

# Summaries

UDC 549.322.21:548.73

**Onufrienok V.V.**  
**HYDROCHEMICAL PROCESSES OF FORMING MINERALS  
IN WATER-BEARING MEDIUM**

The author has studied the features of meteorological water vapor hydration of iron sulfides with different ratio of sulfur and iron obtained by the dry synthesis method. According to the data of the X-ray analysis the samples after synthesis did not contain the compounds with oxygen, hydrogen and hydroxyl group. The sulfide phases were hydrogenated by water adsorption from air atmosphere at 293 K without the researchers interference during 29 years after synthesis. X-ray analysis of the cured samples phase composition shown the presence of compounds which contain the hydroxyl group OH in their structures: parabutlerite –  $\text{Fe}(\text{SO}_4)(\text{OH})2\text{H}_2\text{O}$ , goethite –  $\text{FeO}(\text{HO})$ , szomolnokite –  $\text{Fe}(\text{SO}_4)(\text{H}_2\text{O})$ , rozenite –  $\text{Fe}(\text{SO}_4)4(\text{H}_2\text{O})$ , rhomboclase –  $\text{FeH}(\text{SO}_4)4(\text{H}_2\text{O})$ . These samples contained originally the iron sulfides in metastable state. It was ascertained that narrow intervals in a series of stable pyrrhotins  $\text{FeS}$ ,  $\text{Fe}_{0.875}\text{S}$ ,  $\text{Fe}_{0.905}\text{S}$ ,  $\text{Fe}_{0.950}\text{S}$  and  $\text{Fe}_{0.975}\text{S}$  did not contain phases with hydroxyl group. The results obtained in the research demonstrate that metastable iron sulfides undergo hydration; the compounds which contain bound-state water in their structure are formed at water adsorption.

UDC 553.411.071.061

**Kucherenko I.V.**  
**THE PROBLEMS OF FORMATION OF HYDROTHERMAL  
GOLD DEPOSITS. P. 1. MAGMATOGENE GEOLOGICAL  
AND GENETIC CONCEPTS**

The article introduces the content and validations of four modern concepts of hydrothermal gold deposit formation – granite-genetic, basalt-genetic, metamorphogenic, polygenic. The critical analysis of arguments integrates with the suggestion and interpretation of the author data characterizing the ratios of mineralization with magnetism in the first part of the article and petrochemical, geochemical features of wallrock metasomatic haloes in the second. In the second part of the article the proposed materials are discussed and the conclusions are drawn.

UDC 553.411.04/071(571.5)

**Kucherenko I.V.**  
**PROGNOSIS-SEARCH COMPLEX FOR MESOTHERMAL GOLD  
DEPOSITS. P. 1. TECTONIC AND GEODYNAMIC CRITERIA**

The article introduces the data revealing the variety of geological situations of mesothermal gold deposits allocation in southern mountain-folded framing of Siberian craton. The deposits were formed in crystal and black-shale substrate in the Late Riphean (Yenisei region), the Early Paleozoic (Kuznetsk-Alatausk region), the Late Paleozoic (Muya, Lensk regions). It is shown that the control over mineralization by deep faults, geodynamic modes of collision in active continental margins and activation of intercontinental rifts have the predicted value. Both criteria (tectonic and geodynamic) are recommended to be included into the structure of prognosis-search complex.

UDC 550.831.01

**Starostenko V.I., Pyatakov Yu.V.**  
**SOLUTION OF THE DIRECT GRAVITY PROBLEMS FOR  
SPHERICAL APPROXIMATE BODIES. ALGORITHMS**

The article considers the mathematical statements and introduces the algorithms for solving the direct gravity problems for spherical polyhedron and spherical triangular prism with upper and lower bases spaced in an arbitrary way. The polyhedron density changes in radial direction according to the linear law. The prism density varies along the parallels and meridians proportionally with arc lengths on the upper

and lower bases and linearly along any radius taking the values set in the vertices.

UDC 550.831.01

**Starostenko V.I., Pyatakov Yu.V., Isaev V.I.**  
**SOLUTION OF THE DIRECT GRAVITY PROBLEMS FOR  
SPHERICAL APPROXIMATE BODIES. ALGORITHMS TESTING**

Using the test cases system the authors have tested the algorithms for numerical solution of the direct gravity problems for approximate body in the form of spherical triangular prism with arbitrary upper and lower bases to check their stability, accuracy and speed.

UDC 550.83;553.98;551.73;551.76(571.16)

**Abrosimova O.O., Guba A.V.**  
**SEISMIC CRITERIA FOR PETROLEUM POTENTIAL  
OF RESERVOIRS AT THE PALEOZOIC-MESOZOIC BOUND-  
ARY OF MEZHOVKA ARCH (NOVOSIBIRSK REGION)**

Based on the comparison of seismic record character with geological data the authors single out six main seismic facies reflecting the most specific rock types in pre-Jurassic complex in south-west part of Novosibirsk region. The seismic model of pre-Jurassic deposit structure allows outlining the supposed zones of distribution of various rocks in pre-Jurassic complex. The results obtained may be used when estimating the collector zone extraction and oil bearing prospects on this stratigraphic datum.

UDC 553.98:553.041:552.578:550.8.05

**Lobova G.A., Osipova E.N., Krinitsyna K.A., Ostankova Yu.G.**  
**THE EFFECT OF PALEOCLIMATE ON GEOMETRY MODE AND  
OIL GENERATION POTENTIAL OF BAZHENOV FORMATION  
(AT TOMSK REGION LATITUDES)**

The multivariate paleotemperature modeling of sedimentary sections in six deep wells in Tomsk region has been carried out. The authors determined the considerable effect of temperature secular trend on the earth surface (paleoclimate) on thermal history and implementation of oil generation potential by Bazhenov formation deposits for various tectonic structures situated in different latitudes of Tomsk region. The «reference» geotemperatures from vitrinite reflectance and oil and gas content of upper Jurassic deposits were taken as the criteria of adequacy to the geometry mode model.

UDC 552.578.2.061.4:550.836(571.16)

**Osipova E.N., Lobova G.A.**  
**GEOTEMPERATURE MODE OF BAZHENOV FORMATION  
AND OIL-BEARING AREAS OF CRETACEOUS DEPOSITS  
(NYUROLSKY MEGAHOLLOW)**

Using the reservoir temperature survey in upper Jurassic deposits the authors have compiled a map of geotemperature distribution for Bazhenov formation in Nyurolsky megahollow and structures of its framing. The centers of Bazhenov oil intensive generation were selected by geotemperature criterion. The epicenters locations were recommended as high-priority areas for determining objects in cretaceous oil-and-gas complex.

UDC 550.831.017.834.05.837.211.82(571.53)

**Pashevin A.M., Lavrentieva A.E., Ivanov N.K.**  
**DEEP TECTONICS OF NORTH-EAST BAIKAL REGION**

Integrated geophysics of Siberian platform edge part in piedmont area of Akitkansky Range in Patom highland carried out using modern equipment allow estimating the deep tectonics of the region. The

most probable fact is that dynamic stress of collision nature on Earth crust resulted in occurrence of a number of inclined fault zones sub-parallel to the contour of mountain framing. The direct contact of Proterozoic deposits with sedimentary cover formations of the platform is in the inclined through fault thrust.

UDC 550.83:551.3

**Ustinova V.N., Ustinova I.G., Ustinov V.G., Starikov N.N.**  
**DIGITAL MODELS OF PHYSICAL FIELDS**  
**AND MORPHOSURFACES AT REGIONAL PREDICTION**  
**OF OIL-AND-GAS CONTENT**

The involvement of regional research results to oil-and-gas content prediction allowed establishing the criteria for determining hydrocarbon deposit accumulations on the platforms, their confinement to triple junction lineaments in rift basins, to the basins of stable warping and inherited development: since ancient rift-aulacogen to rift structures of Permian and Triassic. The construction of digital models for surface of mantle and magnetic field of Western Siberian Plate became the base for determining the confinement of sedimentary complexes with maximum oil-and-gas content in platform cover sediments to the areas of anomalous curvature on mantle surface and maximum variability of magnetic field – on fragments of negative anomalies of field intensity corresponding to basement high. The probabilistic statistical analysis of prediction criteria information value allowed estimating the probability of occurrence of prospective targets.

UDC 553.98;550.4

**Zhiltsova A.A., Isaev V.I., Korzhov Yu.V.**  
**VERTICAL GEOCHEMICAL ZONALITY OF OIL-AND-GAS**  
**COMPLEX (BY THE EXAMPLE OF ROGOZHNIKOVSKY AND**  
**SEVERO-ROGOZHNIKOVSKY FIELDS)**

Based on the unique geochemical researches of core material samples in two prospect wells (718, 765) the interstratal displacement of heavy oil hydrocarbons ( $C_{10}$ – $C_{25}$ ) was determined in section of Rogozhnikovskiy and Severo-Rogozhnikovskiy fields of the Khanty-Mansiysk Autonomous Region. The authors have developed a geochemical model of vertical migration of heavy oil hydrocarbons in which the compounds capable of interstratal migration were determined. The migration form was proposed and the distance of substances displacement in the section was estimated.

UDC 553.94 (55)

**Rybalko V.I., Arbuzov S.I., Volostnov A.V.**  
**IRAN COAL METAL-BEARING**

The average grades of impurity elements in coals of the Islamic Republic of Iran were estimated. The authors detected the metal-bearing coals and determined geochemical specialization of coal basins and deposits. It was ascertained that the mixed chalcophile lithophile siderophile type of geochemical specialization is significant for Iran coals.

UDC 622.276.43

**Abidov D.G., Kamartdinov M.R.**  
**THE METHOD OF MATERIAL BALANCE AS A PRIMARY**  
**TOOL FOR ESTIMATING THE INDICES OF FIELD AREA**  
**DEVELOPMENT AT FLOODING**

The article considers the problem of applying the material balance when estimating the efficiency of field area flooding. The authors propose the solution of the problem of distributing the produced and pumped liquid volumes of total edge wells between the adjacent areas (the problem of well allocation estimation). The method is based on transition from constant geometrical well allocation factors which are valid only at symmetric pattern of pressure distribution to their alternating analogues. It could reflect the real situation when the pressure distribution pattern changes. This effects, in its turn, on well flow rates distribution among the areas.

UDC 551.762(571.1)

**Beyzel A.L.**  
**THE CHART OF INDEXING THE PRODUCTIVE SAND LAYERS**  
**OF JURASSIC IN WESTERN SIBERIA ON THE BASIS OF**  
**CYCLOGENESIS INVERSION MODEL**

The author has developed a new chart of indexing the productive sand layers based on separate approach to continental and marine sections. Sand layers are basal in alluvial cycles and they are roofing regressive in marine ones. They cannot be synchronous to each other. The chart proposed introduces two columns of indices instead of the uniform one  $J_n$ . The marine layers are denoted by letter «m» and letter «c» is used for denoting the continental layers. For example,  $J_{m1}$  and  $J_{c1}$ . The index of the type  $J_i^j$  is applied for the layers of uncertain facial belonging and for cycles as a whole. The layers of the type  $J_2^0$  are considered as the immediate continuation of continental basal layers of the main phase of streamflow activation. The lowest layer of Vasyugan zone in marine facies has index  $J_{m2}^0$  and the continental layer synchronous to it –  $J_{c2}^0$ .

UDC 551.762 (571.1+420)

**Beyzel A.L., Alifirov A.S.**  
**THE POSSIBILITY OF DETERMINING THE ANALOGUES OF**  
**VASYUGAN, GEORGIEV AND PARTIALLY BAZHENOV ZONES**  
**OF WESTERN SIBERIA IN STRATOTYPICAL SECTIONS OF**  
**CALLOVIAN, OXFORDIAN AND KIMMERIDGIAN STAGES OF**  
**SOUTHERN ENGLAND**

Stratigraphic zones of Western Siberia Jurassic considered under a certain angle of view represent the sedimentation cycles of high order. The boundaries of these cycles possess a high correlation potential. They are traced far beyond the region – in Western Siberia, Pechora basin, on the Barents Sea shelf, the East-European platform, the North Caucasus etc. The opportunity to trace the Siberian zones in stratotypical sections of proper stages in Western Europe is of particular interest. Such correlation with application of the detailed ammonite scales is introduced by the example of Vasyugan, Georgiev and partially Bazhenov zones.

UDC 553.984;552.54

**Koveshnikov A.E.**  
**OIL-AND-GAS FIELDS OF FRACTURED-MATASOMATIC**  
**GENESIS IN PRE-JURASSIC DEPOSITS**  
**OF WESTERN-SIBERIAN GEOSINECLISE**

In pre-Jurassic deposits of Western-Siberian geosineclise the oil-and-gas fields may be formed in petroleum contact zone of Paleozoic and Mesozoic deposits by Permo-Triassic mantles of waste or in hydrothermal-metasomatic fractured zones both in unaltered rocks and at these zones overlapping to the zone of Permo-Triassic mantle of waste. The key system is the one of conjugated fractures or fracture zones. This system includes the reservoir rocks of waste mantle zone as separate areas for improving the reservoir characteristics.

UDC 553.984;552.54;551.253

**Koveshnikov A.E.**  
**THE SOURCE OF OIL AND GAS DELIVERY INTO PALEOZOIC**  
**DEPOSITS OF WESTERN-SIBERIAN GEOSINECLISE**

Paleozoic deposits at formation and further transformations have passed three stages: diagenesis and primary catagenesis; orogenesis and weathering mantle formation; secondary catagenesis and formation of fracture hydrothermal-metasomatic reservoir rocks. The Paleozoic rocks passed the principle stage of oil generation at primary catagenesis. At the orogenesis stage of region development the oil generated at the primary catagenesis was dissipated in the area of weathering mantle formation. The reservoir rocks were formed as a unified system and some of them were filled with oil and gas at the secondary-catagenetic stage of rock transformation. Oil migrates to the fields concentrated in Paleozoic deposits as a result of diffusion transfer in formation water of high temperature. The oil is separated from formation water in the form of drops on deep fault areas due to oil passing the «dew point» and lifting by gravitation forces to the reservoir rocks formed in Paleozoic deposits.

UDC 622.279.23: 519.688

**Zhuravsky V.V., Sergeev V.L.**  
**ESTIMATION OF RECOVERABLE RESERVES IN GAS AND CONDENSATE FIELDS ON THE BASIS OF THE INTEGRATED MODEL METHOD**

The authors consider the problem of determining the recoverable reserves in gas and condensate fields by the production data and propose the technique for its solution. The technique is based on integrated system of material balance models considering a-priori information. The article introduces the results of analysis of accuracy of the proposed and traditional pressure drop methods based on indices data at development of Anastasievsk-Troitsk condensate field.

UDC 622.276.031.011.43:53.091

**Mezentsev D.N., Shchemelin Yu.A., Ledovskaya T.I., Voykov G.G.**  
**THE EFFECT OF PRESSURE CONDITIONS ON PETROPHYSICAL BONDS FOR RESERVOIRS OF NORTH-VENINSK FIELD**

The article considers the results of the laboratory tests for determining rocks reservoir and petrophysical properties: porosity, permeability, elastic waves travel speed, electric resistivity under atmospheric and pressure conditions for reservoirs of North-Veninsk field in the Sakhalin region. The authors have obtained the correlation relations of the characteristics under test.

UDC 622.276.6

**Mezentsev D.N., Kvesko N.G.**  
**ESTIMATION OF PERMEABILITY RECOVERY IN TERRIGENOUS RESERVOIRS WHEN MODELING SEALING PROCESSES**

The authors have carried out the laboratory tests of oil permeability change under the effect of sealing fluids for core samples of terrigenous reservoir in Tomsk region field. It was ascertained that application of Cenomanian horizon water results in maximum fall of sample permeability. Application of additive in composition off sealing fluid «Neftenol-K» allows balancing the negative effect and preserving permeability.

UDC 622.276

**Martynov M.E., Kvesko B.B., Karpova E.G., Kvesko A.R.**  
**EVALUATION OF PERMEABILITY AND INTRASTRATAL CROSS-FLOW IN A LAYER VERTICALLY INHOMOGENEOUS IN POROSITY AND PERMEABILITY PROPERTIES**

Based on the analysis of the results of hydrodynamic researches the authors have considered the mechanism for evaluating vertical permeability. The classical analytical solution for dually completed systems at assumption on pseudostationary intrastratal cross-flow was used to calculate the layer parameters. The authors evaluated the values of permeability for each layer at their integration test.

UDC 543.38:543.51

**Serebrennikova O.V., Russkikh I.V., Gulaya E.V., Strelnikova E.B., Kadychagov P.B.**  
**HYDROCARBONS AND ORGANIC COMPOUNDS OF OXYGEN IN BOTTOM SEDIMENTS OF ALTAY AND KHAKASSIA LAKES**

Using the techniques of IR-spectrometry and gas chromatography mass spectrometry the authors have studied the organic compounds distribution in bottom sediments of Altay and Khakassia lakes. The structure and content of individual groups of hydrocarbons and oxygen-containing compounds indicate not only the natural but also anthropogenic factors of forming the organic constituent of bottom sediments.

UDC 556.314

**Kolubaeva Yu.V.**  
**MIGRATION PATTERNS OF CHEMICAL ELEMENTS IN WATERS OF NORTHERN PART OF KOLYVAN-TOMSK FOLDED ZONE**

Using the software system HydroGeo the author has studied inorganic migration patterns of chemical elements in natural waters of northern part of Kolyvan-Tomsk folded zone (Tomsk region, Tomsk district). It was shown that chemical elements being the main ones in water salt composition migrate mainly in ionic form or in the form of neutral nondissociating molecules. Microelements form a great number of complexes of different strength along with ionic migration pattern.

UDC 556.314

**Guseva N.V., Kopylova Yu.G., Leushina S.K.**  
**ABUNDANCE OF RARE EARTH ELEMENTS IN NATURAL WATERS OF KHAKASSIA**

The authors have studied the abundance of rare earth elements in natural waters of Khakassia (Shirinsky district). The effect of physico-chemical parameters of waters on behavior features of rare earth elements was determined. The levels of elements accumulation in lake, river and ground waters were defined. The article introduces a new approach to rationing of rare elements content in waters by hydrosphere clarks.

UDC 551.577.53:553.982.2

**Bolshunova T.S.**  
**DISTRIBUTION OF SOME CHEMICAL ELEMENTS IN SNOW MELTED WATER FROM AREAS OF OIL AND GAS PLANTS OF TOMSK REGION**

The article introduces the data on chemical elements content in snow melted water obtained by snow survey of the area of effect of Tomsk region oil and gas plants. The elevated concentrations of such elements as Li, Be, Na, Mn, Ni, Zn, As, Mo, Th, U are detected for this area. It may be conditioned both by effect of air pollution source emissions on oil fields and regional air transport of pollutant emissions from industrial enterprises of Tomsk and neighboring regions.

UDC 622.341:622271.6(071.16)

**Shaykhiev I.R.**  
**GEO-ECOLOGICAL PROBLEMS OF DEVELOPING BAKCHAR IRON-ORE DEPOSIT BY HYDRAULIC BOREHOLE MINING**

The article considers the main geo-ecological problems which may occur when developing Bakchar iron-ore deposit by hydraulic borehole mining. The author has analyzed the experience of previous years when this technique was applied on Tarskoe zircon-ilmenite deposit and Shumraevsk area of Kursk magnetic anomaly.

UDC 662.2:658.567.5:502.175

**Popova M.V., Litvinov A.V., Kozlov S.N., Lushev V.P.**  
**CASE STUDY OF ECOLOGICAL RISKS WHEN FIRING PROPULSION SYSTEM SOLID-PROPELLANT ON THE OPEN STAND**

The authors have considered the factors which determine environmental safety of an open stand when firing propulsion system solid-propellant using water environmental protection. The article introduces the diagram for structural characterization of information management system for controlling the level of combustion products air emission. The function of ecological risk considering the failure of information management system was defined. The authors state the functional and parametric failures of environmental safety supporting system. The article considers the features of thermodynamic state of combustion product air emission.