Tabelle

Gruppenzusammensetzung der aromatischen Kohlenwasserstoffe (28.08.2012- 04.09.2012)

	Aromatische Stoffe 28.08.2012		Aromatische Stoffe 04.09.2012	
	berechnete Daten	experimentale Daten	berechnete Daten	experimentale Daten
C1	0.00	0.00	0.00	0.00
C2	0.00	0.00	0.00	0.00
C3	0.00	0.00	0.00	0.00
C4	0.00	0.00	0.00	0.00
C5	0.00	0.00	0.00	0.00
C6	4.99	5.00	2.13	2.13
C7	18.99	19.00	13.39	13.37
C8	20.72	20.74	24.81	24.78
C9	11.55	11.55	26.00	25.97
C10	4.95	4.95	11.14	11.13
Gruppenzusammensetzung	61.20	61.24	77.46	77.37

Für die Forschung der industriellen katalytischen Reformierung-Anlage L - 35 - 11/450 K Komsomolsker Raffinerie wurde ein Modellierungsprogramm „Kontrolle der Katalysatorarbeit“ verwendet. Mit Hilfe dieses Programms wird der volle Katalysatorzyklus von 22.05.2012 bis 04.03.2014 berechnet. Die Berechnungsergebnisse sind in der Abbildung 1 dargestellt. Diese Abbildung zeigt eine Tendenz zum Aktivitätsfall während des Katalysatorzyklus im Rahmen von 1 bis 0,7 bezogener Einheiten.

Die Abweichung der aktuellen Aktivität vom optimalen Regime ist minimal, wirkt aber auf Ausgangsprodukt, Koksakkumulation und Oktanzahl.

Die Abbildung 2 zeigt die Abhängigkeit der Oktanzahl vom Volumen des verarbeiteten Einsatzmaterials. Die tatsächliche Oktanzahl des stabilen Reformats schwankt im Rahmen 93 ÷ 96 Punkte. Am 04.09.2012 war eine starke Erhöhung der Oktanzahl (RON 102,6) beobachtet, was wahrscheinlich mit der veränderten Zusammensetzung des Einsatzmaterials verbunden konnte. In der Tabelle 1 ist die Gruppenzusammensetzung der aromatischen Kohlenwasserstoffe dargestellt.

Der Gruppenzusammensetzungsvergleich (s. Tab.) zeigt am 04.09.2012 eine starke Erhöhung des aromatischen Kohlenwasserstoffgehalts, was eine der Gründe für die starke Oktanzahlerhöhung, aktuelle Katalysatoraktivität, Reduktion der Reformatausbeute von 80 bis 84,93 54% des Gewichts ist.

Zusammenfassend kann man folgende Schlussfolgerungen machen. Es ist notwendig:

1. kontinuierliche Kontrolle der Aufstellung durchzuführen;
2. technologische Vorschriften von katalytischem Reforming zu regulieren.

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X-RAY TOMOGRAPHY IN THE STUDY OF ROCKS

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Computer tomography is a method of non-destructive study of layered internal structure of the object. It was proposed in 1972 by Godfrey Hounsfield and Allan Cormack, who were awarded the Noble Prize for this development. Study rocks x-ray method is based on the difference in the density of the rock, mineral inclusions, voids and cracks, and filling their formation fluids[1]. Microfocus X-ray gun transilluminates objects and the registration its shadow projections are performed by array detector. X-rays passing through the rock, losing their power, which is proportional to its density, and registered by the matrix cell array receiver. In this way a pixel image is forming. During scanning, the object rotates around its axis, thereby accumulating a package of hundreds of virtual sections.

These images represent a grayscale image, the brightness of which characterizes the degree of absorption of X-rays. The volumetric three-dimensional model of the samples was reconstructed by these images. Thus, the result of X-ray imaging is the three-dimensional distribution density of the sample volume, which allows evaluate the structure of the rock matrix and the distribution of pores and inclusions [2].

From 2011 PNIPU develops studies of the core, which are based on X-ray inspection system with the function of computer tomography «Nikon Metrology XT H 225», which is well proven in studies of core abroad.

Working Position potential difference is from 30 to 225 kV, the dimensions of the detector are 200 to 250 mm, the distance from the source to the receiver is 1000 mm. All these researches allow carrying out studies of the different core samples. Image processing and three-dimensional modeling of rock was performed in the software package, which are called VSG Avizo Fire.

Package Avizo Fire is a broad set of tools for downloading, visualization and obtaining qualitative and quantitative information on the different types of data. With its help it is possible:

- Import and processing of 3D slices
- Segmentation and selection
- A complete study of 3D data
- Statistical analysis
- Creation of presentations, videos, reports, and remote access to projects

As I am directly involved in processing the scan results, I will focus on the stages of work in the software package.

Stages of program Avizo Fire work:

1 .Load reconstructed sample.

2. Apply various filters to an image (anisotropic diffusion, Gauss, etc), it is necessary to filter out the objectionable noise.

3. Then manually or automatically perform the separation of the sample on the rock cavities (cracks, cavities, pores) and on. As a result, a suitable for analysis object in binary code is generated.

4. Binarization allows allocating each element separately of the porous structure and calculate its characteristics, such as volume.

5. Then we can filter the needed pores, cavities, cracks in size (that is the object of study indeed), for example here, we investigated the cracks in the sample.

6. And now it is possible to calculate the coefficients of porosity, fractures and other characteristics; Building a 3D image; creating graphs and video clips on the model.

We studied rock samples of Perm region, Eastern Siberia, Uzbekistan and Iraq:

1. Sandstones rocks samples (full-size D = 100mm, D = 30mm standard).
2. Carbonate rocks samples (full-size D = 100mm, D = 30mm standard).
3. Salt rock samples from Verhnikamsk.

Full-length study of core samples helps to determine the fracture and allow cavitation, and macroinhomogeneity rock. In studies of standard core samples (d = 30mm) more detailed and accurate study of the properties of rocks of different microcavities is possible. It is also possible to study the properties of rocks before and after various external influences. Exploring core samples of small size (less than 30 mm), it is possible to study the structure of the sample to the smallest detail: mineral composition, type of cement, grain structure and voids[3].

Study of sandstones reservoir rocks

During the studying of full-sized sandstones samples, cracks and large pores were found. Detecting cracks, usually are very narrow (width 0,001 mm) wide and maximum width cracks (1 mm) were opening across very rarely. During the studying of standard sandstones samples the voids were presented by intergranular pores. Porosity of rocks was defined. Basically, porosity ranges from 7 - 15%.

Study of carbonate reservoir rocks

During the studying of carbonate full-sized samples it was showed a large number of cavities, they are quite large, the maximum size of 2-3 mm. The cavern porosity was calculated, which on average was 10%. Some cracks are extending through the entire sample, usually lengthwise. There were samples in which the crack was extending at an angle or some cracks were intersecting at different angles.

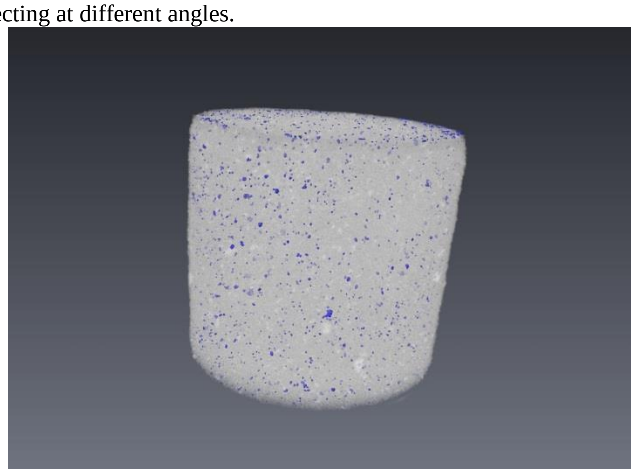

Fig. 3D image carbonate rock

The working experience on standard samples of carbonate rocks produced the most successful results. Cracks, cavities, pores, inclusion of calcite were found in samples. During the research the cavities matches which were defined earlier in the full-size samples were recorded. The cavities are sufficiently large - diameter in the range of 3 mm. In some samples of the cavity are connected by channels and they occupy a fairly large amount. The cavern average porosity is about 15%. The cracks are considerably smaller than cavities, their disclosure of an average is about 1 mm. Fracture average porosity is about 5%.

In other types of samples pores were recorded. The size of the pores is large, rounded in shape, open. The reservoir of this type is of high porosity of 20 to 30%. Radiopaque inclusions of calcite were found. Minerals and organic remains of gastropods shells were also found. The method of exploration allows us to compare the effects of carbonate rocks using to hydrochloric "before and after". The result is shown quite clearly and numerically confirmed. Channels in the samples are significantly increased and in some cases, they are connected. New channels and porosity are also increased.

Study of salt rocks

The investigation of sylvinite VKMKS cubic shape samples until exposure to compressive load after initial loading, and then after the repeated load corresponding limit compressive strength of the sample were examined. The loading of the samples was carried out on the "hard" electromechanical press. The result is not only the numerical values of the volume, but also the representation of cracks and the sample itself , as well as models give an idea of the spatial distribution of cracks. The program also allows to reflect on the screen the dimensions of the cracks. According to this, he width of cracks were increasing every time, for example, in one of the samples in the first time the width cracking was 0,01-0,1mm; 0,19-0,5mm was at second time; the third it was 0,26-1,4 mm.

The main advantages of tomography:

1. Researching without the sample destroying.
2. Reducing the terms of research
3. Reducing the cost of research
4. Reducing the technological and financial risks by reducing uncertainty, as well as improve the reliability and detail of the information received.
5. Ability to conduct experiments unrealizable in the physics laboratory, including extreme temperature and pressure conditions.
6. Ability to conduct a series of multivariate numerical experiments on one sample (with a limited set of physical samples).

Conclusion

X-ray tomography core is a very perspective method of petrophysical properties of rocks studying. The method allows to solve a great variety of basic and fundamental geological problems. We can fully visualize the rock in a 3D image and analyze all its properties. It is possible to highlight cracks, pores, cavities, inclusions, and heterogeneity, different layers of rock density and differentiation. X-ray tomography allows us to investigate samples of various sizes, and not only a reservoir samples, it allow to study all the rocks. Using the method helps us to be competitive in the world of high technology.

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HISTORY OF OIL INDUSTRY IN RUSSIA

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In Russia, oil was first mentioned in 16th century. Travelers described how tribes living near the shores of the river Ukhta in northern Timan-Pechora region, collected oil from the surface of the river and used it as medicine, oil and grease. Oil collected from the river Ukhta, was first brought to Moscow in 1597.

In 1745 Fedor Pryadunov received permission to start oil production from the bottom of the river Ukhta. Pryadunov also constructed a primitive refinery and was supplying some products to Moscow and St. Petersburg.

Oil was also observed by numerous travelers in the North Caucasus. Local residents even collected oil with buckets, scooping it out of wells up to five feet. In 1823, the brothers Dubinins opened the refinery in Mozdok for oil collected from the nearby Vozneseskiy oilfield.

Birth of oil industry in Russia

In the Baku region, there were many large fields with relatively easy recoverable reserves, but the transportation of oil to markets was difficult and expensive.