NATIONAL UNIVERSITY OF „KYIV-MOHYLA ACADEMY”

SCIENTIFIC CENTER OF POLISH ACADEMY OF SCIENCES IN KYIV

II Ukrainian-Polish scientific conference

# „MEMBRANE AND SORPTION PROCESSES AND TECHNOLOGIES”

## BOOK OF ABSTRACTS

December 2-4, 2015

Kyiv, Ukraine

УДК 544.076.34 (063)
ББК 24.5 я2
U31

**Editors:**
H. Sobczuk, P. Vakuliuk

**Design and typesetting**
P. Vakuliuk

II Ukrainian-Polish scientific conference „Membrane and Sorption processes and technologies" (Kyiv, December 2-4, 2015). Abstracts / Editors: Sobczuk H., Vakuliuk P. – Kyiv: NaUKMA, 2015. – 252 p.

## ISBN 978-966-2410-36-5

This II Ukrainian-Polish scientific conference is devoted to the problems in the field of membrane and sorption technologies, their fundamental, applied and industrial aspects, is aimed at international integration of science and education, forming cooperation between universities and research institutions.

Scholars, students and other representatives from scientific, educational and industrial institutions are invited to take part in the conference. The conference will include oral presentations and posters. Additionally, leading experts and scientists in the area of membrane and sorption technologies will present the plenary sections.

TOPICS
Scientific program of the conference includes:
*membrane and sorption processes:* baromembrane processes; electromembrane processes; membrane gas separation; membrane distillation and pervaporation; novel and non-traditional membrane processes; sorption processes and sorption from liquids and gases; biosorption; hybrid membrane-sorption processes and technologies; nanotechnologies in membrane materials and processes; fuel cells and batteries; membrane contactors; membrane reactors; membrane spacers;
*membrane and sorption applications:* membrane materials for medical application; membrane materials for alternative energy sources; membrane technology in food industry; membrane bioreactor; water purification; wastewater treatment;
*membrane and sorption development:* polymeric and inorganic membranes: formation, structure, properties; sorbents: preparation, structure, properties; nanocomposite membranes; electrochemical membrane processes; tissue engineering.

УДК 544.076.34 (063)
ББК 24.5 я2
U31

## ISBN 978-966-2410-36-5

Authors are fully responsible for the content of the abstracts.
No technical or language corrections were made during editing.

***Perlova N.O., Sazonova V.F., Perlova O.V., Dzyazko Yu.S., Polikarpov A.P***
NEW SORBENTS FOR REMOVAL OF URANIUM(VI) COMPOUNDS FROM DILUTED AQUEOUS SOLUTIONS…… 165

***Pirskyy Yu.K., Panchishyn T.M., Gaidin O.V., Krupennikova O.S., Tupchiyenko O.S.***
LABORATORY MODEL OF HYDROGEN-OXYGEN PEM FUEL CELL..... 166

***Bildyukevich A.V., Plisko T. V., Ususky V. V., Liubimova E. S.***
HYDROPHILIZATION OF THE HOLLOW FIBER POLYSULFONE MEMBRANES BY THE ADDITION OF POLYVINYLPYRROLIDONE TO THE BORE LIQUID SOLUTION…….. 169

***Plisko T. V., Bildyukevich A.V., Huang Weiqing, Huang Zuohua***
FORMATION OF HOLLOW FIBER MEMBRANES USING THE LOW CRITICAL SOLUTION TEMPERATURE SYSTEMS…… 172

***L.N.Ponomareva, Yu.S. Dzyazko***
ION-EXCHANGE RESIN MODIFIED WITH NANOPARTICLES OF ZIRCONIUM HYDROPHOSPHATE..... 175

***Popyk I.I., Budzinska V.L.***
ENVIRONMENTALLY FRIENDLY ORGANIC-INORGANIC NANOCOMPOSITE MATERIALS…….. 176

***Porohnya O.A., Yakovlev Y.V., Lobko E.V.***
EFFECT OF THE CONCENTRATION OF CARBON NANOTUBES ON THE SENSITIVITY OF POLYETHYLENE GLYCOL RESISTIVE SENSOR FOR ACETONE VAPOR……... 178

***Pozniak M.V., Yarotskyi O.M., Dontsova T.A., Kulikov L.M., Ivanenko I.M.***
ADSORPTION PROPERTIES OF SULPHIDE AND SELENIDE MOLYBDENUM (IV).... 179

***K. Prokopenko, I. Kolesnyk, V. Konovalova, A. Burban***
ALGINATE MICROCAPSULES WITH MAGNETIC NANOPARTICLES FOR THERAPEUTIC DELIVERY…… 180

***I.S. Protsak, E.M. Pakhlov, V.A. Tertykh***
PECULIARITIES OF CHEMISORPTION OF DIMETHYL CARBONATE ON SILICA SURFACE…… 181

***Redkina A.V., Kravchenko M.V., Yakovlev V.I., Konovalova N.D., Strelko V.V.***
SORPTION PROPERTIES AND CATALYTIC ACTIVITY OF MESOPOROUS ZIRCONIUM-SILICATES IN PROCESS OF PROPANE DEHYDROGENATION…….. 183

***Romankevich O.V., Redko Ya.V.***
SORPTION OF NANOPARTICLES AT A LAYER DEPOSITION…… 184

# ADSORPTION PROPERTIES OF SULPHIDE AND SELENIDE MOLYBDENUM (IV)

**Pozniak M.V., Yarotskyi O.M., Dontsova T.A., Kulikov L.M., Ivanenko I.M.**
**National Technical University of Ukraine „Kyiv Polytechnic Institute"**
**Kyiv, Prospect Peremogy 37, Ukraine, 03056**
**e-mail: *dontsova@ua.fm***

Recently, 2D layers of materials such as $MoS_2$ and $MoSe_2$ have just started to gain attention in the past three years, as indicated by a significant increase in the number of published articles. The popularity of 2D materials is due to their unique electronic and optical properties, which are significantly different from the bulk precursors [1]. The interest in these materials sprang up due to the discovery of their new properties. Earlier $MoS_2$ and $MoSe_2$ were used only as a lubricant for special purposes. Today these materials are tried to apply in a variety of optoelectronic devices. However, in our opinion, their catalytic properties are not investigated enough. Therefore, from this point of view it makes sense to explore their sorption-catalytic properties in order to use them as a catalytic system in water treatment process.

The object of study was to establish the sorption properties of $MoS_2$ and $MoSe_2$ towards the cationic dyes.

First, bulk $MoS_2$ was dried at 100°C within 30 minutes. Then, four samples of bulk $MoS_2$(or $MoSe_2$) were added into methylene blue solution with concentration 20mg/L. In all cases, the concentration of catalyst was 1,25g. The obtained suspensions were placed into a mixer and stirred for 1, 3, 5 and 7 minutes in accordance at 15◦C. Then, each sample was clarified by 3000 r/min centrifugation for 10 minutes. The absorbance of the methylene blue solution was measured on a spectrophotometer (UV-5800 PC, China) at 660 nm. The adsorption properties of bulk $MoS_2$ were evaluated according to the decoloration rate of the methylene blue solution in a glass reactor.

Calculated concentrations of methylene blue solution are represented as the kinetic curves which are shown in Fig.1.

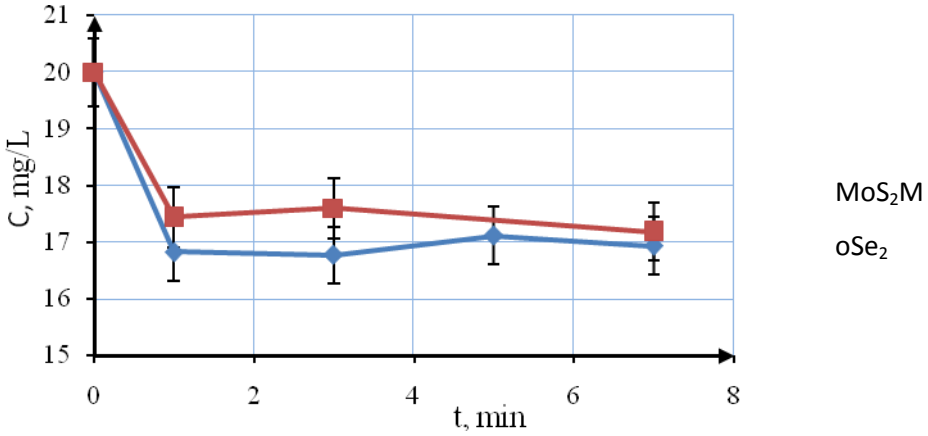


Fig.1. – The residual concentration of dye in the solution depending on the duration of contact.

As can be seen from the figure, the adsorption runs immediately for both samples, whereupon the concentration of dye decreases slowly. In view of this, $MoS_2$ and $MoSe_2$ demonstrate the high potential in the purification from dyes, because as the main removal of dye is achieved in a short time. Thus, based on the obtained preliminary data, we can say that molybdenum sulfides and selenides can be very promising catalysts for the degradation of organic pollutants.

References

**1.** *Ye M., Winslow D., Zhang D., at all.* Recent Advancement on the Optical Properties of Two-Dimensional Molybdenum Disulfide ($MoS_2$)//Thin Films Photonics. – 2015. –2. –288-307.