Guideline to geochemical analysis

NIGOGA

NIGOGA - THE NORWEGIAN INDUSTRY GUIDE TO ORGANIC GEOCHEMICAL ANALYSES.

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NIGOGA is an electronic document containing guidelines for the performance and reporting of organic geochemical analyses of well samples (rocks and fluids) as applied in the Norwegian petroleum industry. Its intention is to improve standardisation and comparability of the analytical results and their presentation.

NIGOGA is an industry guide and not an official regulation or norm, but the Norwegian Petroleum Directorate recommends its use.

NIGOGA consists of an Analysis Guide and a Reporting Guide.

The Analysis Guide describes the following aspects of each type of analysis :

Minimum requirements

- Purpose, range of application, terminology
- Samples to be analysed
- Procedural requirements
- Acceptance criteria and reference samples
- Reporting requirements

Recommendations, information

- Recommendations and notes
- Key references
- Figures

The Reporting Guide contains general guidelines for reporting and digital data transfer. NIGOGA puts, where possible, more emphasis on the specification of the result (quality) than on the description of the analytical procedures. Where possible, it recommends, and sometimes requires, the use of the Norwegian Geochemical Standard (NGS) samples as a reference and sets acceptance criteria for selected test parameters. These criteria are largely based on the results from an intercalibration project, carried out in 1994 - 1997 by the Norwegian Petroleum Directorate (NPD). Thirty two laboratories from Europe, USA and Australia participated in this project. More information about the availability of NGS samples and results of the intercalibration is given in the NGS Newsletters (NPD 1998).
The NIGOGA document (Adobe PDF format, 1.6 Mb) can be downloaded free of charge. It can be read using the freely available Adobe Acrobat Reader 4.0 or a more recent version. (Acrobat Reader 3.0 may cause minor formatting problems.)
For statistical purposes, we kindly ask you to fill in the form below before you access the NIGOGA. The information provided will not commit you or your employer as we will use this information exclusively for the purpose of creating statistical summaries (numbers and types of institutions by country, number of visits, etc.). These summaries may be made available to the public. Names, affiliations and e-mail addresses will be accessible only to the committee that updates the NIGOGA, and will not be made available to third parties.

Access NIGOGA

NORWEGIAN GEOCHEMICAL STANDARDS FOR GEOCHEMICAL ANALYSIS

The Norwegian Geochemical Standards (NGS) project was financed by Norsk Hydro Produksjon AS, Saga Petroleum ASA, Statoil, and the Norwegian Petroleum Directorate. Three standard samples have been established, two for shales and one for crude oil. They are primarily aimed at the petroleum industry and at research institutions performing geochemical projects within exploration and reservoir exploitation.
The reference values for the NGS samples are based on analyses carried out according to the Norwegian Industry Guide to Organic Geochemical Analyses, third edition (NIGOGA) (Patience et al. 1993).

Why geochemical standards?
Geochemical analysis of organic and inorganic components in crude oils, organic-rich shales and coals has become an increasingly important tool for petroleum exploration and production. The chemical analysis of these organic components is highly specialised and extremely complex, and in general there will be many different ways of analysing any given component. The laboratories performing the various types of analyses are very well equipped with modern analytical instrumentation, and they have usually put much effort into obtaining internally consistent data. This has largely been achieved by use of "in-house" calibration standard samples. However, the inter-laboratory data consistency is often found to be extremely poor. A main reason for this has been lack of suitable analytical standard samples with certified analytical reference values. The NGS project was launched to supply the industry and research institutions with such sample material in sufficient quantities to last for at least ten years.

Standard sample documentation
Newsletters with sample documentation are available. The sample newsletters detail the origin of the samples, all procedures related to sampling, homogenisation, storage, and results from the first inter-laboratory calibration of the samples. In brief, the samples have the following characteristics:

THE NORWEGIAN GEOCHEMICAL STANDARD SVALBARD ROCK ? 1 (NGS SR-1)

About 400 kg of the Svalbard Rock was collected from the southern side of Teistberget hill, Eastern Spitsbergen, Svalbard. The Svalbard Rock was taken from a horizon with relatively low Total Organic Carbon content in the Anisian, Middle Triassic Botneheia Formation. The sample has a mean vitrinite reflectance of 0.41 per cent Rm, a mean TOC content of 2.17 weight per cent and a mean extractable organic matter content of 4800 mg/kg rock. The sample has been homogenised and subsequently split into 1480 aliquots of 500 ml each. The aliquots are stored at -20ºC at the NPD. We believe that enough sample material has been collected for the SR-1 sample to last for about 20 years.

THE NORWEGIAN GEOCHEMICAL STANDARD JET ROCK ? 1 (NGS JR-1)

Nearly 200 kg of the Jet Rock was collected from the Port Mulgrave area, Yorkshire, NE England. The Jet Rock is an organic-rich black shale. It is classified as a member of the Toarcian age Whitby Mudstone Formation. The sample has a mean vitrinite reflectance of 0.47 per cent Rm, a mean TOC content of 12.4 weight per cent, and a mean extractable organic matter content of 16000 mg/kg rock. The sample has been homogenised and subsequently split into 980 aliquots of 300 ml each. The aliquots are stored at -20ºC at the NPD. We believe that enough sample material has been collected for the JR-1 sample to last for about 10 years.

THE NORWEGIAN GEOCHEMICAL STANDARD NORTH SEA OIL - 1 (NGS NSO-1)

Around 1000 litres of crude oil was collected from the Oseberg field located in block 30/9 in the Norwegian part of the North Sea. The sample has been homogenised and tapped into ninety 12.5-litre aluminium flasks and ten 10-litre polyethylene flasks. The oil has a mean API gravity of 32.9°, a mean C15+ fraction of 77 per cent of the total crude, and a mean asphaltene content of 1.9 per cent. All flasks are stored at -20ºC at the NPD. Aliquots are prepared in 300 ml aluminium containers intended for organic geochemical and stable isotopes analyses, and in 250 ml polyethylene flasks intended for trace metal and radiogenic isotope analyses. We believe that enough sample material has been collected for the NSO-1 sample to last for at least 20 years.

Prices

The price for a sample aliquot is NOK 1000, while the price for the accompanying newsletter with documentation sampling, sample treatment, screening data, original data from the first calibration, and reference values is NOK 500. These are 2000 prices exclusive of value added tax and shipping costs. Short summaries of the Newsletters with statistical results from the first calibration can be downloaded from this page free of charge.

Who may apply for samples?

The NGS samples are aimed primarily at the petroleum industry and research institutions performing geochemical projects within exploration and reservoir exploitation on the Norwegian Continental Shelf (NCS). Petroleum geochemistry projects that are not directly related to the Norwegian shelf, may also be granted samples based on evaluation of the purely geochemical aspects of the application.
It is likely that the samples will be useful for analyses performed for environmental projects. Parts of the samples are allocated for possible usage in basic research, as well as for the development of new procedures, instrumentation etc.

Application requirements

The NPD Sample Release Committee considers applications three times a year: April 1st, August 1st and December 1st. The application should contain the applicant?s name,

postal address, telephone and fax number, e-mail address, and a contact person. The normal analytical activity of the laboratory must be stated (e.g. service laboratory for the oil industry, university laboratory working with environmental/geochemical problems, etc). It must also include a statement about the type of usage the NGS samples are intended for (e.g. quality control of TOC screening of drill cuttings, reference samples for comparison of different pyrolysis techniques, etc.).

Anyone who receives the standard samples should submit data from their routine analyses of the samples to the NPD for future refinement of the standard's calibration. The data shall be reported in standard digital format , either by using the GC-NPD-95 format, or by using standard fill-in spreadsheets that can be downloaded from this page.

How to apply

Applications for samples should be sent to
The Norwegian Petroleum Directorate
Attn.: The Sample Release Committee
P.O. Box 600
4003 Stavanger, Norway
Telephone: +47 51 87 60 00
Fax: +47 51 55 15 71

All parts involved in the use of NGS and NIGOGA are encouraged to share their experiences, suggestions, questions, etc. regarding NGS and NIGOGA with the NPD. This information will be used for future development of both the NGS samples and the NIGOGA. Please contact the Norwegian Petroleum Directorate at the address or fax number above, or e-mail to svein.finnestad@npd.no.

Downloads

Summaries of the first NGS newsletters (Word 97 documents):

1. SR-1
2. JR-1
3. NSO-1

Standard data reporting spreadsheet (EXCEL):

1. SR-1
2. JR-1
3. NSO-1

References

Patience, R. L. (Statoil), Pedersen, V.B. (Saga Petroleum), Hanesand, T. (Norsk Hydro), Weiss, H. M. (SINTEF Petroleum Research, former IKU Petroleum Research), Feriday, I. (Geolab Nor), and Nyland, B. (Norwegian Petroleum Directorate), The Norwegian Industry Guide to Organic Geochemical Analyses, Third Edition (1993)