

The scientific aim of this research project is to obtain a knowledge on reactions taking place during cavitation phenomenon in case of intended reductive conditions. The studies are planned to be performed separately in water as well as hydrocarbon matrix. The phenomenon of cavitation is an interesting tool appeared in chemical engineering, which is based on efficient utilization of the energy of physical process to initiate chemical reactions in gases, liquids and solids. Extreme conditions created inside and gas-liquid interfacial region of the imploding cavitation bubble are sufficient to cause thermal decomposition of water molecules as well as organic compounds.

A processes under hydrodynamic cavitation and sonocavitation will be studied using a large-laboratory scale reactors. The studies are divided to stages relating to application of sole cavitation phenomenon under anoxic conditions, activation of external reducing agent by cavitation, catalytic reduction processes as well as photocatalytic reactions. Performance of ARPs in relation to selected organic pollutants will be compared with AOPs. Process control will be made by several classic and modern analytical techniques.

In contrast to other studies, this project is dedicated for studies of advanced reduction processes (ARPs) assisted by cavitation. This project is a first attempt ever to combine cavitation phenomenon and ARPs. Thus, both for aqueous as well as hydrocarbon-type environment this project should provide important and innovative data for further utilization of cavitation based ARPs in treatment of water and wastewater as well as fuels.