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NEW BOOKS

NEW TECHNOLOGIES OF PROCESSING HIGH-SULFUR OIL SHALES. *A. I. BLOKHIN, M. I. ZARETSKII, G. P. STELMAKH, T. S. EIVAZOV*

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НОВЫЕ ТЕХНОЛОГИИ ПЕРЕРАБОТКИ ВЫСОКОСЕРНИСТЫХ СЛАНЦЕВ. *А. И. БЛОХИН, М. И. ЗАРЕЦКИЙ, Г. П. СТЕЛЬМАХ, Т. С. ЭЙВАЗОВ*.

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The monograph deals with questions of improvement of technology and equipment of thermal processing of high-sulfur oil shales to extract, along with alkanes, cycloalkanes and aromatic hydrocarbons, such valuable chemical products as organic sulfur compounds applied in chemical synthesis, in manufacturing preparations for medicine and veterinary aid, in agriculture and in a number of branches of economy.

Utilization of high-sulfur oil shales for their direct burning at modern full-scale plants has been analysed, and low efficiency of these processes was demonstrated. In G. M. Krzhizhanovsky Power Engineering Institute (ENIN) improved high-efficient equipment for pyrolysis of oil shales using units with solid heat-carrier (UTT-500 and UTT-3000, with oil shale throughput rate 500 and 3,000 t/day) have been developed. UTT-3000 retort consists of pyrolysis and condensation sections and is supplied with special devices for purification of pyrolysis gas and fractional condensation of shale oil.

Refining of shale oil petrol fraction (boiling below 175 °C) to extract aromatic hydrocarbons of the benzene series and organic sulfur compounds – thiophene and its methylderivates – is discussed in detail.

The results of physical and chemical researches made in the laboratory of N. D. Zelinski Institute of Organic Chemistry of the Russian Academy of Sciences to study separation of near-boiling benzene hydrocarbons and thiophenes present in crude benzene of cokeries and shale oil petrol fractions are described.

Physical and chemical basis of separation of components of these mixes by rectification in the presence of a selective solvent varying relative volatility of the components are presented considering intermolecular interactions

within solutions. The experimental data of phase balance study liquid-vapour in solutions containing the chosen selective solvents are presented and these data confirmed by computer calculations made using known mathematical models “of local compositions”.

Parameters of extractive rectification columns and of regeneration of the solvent have also been computerized. The results of bench-scale tests of separating benzene-thiophene fractions by extractive rectification are given. Various flow sheets of the process are presented.

N. D. Zelinski Institute of Organic Chemistry of the Russian Academy of Sciences together with the Scientific and Technical Centre *ECOSORB* have offered a new two-stage processing of the shale oil petrol fraction that bases on combined use of precise and extractive rectifications and allows to obtain such valuable commodities as benzene, toluene, thiophene, concentrate of xylenes, concentrate of 2- and 3-methylthiophenes, and also a concentrate consisting mostly of 2,3-dimethylthiophene. The technology is protected by a Russian patent.

Technical and economic evaluation of high-sulfur oil shale processing has been carried out. It includes the analysis of western and Russian marketing of commodity production.

Projects of small-scale plants for pyrolysis of high-sulfur oil shales (Kashpir, (Syzran) and Manturovo (Kostroma Region) deposits) developed by Scientific and Technical Centre *ECOSORB* are discussed. Chemical production obtained at the Syzran plant is characterized in detail.

Ecological aspects of the oil shale processing enterprises, in particular the problems of environment protection, standards of harmful emissions, basic methods of purification of gaseous emissions and wastewater are discussed. An essential reduction in technogenic effect on the surroundings in Syzran is expected after introduction of this technology of thermal processing of high-sulfur shales at the Syzran plant.