 1.24  
1-MDBF/DBF 0.60

### VI) OVERALL RATIOS

Biphenyls/NAPH\* 0.38  
Dibenzothiophenes/NAP 0.08  
Dibenzofurans/NAPH\* 0.11

P = phenanthrene  
MP = methylphenanthrene  
DBT = dibenzothiophene  
MDBT = methyldibenzothiophene  
BP = biphenyl  
MBP = methylbiphenyl

**GC/MS data of the aromatic fraction from  
well 6407/09-09 T2 (1736.1 m), Norway**

## VII ) Misc. NAPHTHALENES

## a) Concentrations (ppm)

2,6-DMN	13	4,5-DMP	0
2,7-DMN	12	2,6+3,6-DMP	1
1,3+1,7-DMN	20	3,5-DMP	1
1,6-DMN	23	2,7-DMP	1
1,4-DMN	n.d.	3,9-DMP	4
2,3-DMN	5	1,6+2,5+2,9-DMP	2
1,5-DMN	11	1,7-DMP	1
1,2-DMN	4	1,9+4,9-DMP	1
1,4+2,3-DMN	5	1,5-DMP	n.d.
		1,8-DMP	0
		1,2-DMP	0
		9,10-DMP	n.d.
1,3,7-TMN	10	1,2,6-TMP	0
1,3,6-TMN	14	1,2,5-TMP	0
1,3,5+1,4,6-TMN	12	1,2,9-TMP	0
2,3,6-TMN	6	1,2,7-TMP	n.d.
1,2,7-TMN	2	1,2,8-TMP	0
1,6,7-TMN	10		
1,2,6-TMN	1		
1,2,4-TMN	1		
1,2,5-TMN	4		
1,3,5,7-TeMN	4		
1,3,6,7-TeMN	4		
1,2,4,7-TeMN	3		
1,2,5,7-TeMN	1		
2,3,6,7-TeMN	1		
1,2,6,7-TeMN	1		
1,2,5,6-TeMN (C4-NAPH)	2		

## b) Parameters

1,2,5-TMN/1,3,6-TMN	0.31
1,2,7-TMN/1,3,7-TMN	0.22

The assignment of some of these peaks is tentative

## GC/MS data of the aromatic steroids from well 6407/09-09 T2 (1736.1 m), Norway

Report of sample: Norway 6407/09-09 T2 1736.1 m omc 8743

Acquired at : 10-Oct-1999

Standard used for calculations: First  
Discrimination factor : 1.62

I) Monoaromatic steroids  
Intensities (arbitrary units)

MA C21 a ?	106
MA C21 b ?	48
MA C22 a ?	100
MA C22 b ??	47
MA C23 a ?	32
MA C23 b ?	12
MA C27 I 20S	24
MA C27 V 20S	61
MA C27 I 20R + MA C27 V 20R	57
MA C27 II 20S	27
MA C28 I 20S	156
MA C28 V 20S	16
MA C27 II 20R	23
MA C28 II 20S	47
MA C28 I 20R + MA C28 V 20R	116
MA C29 I 20S + MA C29 V 20S	84
MA C29 II 20S	22
MA C28 II 20R	64
MA C29 I 20R + MA C29 V 20R	66
MA C29 II 20R	28

II) Triaromatic steroids  
Intensities (arbitrary units)

TA C20	82
TA C21	71
TA C22 20S	15
TA C22 20R	12
TA C26 20S	48
TA C26 20R + TA C27 20S	121
TA C28 20S	87
TA C28 20S	n.d.
TA C27 20R	73
TA C29 20S	34
TA C29 20S	12
TA C28 20R	62
TA C29 20R	17

III) Methylated Triaromatic steroids  
Intensities (arbitrary units)

1Me TA C21 ?	25
3Me TA C21	28
6Me TA C21 ?	13
4Me TA C21	34
3Me TA C22	28
4Me TA C22	29
3Me TA C27 20S	20
4Me TA C27 20S	16
2Me TA C28 20S	5
3Me TA (C27 + C28) 20S	30
4Me TA (C27 + C28) 20S ?	47
4Me TA (C27 + C28) 20S ?	n.d.
2Me TA C29 20S	1
TA dinosteroid D1	15
3Me TA C29 20S	10
TA dinosteroid D2	31
2Me TA C28 20R	29
4Me TA C29 20S	n.d.
3Me TA C28 20R	12
4Me TA C28 20R	17
TA dinosteroid D3	28
TA dinosteroid D4	31
2Me TA C29 20R	1
3Me TA C29 20R	5
TA dinosteroid D5	26
4Me TA C29 20R	8
TA dinosteroid D6	36

IV) Parameters

% MA C27	24.94
% MA C28	48.92
% MA C29	26.15
TA C28/(MA C29 + TA C28)	0.43
MA (I)/MA (I+II)	0.28
TA (I)/TA (I+II)	0.25
MA C27 V 20S/(MA C27 (I+V) 2	0.72
TA C26 20S/TA C28 20S	0.55
TA C27 20R/TA C28 20R	1.17
3Me TA C28 20R/3Me TA C29 20	2.65
3Me TA C29 20R/(3+4)Me TA C2	0.36
TA (3+4)Me C27 20S/(3+4)Me C	3.79
TA (3+4)Me C28 20R/(3+4)Me C	2.28



*GC data of the light fraction (< 120 C) of the oil sample from  
well 6407/09-09 T2 (1736.1 m), Norway*

COMPONENT		RET. TIME	HEIGHT	AREA
No.	Name	(min)	(uV)	(uVs)
1	methane	0.00	0	0
2	ethane	0.00	0	0
3	propane	24.46	376	19902
4	i-butane	25.21	2963	157238
5	n-butane	25.88	12674	694521
6	i-pentane	28.73	50341	3063567
7	n-pentane	30.47	73248	4806707
8	2.2-dimethylbutane	33.78	2616	188358
9	cyclopentane	36.14	7401	612720
10	2.3-dimethylbutane	37.82	8762	762190
11	2-methylpentane	38.74	60461	5436048
12	3-methylpentane	41.01	33563	3252817
13	n-hexane	45.09	82725	9395473
14	methylcyclopentane	49.48	43669	5213651
15	2.2-dimethylpentane	52.03	2235	262190
16	benzene	52.71	1306	166949
17	2.4-dimethylpentane	53.70	5013	620443
18	2.2.3-trimethylbutane	55.17	554	65301
19	cyclohexane	59.85	51869	7898926
20	3.3-dimethylpentane	63.02	941	127158
21	1.1-dimethylcyclopentane	67.30	5836	907586
22	2-methylhexane	69.41	22443	3695793
23	2.3-dimethylpentane	69.98	8261	1196707
24	1-c-3-dimethylcyclopentane	73.16	8527	1575294
25	3-methylhexane	73.89	24366	4065576
26	1-tr-3-dimethylcyclopentane	75.30	8716	1443992
27	1-tr-2-dimethylcyclopentane	76.61	14789	2487973
28	3-ethylpentane	78.25	2354	375635
29	standard	82.34	10488	1885669
30	n-heptane	91.23	39736	10523677
31	1-c-2-dimethylcyclopentane	95.95	1923	418956
32	methylcyclohexane	100.52	49939	16825174
33	1.1.3-trimethylcyclopentane	103.79	4515	929330
34	2.2-dimethylhexane	106.36	658	139138
35	ethylcyclopentane	109.33	3368	773608
36	2.5-dimethylhexane	116.05	2182	521240
37	not_present	0.00	0	0
38	2.2.3-trimethylpentane	118.66	2772	670488
39	1-tr-2-c-4-trimethylcyclopentane	122.47	3588	926400
40	toluene	124.26	4299	1193088

total area excluding i.s.: 91413803

Weight percentage internal standard: 0.66  
Weight percentage C7 fraction : 32.00

**Data for the enlarged part of the whole oil gas chromatogram from  
well 6407/09-09 T2 (1746 m), Norway**

**Peak Information**

Retention Time	Area	Fit	Height	Peak Name	Retention Time	Area	Fit	Height	Peak Name
3.41	25.389		16.6695		12.17	31.204		5.9095	
3.45	398.795		227.6649		12.36	23.592		6.5538	
3.53	358.450		205.9367		12.46	67.363		17.9736	
3.60	1238.225		646.4460		12.60	107.688		19.7020	
3.84	1834.269		674.2089		12.82	802.168		194.5457	
4.00	4316.514		987.8243	iC5(6)	12.99	267.868		70.2085	
4.24	697.281		221.4112		13.10	220.792		57.6038	
4.31	1699.173		227.5811		13.22	38.876		10.3716	
4.54	18175.932		987.8488		13.34	170.667		32.0778	
4.82	594.507		477.9697		13.49	47.656		11.2081	
5.02	1734.097		987.6520	nC6(13)	13.60	19.980		4.8335	
5.40	1101.050		628.1948	MCP(14)	13.82	14.952		4.6126	
5.47	94.811		52.5809		13.91	137.735		35.8268	
5.56	14.119		5.9489		13.98	175.492		37.5819	
5.86	58.655		26.0231	Benzene(16)	14.24	11.778		2.2364	
5.95	22.809		10.5842		14.43	467.486		97.0396	
6.04	1609.743		779.5589	CH(19)	14.59	332.062		52.2410	
6.25	749.435		281.6686	2MH(22)	14.90	33.941		6.9594	
6.34	161.302		77.8851		15.13	179.230		47.0572	
6.47	634.036		304.3788	3MH(25)	15.20	283.906		66.4561	
6.62	284.346		135.5884		15.37	40.320		8.3827	
6.69	276.036		122.5690		15.51	49.683		12.2602	
6.76	497.063		209.2407	1t2DMCP(27)	15.63	308.339		69.1834	
7.18	1862.826		658.8323	nC7	15.74	31.992		9.0279	
7.80	3370.524		922.0471	MCH(32)	15.82	160.115		30.7131	
7.87	178.863		76.2086		16.04	13.634		2.5355	
8.16	156.217		62.1531		16.27	405.398		74.8592	
8.23	84.572		32.3005		16.41	147.228		32.5812	
8.29	105.165		38.6274		16.61	13.975		2.9662	
8.48	187.378		60.2085		16.73	33.337		5.3526	
8.76	147.862		53.3541		16.94	20.470		4.3419	
8.88	16.888		5.5570		17.16	16.506		3.4620	
9.05	406.568		130.2522	Toluene(40)	17.38	24.196		5.9696	
9.35	165.925		36.1652		17.63	1662.305		237.7506	nC9
9.66	687.387		192.6284		17.72	26.912		5.1638	
9.72	201.450		70.0226		18.17	183.994		28.3741	
9.84	25.640		6.6219		18.36	145.244		27.9279	
10.01	1119.492		294.5902		18.62	66.468		8.9729	
10.09	288.840		101.0368		18.77	28.235		5.5990	
10.30	94.227		30.3072		18.87	50.889		10.4875	
10.51	60.042		18.0768		18.95	44.248		9.7496	
10.67	169.666		33.9698		19.17	404.839		81.9041	
10.75	23.713		7.2693		19.37	65.366		13.1343	
10.89	340.184		102.8263		19.51	59.800		12.0362	
11.38	1834.715		354.0342	nC8	19.69	110.786		11.1771	
11.65	29.889		7.0590		20.02	364.638		61.9244	
11.85	2.438		0.6670		20.19	68.899		13.0428	
11.95	14.028		3.8175		20.30	36.350		6.8376	
					20.47	168.986		27.2247	
					20.60	43.612		7.1294	
					20.76	146.026		28.4193	
					20.94	142.211		21.7135	
					21.34	129.997		22.0028	
					21.46	158.941		18.3545	

*Data for the enlarged part of the whole oil gas chromatogram from  
well 6407/09-09 T2 (1746 m), Norway*

Retention Time	Area	Fit	Height	Peak Name	Retention Time	Area	Fit	Height	Peak Name
21.76	23.170		3.9799		32.47	86.041		13.9696	
21.97	77.659		17.4026		32.77	1068.017		146.6850	nC11
22.08	255.863		43.0248		32.95	8.194		1.3568	
22.29	264.733		45.6817		33.16	13.032		2.4405	
22.48	43.451		9.0290		33.32	24.963		3.2242	
22.57	52.324		10.1463		33.64	103.706		12.6514	
22.76	144.521		28.2280		34.10	118.613		10.2517	
22.95	20.907		4.3007		34.54	17.682		3.1777	
23.10	161.732		31.9255		34.75	257.644		28.3124	
23.21	151.981		26.8616		35.15	39.047		6.8826	
23.39	166.884		23.9170		35.28	23.189		4.3085	
23.55	23.952		5.0991		35.38	28.200		4.6122	
23.66	34.396		6.4231		35.49	16.299		3.0416	
23.83	10.519		2.4856		35.62	20.064		3.1463	
24.13	95.290		12.3088		35.76	9.745		1.7606	
24.29	19.431		3.5353		35.98	53.204		4.9530	
24.45	111.115		13.8978		36.36	38.407		4.0120	
24.76	25.903		4.3168		36.48	24.393		3.7889	
25.06	1240.289		180.0772	nC10	36.68	16.184		2.1462	
25.22	29.186		4.8711		36.86	65.421		11.5099	
25.39	44.056		8.6695		36.95	64.898		11.6064	
25.60	30.606		3.6449		37.22	103.371		15.7395	
25.95	50.395		5.2796		37.57	171.028		24.4445	
26.17	110.058		16.4448		37.81	39.159		4.3508	
26.31	39.807		5.0850		38.02	78.706		13.4729	
26.58	40.950		6.4252		38.17	11.783		1.9495	
26.82	464.779		80.2128		38.31	16.536		2.3069	
27.23	118.404		12.8197		38.55	45.786		5.6265	
27.44	41.784		6.4877		38.74	49.171		6.8452	
27.61	127.333		17.3852		38.90	32.337		5.4793	
27.95	124.619		16.3449		39.07	39.243		6.4898	
28.05	125.380		21.0915		39.17	53.463		5.5439	
28.22	77.403		8.2573		39.45	51.677		5.3483	
28.56	13.018		1.8727		39.63	22.155		3.3365	
28.68	40.424		4.9884		39.78	9.911		1.7975	
28.88	12.996		2.6417		40.31	870.521		118.5824	nC12
28.98	32.501		3.6132		40.50	16.276		2.1911	
29.27	13.261		2.1650		40.63	7.702		1.5038	
29.43	113.370		15.8706		40.78	41.489		5.0189	
29.66	131.511		19.9351		41.13	51.900		6.6511	
29.95	175.452		29.0229		41.37	251.779		39.9135	iC13
30.09	52.611		7.8808		41.63	22.172		3.1220	
30.41	140.423		21.0865		41.87	47.634		5.4272	
30.57	7.509		1.5220		42.03	9.302		1.4065	
30.79	11.298		1.5604		42.30	46.641		4.6781	
30.98	72.470		11.8146		42.49	113.630		17.7019	
31.18	77.584		8.4979		42.82	54.620		6.7823	
31.40	48.083		7.9864		43.04	37.415		3.3455	
31.51	36.496		6.8587		43.29	20.940		3.4271	
31.69	71.511		7.3519		43.43	15.890		2.4632	
31.80	61.514		6.8762		43.73	37.994		3.7065	
32.00	21.718		4.0986		44.07	83.295		10.1007	
32.11	45.366		5.0368		44.21	48.407		7.7743	
32.28	4.176		0.9041		44.53	77.488		10.2823	

## GC/MS data of the aromatic fraction from well 6407/09-09 T2 (1746 m), Norway

Report of sample: Norway 6407/09-09 T2 1746 m omc 8741

Acquired at : 10-Oct-1999

Standard used for calculations: PDP  
Discrimination factor : 0.39

### I) NAPHTHALENES

#### a) Concentrations (ppm)

2-MN  
1-MN  
2,6+2,7-DMN  
1,6-DMN  
1,5-DMN  
1,3,5+1,4,6-TMN  
2,3,6-TMN  
1,2,5-TMN  
C4-NAPH  
THN  
CAD  
Total Naphthalenes

#### b) Parameters

70 4-MDBT/2+3-MDBT 0.67  
55 4-MDBT/1-MDBT 0.44  
50 2+3-MDBT/1-MDBT 0.66  
51 4-MDBT/DBT 1.22  
25 2+3-MDBT/DBT 1.83  
36 1-MDBT/DBT 2.77

### IV) BIPHENYLS

#### a) Concentrations (ppm)

31 BP 10  
24 2-MBP 3  
381 3-MBP 22  
4-MBP 5  
Total Biphenyls 41

#### b) Parameters

2-MN/1-MN (MNR) 1.27  
2,6+2,7-DMN/1,5-DMN (DNR-1) 2.02  
2,3,6-TMN/1,3,5+1,4,6-TMN (TNR-1) 0.46  
2,3,6-TMN/1,2,5-TMN (TNR-2) 1.16  
2,3,6-TMN/THN 0.53  
2,3,6-TMN/Cadelene 0.70

#### b) Parameters

3-MBP/BP 2.21  
3-MBP/4-MBP 4.06  
3-MBP/2-MBP 6.38

### V) DIBENZOFURANS

#### a) Concentrations (ppm)

DBF 2  
18 4-MDBF 8  
3 2+3-MDBF 4  
3 1-MDBF 2  
6 Total Dibenzofurans 16  
4

#### b) Parameters

4-MDBF/2+3-MDBF 1.73  
4-MDBF/1-MDBF 4.66  
0.77 2+3-MDBF/1-MDBF 2.70  
0.33 4-MDBF/DBF 3.06  
0.35 2+3-MDBF/DBF 1.77  
0.59 1-MDBF/DBF 0.66  
0.37

### VI) OVERALL RATIOS

Biphenyls/NAPH\* 0.32  
Dibenzothiophenes/NAP 0.04  
1 Dibenzofurans/NAPH\* 0.13

### II) PHENANTHRENES

#### a) Concentrations (ppm)

P  
3-MP  
2-MP  
9-MP  
1-MP  
Total Phenantrenes

#### b) Parameters

2-MP/1-MP 0.77  
1.5\*(2+3-MP/(P+1+9-MP)) (MPI-1) 0.33  
3\*(2-MP/(P+1+9-MP)) (MPI-2) 0.35  
2+3-MP/1+9-MP 0.59  
2+3-MP/1+9+2+3-MP 0.37

### III) DIBENZOTHIOPHENES

#### a) Concentrations (ppm)

DBT 1  
4-MDBT 1  
2+3-MDBT 1  
1-MDBT 2  
Total Dibenzothiophenes 6

MN = methylnaphthalene

DMN = dimethylnaphthalene

TMN = trimethylnaphthalene

THN = tetrahyronaphthalene

DBF = methyldibenzofuran

MDBF = methyldibenzofuran

NAPH\* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

P = phenanthrene

MP = methylphenanthrene

DBT = dibenzothiophene

MDBT = methyldibenzothiophene

BP = biphenyl

MBP = methylbiphenyl

**GC/MS data of the aromatic fraction from  
well 6407/09-09 T2 (1746 m), Norway**

VII ) Misc. NAPHTHALENES

a) Concentrations (ppm)

2,6-DMN	28	4,5-DMP	1
2,7-DMN	22	2,6+3,6-DMP	2
1,3+1,7-DMN	44	3,5-DMP	0
1,6-DMN	51	2,7-DMP	0
1,4-DMN	n.d.	3,9-DMP	5
2,3-DMN	12	1,6+2,5+2,9-DMP	2
1,5-DMN	25	1,7-DMP	2
1,2-DMN	10	1,9+4,9-DMP	2
1,4+2,3-DMN	12	1,5-DMP	n.d.
		1,8-DMP	1
		1,2-DMP	0
		9,10-DMP	n.d.
1,3,7-TMN	27	1,2,6-TMP	0
1,3,6-TMN	37	1,2,5-TMP	0
1,3,5+1,4,6-TMN	36	1,2,9-TMP	0
2,3,6-TMN	17	1,2,7-TMP	n.d.
1,2,7-TMN	7	1,2,8-TMP	1
1,6,7-TMN	29		
1,2,6-TMN	2		
1,2,4-TMN	3		
1,2,5-TMN	14		
1,3,5,7-TeMN	14		
1,3,6,7-TeMN	12		
1,2,4,7-TeMN	12		
1,2,5,7-TeMN	7		
2,3,6,7-TeMN	4		
1,2,6,7-TeMN	4		
1,2,5,6-TeMN (C4-NAPH)	8		

b) Parameters

1,2,5-TMN/1,3,6-TMN	0.38
1,2,7-TMN/1,3,7-TMN	0.27

The assignment of some of these peaks is tentative

## GC/MS data of the aromatic steroids from well 6407/09-09 T2 (1746 m), Norway

Report of sample: Norway 6407/09-09 T2 1746 m omc 8741

Acquired at : 10-Oct-1999

Standard used for calculations: First  
Discrimination factor : 1.04

I) Monoaromatic steroids		II) Triaromatic steroids	
Intensities (arbitrary units)		Intensities (arbitrary units)	
MA C21 a ?	86	TA C20	71
MA C21 b ?	46	TA C21	66
MA C22 a ?	100	TA C22 20S	12
MA C22 b ??	40	TA C22 20R	13
MA C23 a ?	31	TA C26 20S	65
MA C23 b ?	10	TA C26 20R + TA C27 20S	195
MA C27 I 20S	20	TA C28 20S	124
MA C27 V 20S	74	TA C28 20S	n.d.
MA C27 I 20R + MA C27 V 20R	75	TA C27 20R	105
MA C27 II 20S	41	TA C29 20S	34
MA C28 I 20S	278	TA C29 20S	20
MA C28 V 20S	23	TA C28 20R	96
MA C27 II 20R	32	TA C29 20R	32
MA C28 II 20S	101		
MA C28 I 20R + MA C28 V 20R	200		
MA C29 I 20S + MA C29 V 20S	108		
MA C29 II 20S	15		
MA C28 II 20R	117		
MA C29 I 20R + MA C29 V 20R	74		
MA C29 II 20R	50		
III) Methylated Triaromatic steroids		IV) Parameters	
Intensities (arbitrary units)			
1Me TA C21 ?	6	% MA C27	21.33
3Me TA C21	18	% MA C28	56.96
6Me TA C21 ?	7	% MA C29	21.72
4Me TA C21	24		
3Me TA C22	16	TA C28/(MA C29 + TA C28)	0.47
4Me TA C22	18	MA(I)/MA(I+II)	0.19
3Me TA C27 20S	16	TA(I)/TA(I+II)	0.17
4Me TA C27 20S	24	MA C27 V 20S/(MA C27 (I+V) 2	0.78
2Me TA C28 20S	5	TA C26 20S/TA C28 20S	0.52
3Me TA (C27 + C28) 20S	37	TA C27 20R/TA C28 20R	1.10
4Me TA (C27 + C28) 20S ?	70	3Me TA C28 20R/3Me TA C29 20	1.18
4Me TA (C27 + C28) 20S ?	n.d.	3Me TA C29 20R/(3+4)Me TA C2	0.52
2Me TA C29 20S	5	TA (3+4)Me C27 20S/(3+4)Me C	1.64
TA dinosteroid D1	10	TA (3+4)Me C28 20R/(3+4)Me C	1.57
3Me TA C29 20S	24		
TA dinosteroid D2	27		
2Me TA C28 20R	41		
4Me TA C29 20S	n.d.		
3Me TA C28 20R	25		
4Me TA C28 20R	39		
TA dinosteroid D3	30		
TA dinosteroid D4	31		
2Me TA C29 20R	4		
3Me TA C29 20R	21		
TA dinosteroid D5	29		
4Me TA C29 20R	20		
TA dinosteroid D6	35		

*GC data of the light fraction (< 120 C) of the oil sample from  
well 6407/09-09 T2 (1746 m), Norway*

COMPONENT		RET. TIME	HEIGHT	AREA
No.	Name	(min)	(uV)	(uVs)
1	methane	0.00	0	0
2	ethane	0.00	0	0
3	propane	24.47	17306	927998
4	i-butane	25.19	20726	1081309
5	n-butane	25.88	74709	4009096
6	i-pentane	28.73	66290	3928628
7	n-pentane	30.49	90875	5753850
8	2.2-dimethylbutane	33.79	1570	113856
9	cyclopentane	36.19	8797	691794
10	2.3-dimethylbutane	37.87	6468	512406
11	2-methylpentane	38.77	46437	3759869
12	3-methylpentane	41.07	28215	2418860
13	n-hexane	45.18	79363	8103306
14	methylcyclopentane	49.59	39314	4320527
15	2.2-dimethylpentane	52.14	1514	157756
16	benzene	52.87	2207	261173
17	2.4-dimethylpentane	53.83	3313	369050
18	2.2.3-trimethylbutane	55.37	531	51976
19	cyclohexane	59.99	43269	6206101
20	3.3-dimethylpentane	63.16	726	74837
21	1.1-dimethylcyclopentane	67.50	4040	585045
22	2-methylhexane	69.56	15287	2321236
23	2.3-dimethylpentane	70.14	5186	737695
24	1-c-3-dimethylcyclopentane	73.35	6401	1073729
25	3-methylhexane	74.05	16060	2520671
26	1-tr-3-dimethylcyclopentane	75.52	6199	997915
27	1-tr-2-dimethylcyclopentane	76.83	10201	1671943
28	3-ethylpentane	78.50	1529	245457
29	standard	82.65	14063	2480478
30	n-heptane	91.46	30842	7324304
31	1-c-2-dimethylcyclopentane	96.31	1465	313933
32	methylcyclohexane	100.75	39701	11846344
33	1.1.3-trimethylcyclopentane	104.14	2726	571881
34	2.2-dimethylhexane	106.77	464	83728
35	ethylcyclopentane	109.72	2705	617886
36	2.5-dimethylhexane	116.47	1259	280075
37	not_present	0.00	0	0
38	2.2.3-trimethylpentane	119.03	1647	397070
39	1-tr-2-c-4-trimethylcyclopentane	122.89	2238	571003
40	toluene	124.77	5146	1402669

total area excluding i.s.: 76304970

Weight percentage internal standard: 0.66  
Weight percentage C7 fraction : 20.30