Table 5.d: Raw sterane data (peak height) m/z 217 SIR for 6507/5-2 oils

Well	Descript.	21a	22a	27dßS	27dßR	27daR	27daS	28dßS	28dßR	28daR*	Sample
		29dßS*	28daS*	27aaR	29dßR	29daR	28aaS	29daS*	28ßßS		
		28aaR	29aaS	29ßßR	29ßßS	29aaR					
6507/5-2	cyl1561ea	29020.2	10197.6	22134.1	15318.7	6267.3	7041.9	10551.2	6101.7	6374.7	T21/0135
		13191.5	11758.3	5126.7	9931.5	4048.9	3822.4	5956.5	8063.6		
		2515.4	4260.4	7944.5	6987.5	3697.8					
6507/5-2	cyl5837ma	20697.0	6688.3	15542.0	9904.7	3750.6	4159.9	6330.4	3981.1	4105.8	T21/0136
		8687.4	8077.4	3541.6	6614.8	2514.8	2417.2	3947.4	5433.0		
		1424.6	2485.6	4953.9	4149.1	2395.3					

* 28daR coel with 27aaS, 29dßS coel with 27ßßR, 28daS coel with 27ßßS, 29daS coel with 28ßßR

Table 5e: Raw sterane data (peak height) m/z 218 SIR for 6507/5-2 oils

Well	Descript.	27ßßR	27ßßS	28ßßR	28ßßS	29ßßR	29ßßS	30ßßR	30ßßS	Sample
6507/5-2	cyl1561ea	13288.2	13881.0	8366.3	11046.7	11614.6	10858.2	2950.0	2880.9	T21/0135
6507/5-2	cyl5837ma	9626.3	10672.0	6076.4	7746.7	8026.7	7107.5	1951.1	1906.8	T21/0136

Table 5.f: Raw triterpane data (peak height) m/z 177 SIR for 6507/5-2 oils

Well	Descript.	25nor28aß	25nor30aß	Sample
6507/5-2	cyl1561ea	6052.6	836.6	T21/0135
6507/5-2	cyl5837ma	3756.6	539.1	T21/0136

Table 6a: Variation in Triaromatic Sterane Distribution (peak height) for 6507/5-2 oils

Well	Descript.	Ratio1	Ratio2	Ratio3	Ratio4	Ratio5	Sample
6507/5-2	3637.0m Co	0.74	0.72	0.49	0.48	0.59	T21/0135
6507/5-2	3647.0m Co	0.77	0.76	0.51	0.51	0.59	T21/0136

Ratio1: a1 / a1 + g1
Ratio2: b1 / b1 + g1
Ratio3: a1 + b1 / a1 + b1 + c1 + d1 + e1 + f1 + g1
Ratio4: a1 / a1 + e1 + f1 + g1
Ratio5: a1 / a1 + d1

Table 6 b: Variation in Monoaromatic Sterane Distribution (peak height) for 6507/5-2 oils

Well	Descript.	Ratio1	Ratio2	Ratio3	Ratio4	Sample
6507/5-2	3637.0m Co	0.59	0.44	0.45	0.39	T21/0135
6507/5-2	3647.0m Co	0.56	0.40	0.41	0.34	T21/0136

Ratio1: A1 / A1 + E1
Ratio2: B1 / B1 + E1
Ratio3: A1 / A1 + E1 + G1
Ratio4: A1+B1 / A1+B1+C1+D1+E1+F1+G1+H1+I1

Table 6 c: Aromatisation of Steranes (peak height) for 6507/5-2 oils

Well	Descript.	Ratio1	Ratio2	Sample
6507/5-2	3637.0m Co	0.59	0.87	T21/0135
6507/5-2	3647.0m Co	0.62	0.80	T21/0136

$$\text{Ratio1:} \quad \frac{C1+D1+E1+F1+G1+H1+I1}{C1+D1+E1+F1+G1+H1+I1 + c1+d1+e1+f1+g1}$$

Ratio2: g1 / g1 + I1

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Table 6 d: Raw triaromatic sterane data (peak height) m/z 231 for 6507/5-2 oils

Well	Descript.	a1	b1	c1	d1	e1	f1	g1	Sample
6507/5-2	3637.0m Co	32875.9	28774.9	5436.4	22473.0	14566.1	10108.4	11466.6	T21/0135
6507/5-2	3647.0m Co	24245.6	22623.1	4060.2	16941.4	9361.6	6866.8	7132.0	T21/0136

Table 6 e: Raw monoaromatic sterane data (peak height) m/z 253 for 6507/5-2 oils

Well	Descript.	A1	B1	C1	D1	E1	F1	G1	H1	I1	Sample
6507/5-2	3637.0m Co	37799.3	20273.2	18447.5	11719.0	25952.6	4784.6	19344.0	9754.2	1780.5	T21/0135
6507/5-2	3647.0m Co	24436.5	12767.5	13489.2	9889.3	19078.8	3546.9	15512.9	8501.6	1749.5	T21/0136

Table 7a: Tabulation of carbon isotope data on oils for 6507/5-2 oils

Well	Descript.	Whole oil	Topped oil	Saturated	Aromatic	NSO	Asphaltenes	Sample
6507/5-2	3637.0m Co	-28.24	-	-29.48	-27.74	-28.09	-	T21/0135
6507/5-2	3647.0m Co	-28.35	-	-29.41	-27.68	-27.40	-	T21/0136

Table 7b: Tabulation of cv values from carbon isotope data for 6507/5-2 oils

Well	Descript.	Saturated	Aromatic	cv value	Interpretation	Sample
6507/5-2	3637.0m Co	-29.48	-27.74	1.35	Terrigenous	T21/0135
6507/5-2	3647.0m Co	-29.41	-27.68	1.31	Terrigenous	T21/0136

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3

Data report on molecular and stable isotope composition of gas samples from Skarv well 6507/5-2

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Summary

Two gas samples from Skarv well 6507/5-2; 3637 m and 3647 m are analysed for gas and isotopic composition.

On the samples C_1 - C_5 and CO_2 are quantified. The $\delta^{13}C$ value is measured on methane, ethane, propane, the butanes and CO_2. In addition the δD value is measured on methane.

The work is done in accordance with "The Norwegian Industry Guide to Organic Geochemical Analyses", third edition 1993

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1 Introduction

Two gas samples from Skarv well 6507/5-2; 3637 m and 3647 m are analysed for gas and isotopic composition.

On the samples C_1 - C_5 and CO_2 are quantified. The $\delta^{13}C$ value is measured on methane, ethane, propane, the butanes and CO_2. In addition the δD value is measured on methane.

2 Analytical procedures

Aliquots of 0.2 ml are sampled with a syringe for analysis on a Porabond Q column connected with flame ionisation (FID) and thermal conductivity (TCD) detectors. The detection limit for the hydrocarbon gas components is 0.001 µl/ml, for CO_2 0.05 µl/ml.

For the isotope analysis two different approaches are used. For determination of the isotopes of methane and carbon dioxide 5-10 ml of the gas is sampled with a syringe and then separated into the different gas components by a Carlo Erba 4200 gas chromatograph. The hydrocarbon gas components are oxidised in separate CuO-ovens in order to prevent cross contamination. The combustion products CO_2 and H_2O are frozen into collection vessels and separated. Carbon dioxide is collected directly after the chromatographic separation.

The combustion water is reduced with zinc metal in sealed quarts tubes to prepare hydrogen for isotopic analysis. The isotopic measurements are performed on a Finnigan MAT 251 and a Finnigan Delta mass spectrometer.

For determination of the carbon isotopic composition of the wet gas components aliquots are sampled with a syringe and analysed on a VG Isochrom connected on line to a VG Optima Mass spectrometer. A HP 5890 II with a Poraplot Q column is used for the separation and helium is used as a carrier gas. The injections are performed in splitless mode.

Both analytical methods are tested with the same laboratory gas mixture. Based on repeated analysis of a the gas mixture, the reproducibility in the $\delta^{13}C$ value is better than 0.5‰ PDB in both methods. The reproducibility in the δD value is likewise better than 10‰.

3 Results

The normalised volume composition of the gas samples is shown in Table 1. The stable isotope composition is shown in Table 2.

The molecular composition related to the carbon isotope variations in methane from the samples are plotted in Figure 1 (Schoell, 1983), the carbon and hydrogen variations in methane are plotted in Figure 2 (Schoell, 1983) and the carbon isotope variation in ethane related to the carbon isotope variations in methane in Figure 3 (Schoell, 1983).

Table 1 Volume composition of gas samples (normalised values) from Skarv well 6507/5-2

Sample	Sample depth m	IFE no GEO	C_1 %	C_2 %	C_3 %	iC_4 %	nC_4 %	iC_5 %	nC_5 %	CO_2 %	ΣC_1- C_5 %	Wet-ness	iC_4/ nC_4
Ex cylinder 5837-MA	3637	20000292	88.3	5.3	2.7	0.39	0.91	0.26	0.30	1.9	98.1	0.10	0.43
Ex cylinder 1561-EA	3647	20000293	88.3	5.3	2.6	0.42	0.90	0.27	0.33	1.8	98.2	0.10	0.47

Table 2 Isotopic composition of gas samples from Skarv well 6507/5-2

Well	Sample depth m	IFE no GEO	C_1 $\delta^{13}C$ ‰ PDB	C_1 δ D ‰ SMOW	C_2 $\delta^{13}C$ ‰ PDB	C_3 $\delta^{13}C$ ‰ PDB	iC_4 $\delta^{13}C$ ‰ PDB	nC_4 $\delta^{13}C$ ‰ PDB	CO_2 $\delta^{13}C$ ‰ PDB	CO_2 $\delta^{18}O$ ‰ PDB
Ex cylinder 5837-MA	3637	20000292	-38.4	-182	-29.6	-29.2	-28.0	-29.0	-10.7	-15.2
Ex cylinder 1561-EA	3647	20000293	-38.3	-180	-30.3	-29.5	-30.1	-29.6	-11.1	-12.6

4 Literature

Schoell, M. (1983). Genetic characterisation of natural gases. *The American Association of Petroleum Geologists Bulletin*, **67**,2225-2238.