IMPLEMENTING AND OPTIMIZING THE OPERATION OF MEMBRANE BIOREACTORS FOR PETROLEUM WASTEWATER TREATMENT

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Introduction. In the recent Kazakhstan Upstream Oil and Gas Technology and R&D Roadmap, water management has been recognized one of the fifteen main challenges that must be dealt with. This roadmap mentions that chemical processes are increasingly used for wastewater treatment; however it is recognized that "the preferred, longer term solution is likely to be membrane technology, which present a local R&D opportunity since further development is needed. This could lead to local opportunities for design, installation and maintenance of membrane separation equipment"[1]. In line with the above requirements the proposed project develops and optimizes a membrane based treatment scheme for the treating & recycling of the water within the industry. Another objective is to investigate several biological processes within the membrane bioreactor (MBR) including nitrification/denitrification and biological removal of cyanides.

Materials and methods. The comprehensive questionnaire has been developed to access the current situation in Kazakhstan in three biggest refineries (Atyrau, Pavlodar and Shymkent) along with supporting site visit to one of them. The samples of wastewater are collected and are to be tested in NU laboratories. The proposed MBR design is to be tested in pilot plant in Italy with further development of optimized design for local refineries.

Results and discussion. Based on the study of the current wastewater treatment technologies in Kazakhstan, it has been evaluated that all of the refineries use conventional water treatment technologies. Wastewater reuse rates are low, largely due to the poor quality of the effluents. Major concern is found to be around the phenols.

Conclusions. As indicated by the primary results, the need for the project is in place and the interest from the industry is substantial. The further collaboration between NU, industry and European partners is expected to bring the innovations to local wastewater treatment system.

Acknowledgments. We thank Nazarbayev University Research and Innovation Systems for funding the project; Atyrau Oil Refinery, Pavlodar Oil Chemistry Refinery and Petrokazakhstan Oil Products for collaboration.

References.

1. Kazakhstan Upstream Oil and Gas Technology and R&D Roadmap, 2013.