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SUMMARY			DISTRIBUTION	
<p>The gas components CH₄, C₂H₆, C₃H₈, i-C₄H₁₀, n-C₄H₁₀ and CO₂ have been separated from the natural gases of well 7120/8-2. The $\delta^{13}C$ values of these components have been measured when high enough concentration has made this possible.</p> <p>The isotopic composition of hydrogen, which was made from the H₂O formed during the combustion of CH₄, have also been measured.</p> <p>Both gas samples have a thermogenic origin. They are both formed at high maturity, eq. to the condensate field of the oil window. The samples do not appear to have been derived from the same source.</p>			Oppdragsgiver, 10 Andresen, B. Brevik, E.M. Garder, K. Gaudernack, B. Råheim, A. Berg, J.O.	
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RESERVOIRED GAS STABLE ISOTOPE GEOCHEMISTRY ($\delta^{13}\text{C}$, δD) ON
 SAMPLES FROM WELL 7120/8-2

ANALYTICAL PROCEDURE

The natural gas has been separated into the different gas components by a Carlo-Erba 4200 instrument. The hydrocarbon gas components were oxydized in separate CuO-ovens, which enables us to collect several times when the concentration of a gas component is low. The combustion products CO_2 and H_2O were frozen into collection vessles and separated. The isotopic measurements were performed on a Finnigan Mat 251 mass spectrometer. Our $\delta^{13}\text{C}$ -value on NBS-22 is $-29.77 \pm .06 \text{ ‰}$.

RESULTS

The results are given in the following table :

Depth m	Methane		Ethane	Propane	n-Butane	i-Butane	CO_2
	$\delta^{13}\text{C}$	δD	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$	$\delta^{13}\text{C}$
RFT 1212 RFS	-38.8	-168	-24.7				
DST 2171.1	-40.3	-118	-28.7	-28.0	-25.9	-22.7	- 7.9

The $\delta^{13}\text{C}$ -value of the gas samples clearly shows that they are both of thermogenic origin.

The $\delta^{13}\text{C}$ -values for methane, ethane, propane and n-butane from the DST 2171.1 m-sample have been plotted on the methane diagram of James (1983) * (Figure 1). As seen from this diagram a source LOM between 12 and 13 eq. to a vitrinite reflectance of about 1.5 is indicated. The $\delta^{13}\text{C}$ -methane value falls on the methane line in the diagram. This is often the case for LOMS from 12 to 14, the range of maturities where such gases are common.

A relatively high maturity in the condensate field of the oil window is also indicated when the stable isotope results of both samples are plotted in the δD_{CH_4} vs. $\delta^{13}C_{CH_4}$ diagram of Schoell (1983)^{xx} (Figure 2).

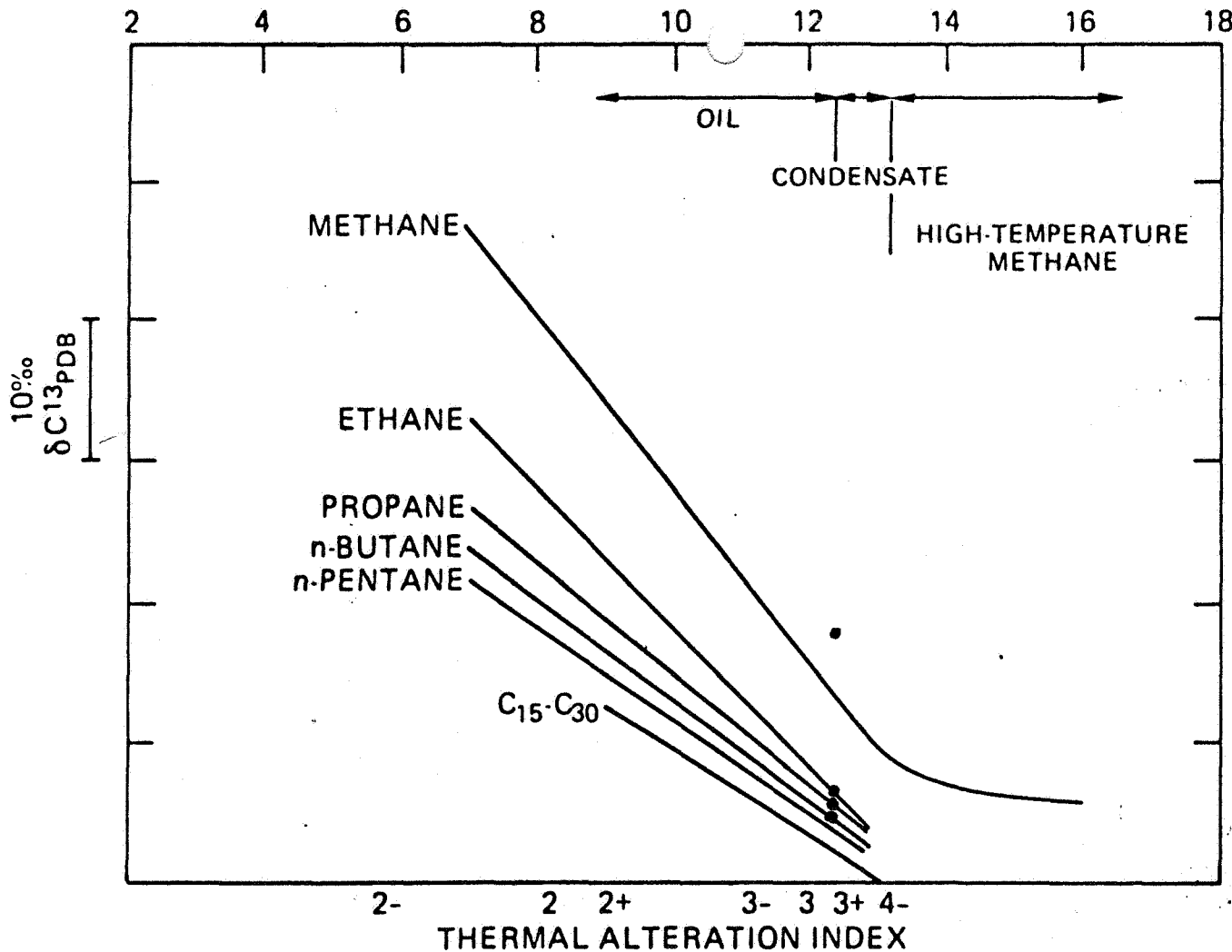
A comparison between the two data sets indicates, however, that even though the gases appear to have been formed at the same, relatively high, maturity, they may not have been derived from the same source.

CONCLUSION

Both gas samples have a thermogenic origin. They are both formed at high maturity, eq. to the condensate field of the oil window. The samples do not appear to have been derived from the same source.

^x James, Alan T. (1983): *Correlation of Natural Gas by Use of Carbon Isotopic Distribution Between Hydrocarbon Components*, A.A.P.G. Vol. 67, No. 7, July, 1983.

^{xx} Schoell, M. 1983 : *Genetic Characterization of Natural Gases*. A.A.P.G. December, 1983.



	Vol % DST 2171.1	Vol % RIT 1212 RFS
C_1	72.0	50.0
C_2	4.2	.8
C_3	1.5	.1
n- C_4	.4	.09
i- C_4	.3	.02
CO_2	1.0	2.0

Figure 1. Carbon isotopic separations of well 7120/8-2 gas plotted on the maturity diagram (after James, 1983). A source LOM between 12 and 13 is indicated for the gas.

The calculated carbon isotopic separations between gas component are plotted on the vertical axis using a sliding scale that is simply the algebraic difference, in parts per mil, between the isotopic compositions of the natural gas components. The scale does not possess a fixed origin, but is oriented with the more depleted $\delta^{13}C$ values at the upper end. Use of this sliding scale allows the maturity of a gas to be assessed without prior knowledge of the isotopic composition of the gas' source.

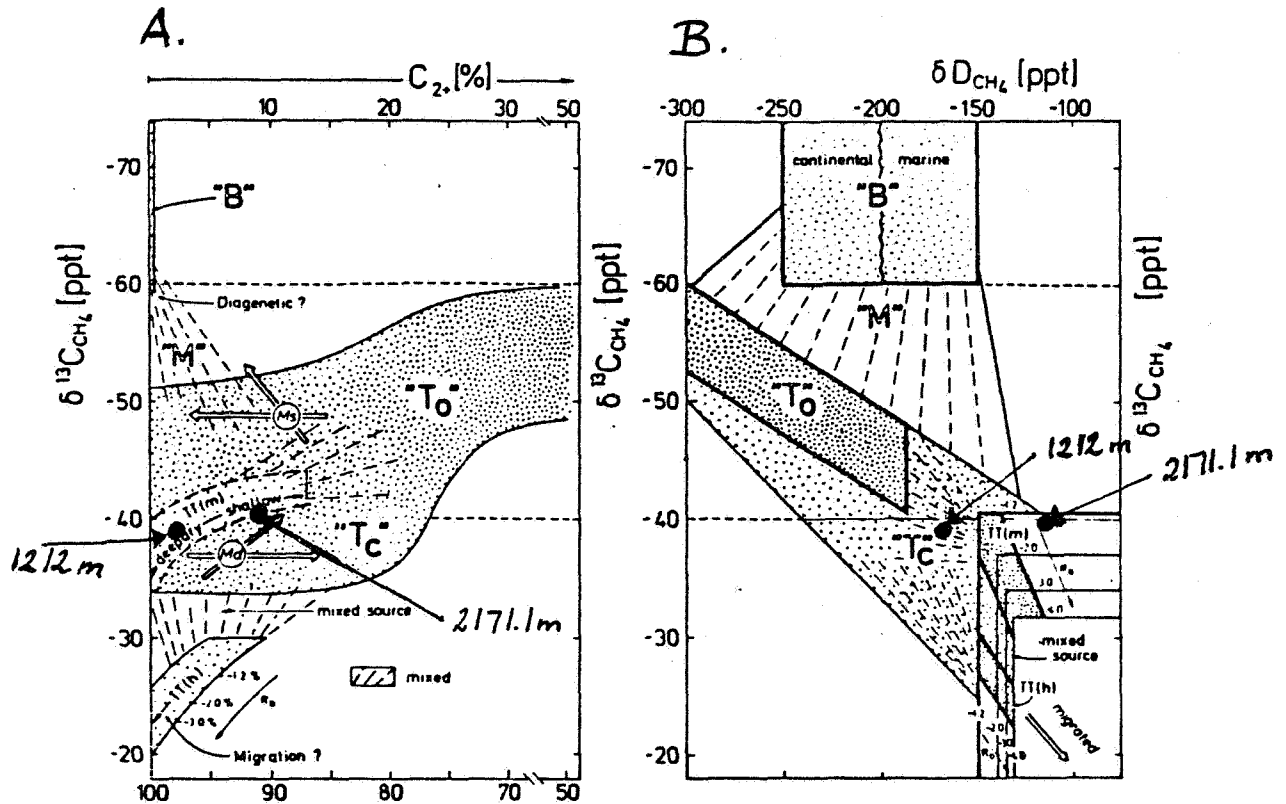


Figure 2 a. Variations of molecular composition in natural gases related to the isotope variations of methane.

Figure 2b. Carbon and hydrogen isotope variations in methanes.

The principle for the genetic characterization of natural gases is that the primary gases (B-biogenic gas, T-associated gas, TT-non-associated gas) are defined by fields of compositional variations. These primary gases may become mixed and form various mixtures "M" of intermediate composition. "TT(m)" and "TT(h)" are non associated gases from marine source rocks and coal gases from N.W. Germany respectively, compositional shifts due to migration are indicated by arrows Md (deep migration) and Ms (shallow migration) respectively. "T" are gases associated with petroleum in an initial phase of formation. "T_C" are gases associated with condensates. (Schoell, 1983).