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37

CONDITION OF NON-SPECIFIC PROTECTION FACTORS OF ORAL CAVITY  
AMONG PREGNANT WOMEN

*Kuriyazov A.K., Nuraliyev N.A.*

4

THE RISK FACTORS OF TUBERCULOSIS OF CHILDREN IN REPUBLIC OF SAKHA

*Gulyaeva N.A., Lineva Z.E., Protopopova G.R., Romanova M.V., Handy M.V., Zakharova N.M.*

6

HOME ENTERAL NUTRITION IN PATIENTS WITH A SMALL BOWEL

*Lazebnik L.B., Kostyuchenko L.N., Kostyuchenko M.V., Kuzmina T.N.*

7

ACTION INHIBITOR PROTEIN HEAT SHOCK 27 ON THE ACTIVITY OF GLUTATHIONE  
PEROXIDASE AND CATALASE IN TUMOR CELLS

*Nosareva O.L., Stepovaya E.A., Ryazantseva N.V., Konovalova E.V.,  
Vesnina O.N., Orlov D.S., Fedosenko I.I., Naumova A.I.*

8

FUNCTIONAL CONDITION OF HEART AMONG CHILDREN WITH DIFFERENT  
TYPES OF EATING REGIME

*Popova T.V., Kourova O.G., Toshev A.D.*

8

THE ROLE OF THE FACTORS OF THE SUN ACTIVITY FOR THE STATISTICA  
OF THE CARDIO – VASCULAR AND NERVOUS DISEASES IN MIDDLE LATITUDE REGION

*Sterlikova I.V.*

9

NEW CATALYSTS OF «SYNTHETIC OIL» AND ITS DISTILLATES ENNOBLEMENT

*Kairbekov Z.K., Myltykbaeva Z.K., Kairbekov A.Z., Shakieva T.V.*

11

RESEARCH OF MECHANOCHEMICAL PROCESSING INFLUENCE ON PROCESS  
OF COAL HYDROGENATION

*Kairbekov Z.K., Eshova Z.T., Myltykbaeva Z.K.*

14

THE BROWN COAL AND COMBUSTIBLE SLATE(S) THERMOCATALYTIC PROCESSING  
OF THE «KENDERLYK» DEPOSIT

*Kairbekov Z.K., Yemelyanova V.S., Myltykbaeva Z.K., Bayzhomartov B.B.*

17

THE INDUSTRIAL CATALYSTS ENLARGED TESTS RESULTS  
IN THE BUTYNEDIOL-1,4 HYDROGENATION PROCESS

*Kairbekov Z.K., Myltykbaeva Z.K., Kataeva K.K., Esenalieva M.Z.*

19

RECEPTION OF ECOLOGICALLY CLEAN DIESEL FUEL BY THE OZONOLYSIS METHOD  
OF MIDDLE-DISTILLATE OIL FRACTIONS

*Kairbekov Z.K., Emelyanova V.S., Myltykbaeva Z.K.*

22

THE «KENDERLYK» DEPOSITSLATE OXIDATION BYTHENITRIC ACID  
AND THE AIR OXYGEN

*Kairbekov Z.K., Yemelyanova V.S., Shakieva T.V., Myltykbaeva Z.K.*

22

THE ASSIGNMENT TO HAZARD CLASS (TOXICITY) OF INDUSTRIAL WASTE CHEMICAL  
ORIGIN DESIGN BY THE ESTIMATED METHODS

*Pikuleva Y.N., Germanova T.V.*

23

PASSIVE-ACTIVE OSCILLATIONCONTROL FOR HIGH-RISE STRUCTURES

*Burtseva O.A., Kaznacheeva O.K., Vasko N.G.*

27

## THE BROWN COAL AND COMBUSTIBLE SLATE(S) THERMOCATALYTIC PROCESSING OF THE «KENDERLYK» DEPOSIT

Kairbekov Z.K., Yemelyanova V.S., Myltykbaeva Z.K., Bayzhomartov B.B.

*The Scientific Research Institute of New Chemical Technologies and Materials,  
Almaty, e-mail: Zhannur.Myltykbaeva@kaznu.kz*

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The article is devoted to the actual problem – expansion of raw hydrocarbon base, involving of brown coal and slates in processing. The process of simultaneous thermocatalytic transformation of coal and slates of the «Kenderlyk» deposit is studied. Results demonstrate the fact that transformation degree of coal and slate mix above by 8–9 % than of coal, the process proceeds without intensive coke formation in the temperature interval 425–440°C and under the pressure 5 MPa. It is shown that organic and mineral parts of slates make activating influence on the coal hydrogenolysis. The mineral part, containing aluminosilicates, iron oxides and others catalytically active forms of metals, activates cracking of coal hydrocarbons, and the organic part of slate promotes hydrogenation and stabilization of formed radicals. The bitumens received from the firm leavings of a coal and slates mix processing with  $T_{\text{boil}} > 320^\circ\text{C}$  meet the requirements of state standard for oil bitumens.

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**Keywords:** coal, slate, catalysis, heat treatment

The raw materials source of the industry should be flexible enough and be based on the various inter – related types of the organic raw materials application for the sustainable development of the country. From this point of view, the most valuable are the coal, the combustible slates and the oil – shales, the oil – bituminous rocks, the already proven reserves, as in Kazakhstan, well as abroad are very huge and great. So, in the future, these fossil fuels and the combustible minerals consumption will be increased, as the energy source, and their complex processing into the synthetic fuel and the chemical products will be further developed. This carbon and slate – chemistry direction is the widely – studied subject in many countries, including Kazakhstan. We note that their application may be economically justified just now, for a number of the regions.

On the Kazakhstan's territory, up to the present time, about 25 combustion slates and the oil – shales manifestations deposits have already been identified, they have been confined to the Upper Devonian, the Lower Carboniferous, the Upper Paleozoic, the Middle, and the Upper Jurassic, and the Paleogene sedimentations. So, they are quite different and various by the initial substance, the starting material composition, and their formation conditions, which have largely been predefined their main technological – numerically characteristics. All these deposits, except for the «Kenderlyksky» and «Chernozatonsky» fields, have been poorly studied. The «Kenderlyksky» deposit combustion slates and the oil – shales reserves are made up more, than 4 bln. tons, of which 750 mln are the balance ones. In addition, over a billion tons of the coal, and the brown coals extraction is quite be possible on this deposit, which is increased the economic attractiveness of this deposit's further development.

A number of processes of the combustion slates and the oil – shales thermochemical pro-

cessing is being developed in the Scientific Research Institute of New Chemical Technologies and Materials (NCHT&M), which are based on the NCHT&M study results by the complex technological – chemically coal and the brown coals processing in Kazakhstan, having carried out in 1990–2010-es. All these obtained studies have already been shown, that the organic and the mineral parts of the combustion slates and the oil – shales have been made the activating effect upon the brown coals and the lignites thermal conversion.

A number of the authors [1–4] explain the combustion slates and the oil – shales activating effect, that the combustion slates and the oil – shales liquefying liquid products, having formed in the 390–440°C temperature range, are contained the significant amount of the tetrahydroderivative condensed aromatic hydrocarbons, the oxygen and the nitrogen compounds, and also the alicyclic alcohols, which are had by the hydrogen – donor properties. By their hydrogen activity, all these compounds are quite similar to the tetralin, and in some reactions, they are surpassed it, in terms of its ability reactivity [2–5].

This has been confirmed by the obtained data, having shown, that in the 390–440°C temperature range in the hydrocarbon raw materials cracking, in the presence of the combustion slate and the oil – shale, the hydrogenation and the reduction reactions are actively proceeded, the dimerization and the condensation reactions are suppressed, and the carbon – the carbonaceous bond destruction is accelerated [2].

The combustion slate and the oil – shale mineral part, having contained the aluminium silicates, the iron oxides, and the other catalytically metals' active forms, in its turn, is quite activated the cracking reaction proceeding [6, 7].

So, the process of the co – catalytic thermal processing of the brown coal and the combustion slate, and the oil – shale of the «Kender-