

## Petrochemistry-2015: Processing of heavy oils and oil sands- Z A Mansurov- Institute of Combustion Problems, Kazakhstan

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### **Abstract:**

One of the most important achievements of recent years is the creation of the technology for extraction of “heavy” oil from oil sands (OS) that is intensively developing in Canada. Huge deposits of OS of Republic of Kazakhstan which are characterized by content of organic part that ranges from 9 to 95% according to type and depth of each deposit are a major candidate as an alternate source of hydrocarbons. It is notable that we will obtain organic products with various physical and chemical properties counting on the tactic of processing of OS.

Heavy oil may be a sort of petroleum that's very viscous, meaning that it's thick and doesn't flow easily. This is caused by both a coffee hydrogen to carbon ratio within the molecular make-up and therefore the presence of other minerals like asphaltenes, resins, sulfur and metals such as vanadium and nickel, which all increase its density.

Nearly all the deposits of heavy oil are degraded remnants of conventional oils. Degradation begins when oil migrates toward the earth's surface and encounters water containing oxygen and bacteria. A tar-like material is made at oil-water contact that eventually invades the whole oil accumulation. A process referred to as “water washing” removes the more water-soluble, light hydrocarbons, leaving an important oil accumulation. Heavy oil accumulations may represent as little as 10 percent of the first conventional oil.

Due to their high density and viscosity, special extraction methods are needed to recover heavy

oil efficiently. These methods include: surface mining, cold production and thermal recovery. Heavy oil can also require additional processing, usually mentioned as upgrading, after being produced so as to be transported and refined. Large amounts of energy are put into the extraction and production of heavy oil - about 20% to 30% of the energy that's actually produced.

In reference to the above, within the Laboratory of Oxidation Processes of hydrocarbon of Institute of Combustion Problems (ICP) the event of following main directions of processing of OS in order to supply commercial oil products is carried:

- Extraction of organic a part of OS of Kazakhstan deposits using different organic solvents with subsequent oxidizing it to bitumen, that is used for road construction;
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Thermal processing of OS of Kazakhstan deposits with obtaining of synthetic oils also as hydrophobic mineral part; • Ultrasonic method for separation of organic and mineral parts of OS using solutions of alkaline metals, serving as surfactants; Along with development of methods of OS processing a great attention is paid to improve the physical & chemical characteristics of road bitumen by creation of its composite with rubber crumb, also as a drag of recycling of rubber pollutants and wastes is solved. An important aspect of ICP research is ecology of oil and gas industry. Study is carried out as research in area of bio-remediation of oil-contaminated soils using bacteria.

Heavy oil makes up a big portion of the world's discovered petroleum resources, while only a

really small fraction of those resources are produced thus far. High density and viscosity have traditionally made their recovery energy demanding as compared to lighter oils. Heavy crudes are expected to be an outsized contributor to the world's energy needs within the future, as conventional supplies decrease. However, the technological costs to supply a barrel are currently much above with conventional resources. Additionally, the increased energy requirements and unconventional practices in production raise various environmental concerns like land disturbance, tailing ponds, and better greenhouse emission emissions.

**Biography:**

Z A Mansurov is a General Director of the Institute of Combustion Problems of the Ministry of Education and Science of the Republic of Kazakhstan, prominent scientist of Kazakhstan; Doctor of Chemistry; Professor; IHEAS Academician; Laureate of the State Prize of the Republic of Kazakhstan and of the Prize named after K. Satpayev. In 1974-1987, he worked as a

junior and senior researcher and Head of the Laboratory of Physicochemical Methods of Research at S.M. Kirov Kazakh State University. In 1981, he was the first among scientists in Kazakhstan to become a research fellow at the UCL (UK).

In 1990, he defended his Doctoral thesis at the Institute of Structural Macrokinetics, USSR AS. From 1992 to 2010, he served as Vice President for Research and First Vice-rector of the al-Farabi Kaz NU. He is a Chairman of Combustion and Plasma Chemistry and Physics and Chemistry of Carbon Materials International Symposiums, Chief Editor of Eurasian Chemico-Technological Journal and Combustion and Plasma Chemistry journals. In 2004, for services to Kazakhstan he was awarded Kurmet Order. Under his peer supervision, eight Doctors, 38 Masters and eight PhD theses were defended. He is the author of over 670 scientific papers, 6 monographs, 5 textbooks and 21 copyright certificates of the USSR and Kazakhstani patents.

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