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INFORMATION ON THE ARTICLES

REDUCTION OF THE ATMOSPHERE POLLUTION BY NITROGEN OXIDES WHEN BURNING FUEL AT OIL REFINERIES (p. 11)

Ol’ga Kulish, Dr. Sc. (Tech.), Stanislav Mescheryakov, Dr. Sc. (Tech.), Prof., Sergey Kuzhevatov, PhD (Tech.), Marina Orlova, PhD (Tech.), Ekaterina Ivanova

I.M. Gubkin Russian State University of Oil and Gas 65-1, Leninskiy prosp., Moscow, 119991, Russia.
Tel.: +7(499)233-95-66.
E-mail: olgakulish@yandex.ru;

Il’ya Gleizer
Planning and Design Office «GALS», Ltd. 37, build. 1, of. 61, Arkhitectora Vlasova str., Moscow, 117393, Russia.
Tel.: +7(499)128-31-09.
E-mail: ilgleizer@mail.ru;

Arkadiy Voschinsky
Oil refineries Ltd.
P.O. Box 4, Haifa, 31000, Israel.
Tel.: +972-4-878828.
E-mail.: varcady@bazan.co.il;

Nikolay Samutin, Dr. Sc. (Medicine)
A.N. Sysin Scientific Research Institute of the Person Ecology and the Environment Hygiene 10/15, build. 1, Pogodinskaya str., Moscow, 119992, Russia.
Tel.: +7(499)246-27-64.
E-mail: samutin.nn@gmail.com

At the I.M. Gubkin Russian State University of Oil and Gas and the high-temperature non-catalytic technology of fuel using units combustion gases cleaning from nitrogen oxides using urea as a reducing agent is developed. The process surpasses known analogs in the technical and economic indicators. Efficiency of combustion gases cleaning from nitrogen oxides in industrial conditions reaches 90 %. The developed process was used by authors for a solution of the problem of atmospheric air pollution by oil processing enterprises. As objects for introduction heating furnaces of oil refinery in Haifa (Israel), working at mix of natural gas and fuel oil which are the largest sources of nitrogen oxides emissions were chosen. Results of process introduction are given for 8 heating furnaces of the plant. As a result of cleaning installations introduction emissions of NO were reduced by 70... 90 % that allowed to provide existing standards and to improve indicators of air quality at the enterprise territory.

Key words: atmosphere pollution; fuel combustion; nitrogen oxides; oil refinery; heating furnaces; emission standards; flue gases; non-catalytic cleaning; urea; nitrogen oxides reduction.

PRODUCTION OF HIGH DISPERSITY PLATINUM IN CATALYSTS OF BIFUNCTIONAL TYPE, DESIGNED FOR THE PROCESSING OF EXTENSIVE FRACTION COMPOSITION HYDROCARBON RAW MATERIAL (p. 13)

Robert Gazarov, Dr.Sc. (Chemistry), Prof., Stanislav Mescheryakov, Dr.Sc. (Tech.), Prof., Vladimir Shirokov, PhD (Tech.), Prof., Karen Gazarov, Sergey Slavin, PhD (Tech.), Assistant prof.
I.M. Gubkin Russian State University of Oil and Gas 65, Leninskiy prosp., Moscow, 119991, Russia.
Tel.: 8(499)233-95-51.
Fax: 8(499)135-88-95.
E-mail: gazarov_ra@mail.ru

The carried out cycle of researches showed that synthesis of marked systems on the base of mixed geteropolyacidic catalysts (GPC) with Keggin modified structure allows to prepare inorganic complexes with ions of platinoids (and other d-metals) stabilized by oxygen environment. Oxidizing-recovery cycles performed in extensive range of temperatures 573...923 K for synthesized system Pt-GPC/Al2O3 prove high structure stability of modified GPC in synthesized marked systems and as a result – preservation of high dispersed (in essence – atomic-dispersed)
state of metals – palladium, platinum, rhenium and others – under above-mentioned temperatures.

Key words: bifunctional catalysts; hydrocarbons; oxocomplexes; support; acidity; metal centers; dispersion.

CHEMICAL TRANSFORMATIONS OF CH4 AND CO2 IN TRIFLUOROACETIC ACID (p. 20)

Marina Vishnetskaya, Dr. Sc. (Chemistry), Prof.
Tel.: 8(916) 859-52-22.
E-mail: mmvishnetskaya@mail.ru;
Irina Skrepleva, PhD (Chemistry), Assistant prof.
Tel.: 8(916) 486-24-76.
E-mail: Skrepleva-JY@yandex.ru;
Oleg Sviakharyov, master degree
Tel.: 8(926) 562-69-73.
E-mail: caba_iz_ct@mail.ru;
I.M. Gubkin Russian State University of Oil and Gas
65, Leninskiy prosp., Moscow, 119991, Russia;
Mikhail Mel’nikov, Dr. Sc., Prof.
Tel.: 8 (916) 381-00-49.
E-mail: melnikov@excite.chem.msu.ru
M.V. Lomonosov Moscow State University, Chemical department
1/3, Leninskiy gory, GSP-1, Moscow, 119991, Russia.

The reaction of CH4 and CO2 conversions in trifluoroacetic acid (TFA) is shown to take place at room temperature and atmospheric pressure and to result in the formation of a various products.

In ranges of MALDI-TOF of the dry rest of methane transformation products peaks of ions weighing 684 and 700 are observed. In a range of a nuclear magnetic resonance (NMR) 1H the signal dry rest relating to a product of reaction wasn't observed. It testifies either to low contents/absence of hydrogen absence in the received high-molecular connection, or to the existence in molecules of the protons product being a part of IT groups and having widened resonant lines. In a range of NMR 13C the in molecules of the protons product being a part of IT groups in the received high-molecular connection, or to the existence transformation in the presence of CO2 doesn't lead to the formation saturated CO2 or CH4 lose oxidizing activity at interaction with methane isn't spent. TFA and its solutions, structure, including C8O13H, C15O30H4, C16O29H8. Lack of signals set of products with various molecular weight and gross – products.

The paper considers reduction techniques for the emissions of toxic substances contained in combustion products of thermal units as well as techniques to improve the efficiency of natural gas use in these units. Environmental parameters for the exploitable pool of gas turbines and new generation of gas turbines normalized to 15 % oxygen content in combustion products are adduced. Thermal and combustible secondary energy resources (SER) and overpressure SER utilization technologies for the gas-transport enterprises are discussed as well. Special attention is paid to the innovative energy-saving technologies based on the development of additional energy by utilizing gas turbines waste gas heat. There is a scheme of the gas-distribution station with «Kriokor» company turbo-expander units with 5 MW nominal capacity allowing to save more than 24 mln m3 of natural gas annually.

Key words: natural gas; emissions; thermal energy; power energy; efficiency; complex units; turbo-expander; combustion products; heat-exchanger.

BIOREMEDIATION OF OIL POLLUTED SOILS WITH THE USAGE OF ORGANIC BIOPREPARATION BIOL (p. 28)

Elena Mazlova, Dr. Sc. (Tech.),
Luis Andres Errera, post-graduate student,
Natalia Eremina, post-graduate student
I.M. Gubkin Russian State University of Oil and Gas
65, Leninskiy prosp., Moscow, 119991, Russia.
Tel./fax: +7(499)135-74-96.
E-mail: luisberea@hotmail.com

Laboratory experiments have shown that the biological preparation BIOL which is made on the basis of two amazon plants and oil destructors aboriginal bacterial strain, due to the stimulation of natural microflora, is capable of increasing the rate of decomposition of oil on the average 5.6…6.2 times. In Ecuador territory in experiments provided on industrial cleaning oil-contaminated areas it has been demonstrated that BIOL for one growing season reduces oil contamination of soil by 4.6…8.2 times. Practical recommendations are formulated for the use of BIOL for cleaning of oil-contaminated soils.

Key words: biological preparation; oil destructor bacterial strain; rate of decomposition; natural microflora; oil-contaminated areas; oil-contaminated soils.

RESEARCH INTO THE PROBLEM OF OIL REFINERIES WASTE WATER POLLUTION BY CYANIDES (p. 33)

Natalia Eremina,
Elena Mazlova, Dr. Sc. (Tech.),
Luis Andres Errera
I.M. Gubkin Russian State University of Oil and Gas
65, Leninskiy prosp., Moscow, 119991, Russia.

The present paper describes the problem of oil refineries waste water pollution by cyanides. Compounds relating to the class of cyanides are highly toxic and can cause serious harm to the ecosystem, even in low concentrations. Today there is no single-valued data that refineries waste water are the source of cyanides environment pollution, therefore the Russian refinery waste waters were selected for investigation. In the article the results of cyanides concentration level in wastewater after mechanical treatment are given. It was found that the concentrations of cyanide in wastewater, both of Russian and foreign oil refineries exceed the maximum permissible concentrations of discharges into water bodies of different purpose. Treatment technologies overview for cyanides removal from waste water is presented. The necessity of continuous monitoring of this indicator in refineries waste water is justified.

Key words: cyanides; waste water; oil refinery; monitoring; environment.

Purification of Crude Benzene From Thiophene Impurities (p. 35)

Evgeniy Boikov,
Marina Vishnetskaya, Dr. Sc. (Chemistry), Prof.
I.M. Gubkin Russian State University of Oil and Gas
65, Leninskiy prosp., Moscow, 119991, Russia.
Tel.: 8(905) 548-19-65, 8(916) 859-52-22.
E-mail: ev-boykoff@yandex.ru, mvvishnetskaya@mail.ru

Possibility of crude benzene desulphurisation by an oxidizing desulfurization by air oxygen on oxides of transitional metals is shown. The conditions of reaction providing the maximum thiophene oxidation at the minimum loss of benzene are established. 0,75V2O5·0,25MoO3 sample appeared the most active in oxidising desulphurisation. At the temperature 310…320 °C this catalyst has optimum indicators of conversion in comparison with other studied samples. Beginning from 310 °C conversion of thiophene reached 91,8 % mas., therewith the conversion of benzene makes up 7,6 % mas. Influence of molybdenum amount containing in a sample of the catalyst on conversion of benzene and thiophene is established at various temperatures. The role of phase structure of catalysts (1–x)V2O5·xMoO3 is shown at the expense of which optimum conversion of benzene and thiophene is reached. Oxidizing cleaning is characterized as economically and ecologically effective method of hydrocarbonic raw materials processing.

Key words: oxidation; thiophene; benzene; desulfurization; oxides of transitional metals; vanadium; molybdenum; mixed oxides.

Impact of Oil and Gas Industry on the Environment and Human Health (p. 39)

Tatiana Smirnova, PhD (Tech.)
I.M. Gubkin Russian State University of Oil and Gas
65, Leninskiy prosp., Moscow, 119991, Russia.
 Tel.: 8 (499) 135-74-66.
E-mail: tatsmirnova82@mail.ru;

Ol’ga Kuznetsova, post-graduate student of FSBI «A.N. Sysin Research Institute of Human Ecology and Environmental Hygiene» of the Ministry of Health of the Russian Federation
10/1, Pogodinskaya str., Moscow, 119992, Russia.
E-mail: ov_kuznetsova@mail.ru

This paper describes the consequences of environmental pollution by oil and gas facilities, as well as the impact of industry major toxicants on the various systems of the human body. On the example of the Khanty-Mansiysk Autonomous Okrug (KhMAO) – Yugra quantitatively the magnitude of air, soil and water pollution as a result of oil facilities activity are illustrated. Oil and oil products are some of widely spread and dangerous environmental pollutants. However, despite this fact up to the present issues of migration and transformation of hydrocarbons in the environment remain insufficiently studied. Not having a clear picture of pollutants behavior in space (various environmental objects) and time it is difficult to estimate the contribution of oil and gas industry to the increase in the number of specified diseases of residents of nearby to oil facilities settlements.

Key words: oil pollution; remediation of oil-polluted lands; hydrocarbons poisoning; oil toxicology; KhMAO – Yugra ecology.

Stochastic Model for the Size of the Zone of Thermal Damage Caused by Fire at Gas Pipelines (p. 43)

Evgeniy Klimenko, PhD (Tech.), Assistant Prof.
I.M. Gubkin Russian State University of Oil and Gas.
65, Leninskiy prosp., Moscow, 119991, Russia.
Tel.: 8(499) 233-93-26, 8(903) 117-18-58.
E-mail: klimet243@inbox.ru

Statistical analysis of the consequences of gas pipeline ruptures is used to obtain an empirical frequency diagram for the sizes of thermal damage zones caused by fire at gas pipelines. Empirical frequency diagrams have one significant flaw: because of the limited amount of experimental data they normally do not have low-probability values (10–3 and lower), which are actually those that are used in legislative documents. Said flaw can be eliminated by selecting a theoretical distribution law that approximates well the empirical frequency diagram and allows to make calculations in the low-probability region. Such theoretical distribution laws include unimodal distributions defined for positive values of argument.

A number of known theoretical distribution laws were used to approximate the empirical frequency diagram. The best theoretical distribution law, that showed the minimal deviation from the empirical frequency diagram in accordance with Pearson criterion, was the gamma distribution.

Key words: ecological safety; gas pipeline accidents; probability; mathematical modeling.

Multiscenario-Based Prediction of the Consequences of Soil Objects Subsurface Oil Pollution (p. 47)

Sergey Ostakh, PhD (Tech.), Assistant prof.
I.M. Gubkin Russian State University of Oil and Gas
65, Leninskiy prosp., Moscow, 119991, Russia.
Tel./fax: 8 (926) 880-72-14.
E-mail: ostah.sv@gmail.com;
Oksana Mironova, magister’s degree
E-mail: Mironova_Ok@mail.ru

Probable consequence of oil products supply facilities exploitation is hydrocarbon contamination of adjacent areas and hence the formation of risks of achievement by dangerous components vulnerable or critical objects of nature management, the damaging effects that occur for various conditions on a specific object. Currently there are no integrated methodologies to assess the potential environmental, economic and social damage in the subsurface oil pollution. Organizational and technical measures for detection and liquidation of oil spillages are generalized. Methodical basis for predicting the effects of hydrocarbon fluids distribution are given. The authors have proposed a ball marker scenario-based assessment of soil objects pollution, as well as classification of oil products lenses monitoring systems. The practical significance of methodological approaches is determined by the possibility of assessing and improving the material and technical component of the ecological-reclamation activities.

**Key words:** safety; monitoring; pollution; environment; geological environment; oil products lens; damage effects; risks; damage; rehabilitation.

**EVALUATION OF HUMIC-CLAY COMPLEXES CAPABILITY TO STABILIZE OIL-IN-WATER EMULSIONS (p. 51)**

Natalia Grechischeva, PhD (Chemistry), Vera Schukina, post-graduate student, Stanislav Mescheryakov, Dr. Sc. (Tech.), Prof.

I.M. Gubkin Russian State University of Oil and Gas 65, Leninsky prosp., Moscow, 119991, Russia.
Tel./fax: 8 (499) 135-80-96,
E-mail: grechischeva@gubkin.ru,

Vladimir Kholodov, PhD (Biology)
RAAS V.V. Dokuchaev Soil Institute
7, Pyzhevskiy by-street, Moscow, 109017, Russia.
E-mail: vkholdol@mail.ru,

Irina Perminova, Dr. Sc. (Chemistry),
Elena Lazareva, PhD (Geol. & Miner.),

Aksana Parfenova
M.V. Lomonosov Moscow State University
1-3, Leninskie Gory, Moscow, 119992, Russia.
Tel./fax: +7 (495) 939-55-46,
E-mail: iperm@org.chem.msu.ru

Formation of oil-suspended particulate matter aggregates (OSAs) is a natural attenuation process which takes place in the marine waters polluted with oil in the presence of organic-mineral fine sediments. It includes disaggregation of oil slick into the droplets and their encapsulation into organic-mineral shells. The dominating forms of suspended particulate matter in the aquatic environments are organic clay colloids consisting of clays modified with humic substances (HS). The objective of this study was to investigate stabilization of oil-in-water emulsions by clay particles modified with HS of different origin. The obtained results show an opportunity to use artificial humic-clay complexes consisting of soil and coal humic substances sorbed onto montmorillonite particles as effective and potentially environmentally friendly oil spill dispersants.

**Key words:** ecologically safe technologies; oil films; humic substances; clay minerals; stabilization of oil emulsions.

**EFFEICENCY INCREASING WAYS FOR TECHNOLOGICAL FLUIDS AND CONSTITUENTS PROTECTION FROM MICROBIOLOGICAL DAMAGE (p. 56)**

Vitaly Zavorotny, PhD (Tech.)

I.M. Gubkin Russian State University of Oil and Gas 65, Leninsky prosp., Moscow, 119991, Russia.
Tel: (499) 233-90-22.
Fax: +7(916) 850-17-64.
E-mail: zavorotny51@mail.ru,

Eleonora Serebnennikova, PhD (Tech.),
Vladimir Minenkov, PhD (Tech.),

Natalia Chenikova, PhD (Tech.),
Elizaveta Firsova,
Evgeniy Petrushin, post-graduate student

LLC «Scientific-production company «EXBUR-K» 25/7, Mira str., Krasnodar, 350063, Russia.
Tel./fax: 8 (861) 267-07-19.
E-mail: exburse@mail.ru

A short review of microbiological aspects of the technological liquids, chemical reagents and the equipment biodamages; ways, methods and the means of controlling the proceeding undesirable processes of a technical microflora activity during the drilling, muffling and maintenance of oil and gas wells is given. The recommendations for the organizational and the scientific and methodical events realization for increasing the efficiency of the protection from microbienocenosis are given.

**Key words:** technological liquids; chemical reagents; wells equipment; sulphate recovery bacteria (SRB); infection sources; bactericides; methods, ways of protection from microbiocenosis.

**PROBLEMS OF APPLICATION AND ANALYSIS OF LOW-TEMPERATURE CAR WASHERS (p. 61)**

Dmitriy Sidorenko, PhD (Tech.), Assistant prof.,
Zhaneta Surikova, PhD (Chemistry), Assistant prof.
I.M. Gubkin Russian State University of Oil and Gas 65, Leninsky prosp., Moscow, 119991, Russia.
Tel.: 8(499) 233-95-22.
Fax: 8(499)135-88-95.
E-mail: surikova.zv@ya.ru, ormr66@yandex.ru

The article is devoted to the study of composition and properties of car washers. The lack of a unified normative documentation for the production of such structures is shown. For samples car washers water content, density and pour point which was compared with the stated were determined. Incorrect use of terminology by manufacturers as well as a discrepancy to environmental requirements were justified. Authors using standard methods of the analysis revealed the availability of high toxic impurities – methanol, ethanol, ethylene glycol and fusel oils in randomly selected car washers.

It is shown that there is no relationship between the place of purchase, the product brand, price and quality, so when buying glass washing liquid one can only rely on the recommendations of automobile publications and forums that offer to pay attention to transparency, the presence of sediment, formation of a stable foam when shaken and cans labeling.

**Key words:** low-temperature fluids; car washer; pour point; iso-propanol; n-propanol; methanol; ethylene glycol; ethanol; iso-pentanol; component composition.