Table

Comparative characteristic of obtained results with literature sources

ORGAN	OBTAINED RESULTS, MG/KG		LITERATURE DATA, MG/KG	AUTHOR
	KAFTANCHIKOVO	*LOSKUTOVO*		
BRAIN	11,5	3,7	3	ROSLYAKOV
THYROID GLAND	21,4	15,4	7,7 ± 0,3	VOYNAR
HEART	69,9	20,3	10	ROSLYAKOV
LIVER	30,8	7,3	10	ROSLYAKOV
LUNGS	54,3	91,7	30	ROSLYAKOV
AORTA	369	239,1	20-25	BERNGARDT AND UKKO
SPLEEN	33,8	33	9-15	BERNGARDT AND UKKO
MUSCLES	35,2	22	7,7	EMSLEY

As compared with the literature data, the increased bromine content is observed in the brain, liver of Kaftanchikovo and in the thyroid gland, heart, lungs, spleen and muscle of the two studied areas. The bromine content in the aorta is of particular interest, which is almost 15 times higher in Kaftanchikovo village and 10 times higher in the Loskutovo village. Elevated concentrations indicate the bromine intake from external sources. More detailed studies are necessary to analyze the specificity of bromine in these areas and to identify possible sources of impact.

References

1. Verkhovskaya I.N. Brom v zhivom organizme i mekhanizm yego deystviya. – M. : AN SSSR, 1962. – 602 s.
2. Voynar A.I. Biologicheskaya rol' mikroelementov v organizme zhivotnykh i cheloveka. – M.: Nauka, 1960. – 497s.
3. Kabata – Pendias A., Pendias KH. Mikroelementy v pochvakh i rasteniyakh.- M.: Mir, 1989. – 439 c.
4. Ekologo-geokhimicheskiye osobennosti prirodnykh sred Tomskogo rayona i zabolevayemost' naseleniya / L.P. Rikhvanov, Ye.G. YAzikov, YU.I. Sukhikh, N.V. Baranovskaya i dr. – Tomsk : Kursiv, 2006. – 216 s.
5. Emsley J. Elements / per. s angl. Ye.A. Krasnushkinoy – M. : Mir, 1993. – 256 s.
6. Properties, applications and emissions of man-made methyl bromide / T. Duafala, M. Gillis // The Handbook of Environmental Chemistry Reactive Halogen Compounds in the Atmosphere. - 1999. – Vol.4 (E). – P. 191.
7. Determination of extractable organic bromine and chlorine in biological compartments of Atlantic cod (Gadus morhua) by neutron activation analysis / J. W. Kiceniuk, B. Zwicker, A. Chatt // Journal of Radioanalytical and Nuclear Chemistry. - 1998. - Vol.235 (1). – P. 291 - 294.

THE INFLUENCE OF SUCCINIMIDE ADDITIVES ON HIGH-OIL COMPOSITIONS

Pham Tien Thang

Scientific advisors engineer E.V. Maltseva[1], senior teacher T.F Dolgaya[2]

[1] Institute of Oil Chemistry, Tomsk, Russia

[2] National Research Tomsk Polytechnic University, Tomsk, Russia

Oil recovery, development and transportation of hydrocarbons contained high content of paraffin and asphaltene compositions, which cause an increase in viscosity of oil disperse systems, as well as the loss of fluidity at low ambient temperatures. Therefore, necessary forecast data behavior of petroleum systems is needed in the transfer and transport process for various climatic conditions.

One of the methods to reduce the temperature of solidification and improve the rheological characteristics of the oil is the application of depressant additives that inhibit nucleation paraffin oil components and reduce the amount of oil residue. However, an important research task is to study the effect of additives on asphaltene components, which also form the oil deposits and complicate the oil recovery and transportation.

The following methods occur: viscosity measurement on mini rotary viscometer, temperature solidification measurement by the devices CRYSTAL developed at the Institute of Petroleum Chemistry, and the use of photon correlation spectroscopy to study the aggregation of asphaltenes.

At the first stage in order to regulate the asphaltene phase transitions, the studies of asphaltene phase transitions were conducted in the model system of toluene-heptane. The threshold concentration of heptane was set 49% at which asphaltene starts to aggregate from the solution.

When threshold concentration of heptane is fixed in the model asphaltene solution, asphaltenes particles from the solution does not fall. At higher concentrations of heptane particle aggregation rate is considerably reduced. It is shown that the dispersant additive stabilizes the growth of asphaltene aggregates up to 200 nm.

The next stage was the analysis of additives influence on the paraffin compositions in the model system and oil based on rheological properties by devices "CRYSTAL" (developer IPC SB RAS, Tomsk, Russia).

It has been found that by adding the additive to the model solution, viscosity range of paraffin 6.1% reduced to 86 mPa.s. When the paraffin content increases to 10%, the viscosity increases.

However, the influence of the additive on viscosity in oil systems is weakly expressed.

The results of determining the temperature of solidification are shown in Table.

Table

Temperature of solidification

	Temperature of solidification, ºC				
Concentrations of additive	-	0,03 %	0,06 %	0,5 %	1 %
Samples (Wax)					
Paraffin (1%)	<-40	-	-	-	-
Paraffin (4%)	-8.4	-7	-5	-	-
Paraffin (6%)	3.8	2.2	2.1	-	-
Парафин (10%)	7.9	11.3	11.8	-	-
Oil 1 (1.1%)	-15.7	-14	-	-26.8	-25.4
Oil 2 (4.4)	-30.4	-31	-31	-35.0	-
Oil 3 (13.27)	14.8	12.3	12.1	12.0	-

The following conclusions have been made:

1. The regulation of the phase transition for asphaltenes was studied using succinimide additive. It is shown that the additive prevents coarsening for asphaltenes fraction, lowering the strength of the forming particles.

2. As a result of research work, it has been found that the succinimide dispersant additive in model solutions under cooling in a series of paraffin with additives prevents nucleation in case of low paraffin concentrations.

3. In real oil systems, additive helps to reduce the temperature of solidification only when the entry at high additive concentrations (0.5-1%). With this increase in the content of paraffin oil more than 6%, depressant properties decreases.

References

1. Zang V., Takanohashi T., Sato S., Kondo T., Saito I., Tanako R. Energy and Fuels. 2003. V.17. P. 101.
2. Mullins O.C., Sheu E.Y., Hammami A. (Eds.) - New York: Springer, 2007.

APPLICATION OF DISTILLATES CATALYTIC HYDRODEWAXING MATHEMATICAL MODEL

A.Yu. Pronevich, N.E. Belozertseva

Scientific advisor assistant teacher N.S. Belinskaya

National Research Tomsk Polytechnic University

Modernization of petroleum refining industry is being a priority direction of Russian economy development at present. Implementation of state of the art technologies of middle and heavy petroleum distillates enhanced processing provides both increasing in petroleum refining depth and producing end products that meet the latest Euro standards to quality of motor fuels. Particularly, the process of catalytic hydrodewaxing, which is widely implementing on Russian petroleum refineries these days, provides straight run diesel fractions and atmospheric gasoil processing in order to produce marketable diesel fuel components that meet the Euro-5 standard. Moreover, in winter time the processing unit produces diesel fuel with improved low temperature properties. This allows using obtained diesel fuels in severe winter and arctic weather conditions of the Russian Federation north climate zones.

With that, while implementing new technologies, the methods of available resources and industrial power sustainable use should be developing. One of the techniques, which are effectively applied to forecast resource efficiency modes of refining processing units operation, is optimization by means of computer modelling systems application [1]. The advantages of such systems are predicated by the fact that they are based on physical-chemical laws of complex, multifactorial re-refining processes. In this work the catalytic hydrodewaxing processing unit optimal operation modes forecasting was made depending on feedstock consumption using computer modelling system.

To develop the mathematical model the thermodynamic analysis of hydrodewaxing reactions was performed; kinetic model of the process was developed; kinetic parameters of the model were estimated.