

# Oil and gas of the Norwegian Barents Sea

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## Oil

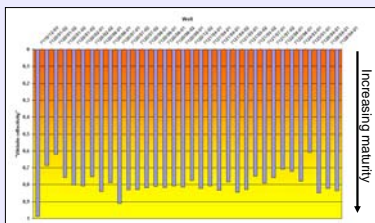


Fig. 1. The maturity of a set of Barents Sea oils expressed by aromatic compounds (methylphenanthrenes). The maturity varies from 0.6 to 1.0 %Ro vitrinite reflectivity. (%Ro = 0.60 \* MPI + 0.40 (Radke, 1988)) The oil window lies within the maturity range of 0.5 to 1.3 %Ro, meaning that these oils are early to mid-mature with respect to the oil window.

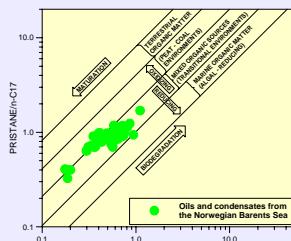


Fig. 2. A cross plot of isoprenoids versus n-alkane ratios indicates a mixed organic facies for the oils, probably due to facies variations in the assumed marine source rocks. The majority of the samples appear "mid-mature". Modified from Shanmugam (1985).

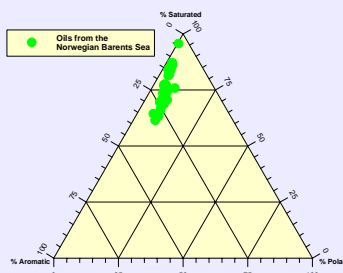


Fig. 3. The bulk composition of a set of Norwegian Barents Sea oils. The oils are rich in saturated compounds, and have a correspondingly low content of aromatic and polar components.

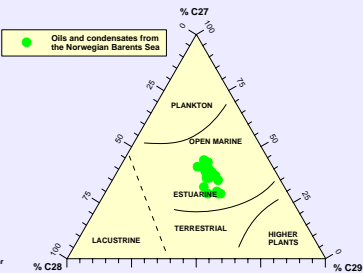


Fig. 4. A ternary plot of C<sub>27</sub>, C<sub>28</sub>, and C<sub>29</sub> regular steranes suggests a marine origin for a number of Barents Sea oils. Modified from Shanmugam (1985).

## Reservoir rock



Fig. 5. Middle Jurassic oil stained reservoir sandstones of the Sto Formation from well 7121/5-1.

## Conclusions

- The investigated Barents Sea oils originate from a marine type II source rock
- Source rock facies variations most likely occur due to varying organic input/level of oxygen in the depositional environment
- The oils composition is dominated by saturated components
- The thermal maturities of the oils vary from early mature to middle mature (0.6 to 1.0 %Ro vitrinite reflectivity)
- The investigated Barents Sea gases are thermogenic
- The gas samples are oil/condensate associated, i.e. the oil/condensate and gas originate from the same source rock
- The gas ranges from early mature to late mature with respect to the oil window (0.6 to 1.3 %Ro vitrinite reflectivity)

## Gas

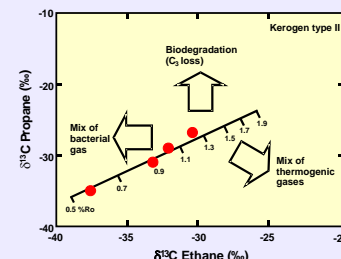


Fig. 6. The <sup>13</sup>C isotopic values of ethane and propane in thermogenic gas from the Barents Sea points to a maturity ranging from 0.6 to 1.3 %Ro. The majority of gases are mid- to highly mature with respect to the oil window. Modified from Whiticar (1994).

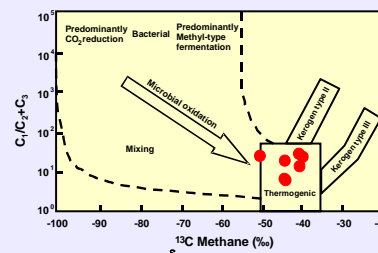


Fig. 7. The "wetness" of the gas (C<sub>1</sub>/C<sub>2</sub>+C<sub>3</sub>) plotted against the <sup>13</sup>C isotopic values for methane shows clearly the thermogenic origin of the analysed Barents Sea gas samples. Modified from Whiticar (1994).

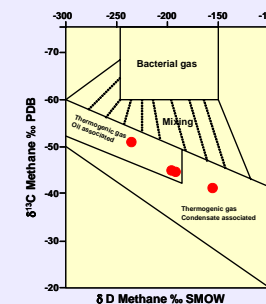


Fig. 8. The <sup>13</sup>C and D isotopic values for methane indicate that the gas is thermogenic, and associated with oil or condensate. Modified from Schoell (1983).

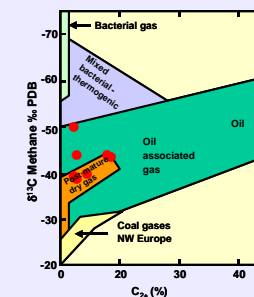


Fig. 9. The percentage of C<sub>2</sub>+ fractions and the <sup>13</sup>C isotopic values for methane indicate that the gas is a dry, thermogenic gas. Modified from Schoell (1983).