

QUESTIONNAIRE

(*) – mandatory fields

	Details about organization
* Organization name	Shota Rustaveli State University; Membrane Technology Institute
Organization acronym	SRSU; MTI
* Organization Activity Type (RES – Research, HE- university, SME-Small and Medium Enterprise, IND – Industry, OTH – Other)	RES, IND, HE
* Keywords of main research areas	Fertilizer, clinoptilolite, sea water, membrane.
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*** Description of organization and research achievements for the last five years
(~5000 signs)**

The scientific editions, publications, scientific reports, materials of conferences on extraction, processing and application of natural zeolites, their nature and an essence have been reconsidered for the creation of a data base. The following experimental works were carried out during the accounting period at the intuition: control investigations on identification and certification of zeolite samples; content of mineral in zeolite-containing tuffs by calorimetric way was determined; determination was fulfilled by Sand's method, which is based on ability of dehydrated zeolite to allocate heat when immersing in water; the radiographic analysis for identification of samples of zeolite-containing tuffs was carried out.; character of thermal stability of clinoptilolite samples by the IR spectrum at the different temperatures and different degrees of pumping was studied ;determination of acidity of samples of zeolite-containing tuffs. Such results allow to associate clinoptilolite from Khekordzula to acid resistant types of zeolites. Chosen by us for further use samples of natural zeolite- clinoptilolite are characterized by the high mineral content, showing all the necessary properties and can be successfully used for extraction of potassium from sea water. Different fractions (from 1 to 5mm) of were prepared for further use in analyses.

The following laboratory researches were carried out for establishment of: clinoptilolite chemical composition; character of process of monocationization of initial zeolite; temperature influence on static exchanging capacity (SEC) and dynamic exchanging capacity (DEC) and influence of time factor on content of K^+ in sea water, influence of temperature on the extraction degree (SEC) of K^+ from sea-water, Laboratory researches on determination of influence of temperature on static (SEC) and dynamic (DEC) exchanging capacities of clinoptilolite are continued. Sorption of potassium ions was studied on test plant. Electrodialysis model device was constructed: metal constructions and test bench were made. Microfiltration apparatus for filtration of sea-water was assembled. The works for setting-up of air compressor and flame photometer were carried out. Corresponding placement for crusher device was prepared, three phase voltage and grounding mat were wired up. Working places for sea-water analyses were prepared. Required fractions of zeolite were prepared and columns were packed for further experiments.

Studying of sea-water composition (full chemical and microbiological analysis): Physical-chemical and microbiological analyses were carried out with purpose of sanitary - epidemiological evaluation of sea-water. Chemical and microbiological indices of water quality were determined corresponding to the international standards (ISO). Following organoleptic indices were used for researching of sea-water characteristics: coloration, transparency, turbidity, odor, pH, salinity, dissolved oxygen, indirect index of pollution (oxidability), hardness and ion composition. Content of microelements and heavy metals were determined by atomic-absorption method with purpose of comprehensive evaluation of sea-water.

Constant bacteriological pollution of seawater stipulated necessity of studying of water disinfection by filtering through the ion exchanging filters. Influence of zeolite- clinoptilolite on water saprophytic micro flora on content of goldfish

staphylococcus, enteric viruses and lactose positive enteric bacillus was stayed. By the results of microbiological analysis there was established, that zeolite – clinoptilolite has sharp sorption qualities towards microbes of general pathogen. In samples filtered through the zeolite quantity of enterococcus, lactose positive enteric bacillus and salmonellas was reduced. Microbiological indices of seawater were defined according to the international standards and requirements and recommendations of Georgian legislation.

Main attention was paid to studying of kinetics of sorption of ion-exchanging process when proceeding clinoptilolite by seawater. New technology is based on studying of dependence of ion-exchanging process on temperature. With purpose of establishment of qualitative indices of process, experiments were carried out. The experiments were carried out at special test bench at different temperatures (20, 40, 65 °C).

With purpose of definition of quantitative indices glass columns with diameter 1, 13 cm² were used (height of zeolite load 18 cm, speed of filtration 100 ml/h). In advance, the experiment for establishment of clinoptilolite ion-exchanging capacity towards K⁺ was held. With this purpose three systems with clinoptilolite and KCl solution (0,1 N) were created.

Process of concentration of potassium was implemented in three stages, by using cascade scheme and ratio of clinoptilolite volume to running seawater 1:3. First stage passed at 15 °C during 15 hours. On the second stage, at 65 °C, by using the clinoptilolite enriched at the first stage - the “concentrate of seawater” is received, which excels initial seawater in concentration approximately 5 times. The last stage was passed at 15 °C using received “concentrate of seawater” and new portion of clinoptilolite. Several sorption qualities of natural zeolite - clinoptilolite were established towards salts of potassium, sodium, calcium, magnesium and cesium. Also, preliminary works for reception of scheme for reception of magnesium from seawater were carried out at laboratory conditions.

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<p>International co-operation / Participation in EU RTD programmers or other bilateral / multilateral actions</p> <p>INTAS, TESIS, TEMPUS, COST, EUREKA, other RTD programmers (please specify programmers, project titles and years).</p>
<p>ISTC Project No. <G-1302></p> <p>Development of technological process for reception of new type of potassium-containing fertilizers: creation and testing of experimental installation</p>

	* Please, use “X» to indicate the scientific areas of your potential project
CHEMISTRY	x
SOCIAL AND HUMAN SCIENCES	
ECONOMIC SCIENCES	
ENGINEERING SCIENCES	x
ENVIRONMENT	x
AGRICULTURE AND FOOD	x
HEALTH	
MATHEMATICS	
INFORMATION SCIENCES	
PHYSICS	

NANOTECHNOLOGIES	
ENERGY	
TRANSPORT	
SPACE	

<p>* Summary of potential research project envisaged hosting of European researcher for the period of between 1 and 2 years</p>	
<p>* Carrying out of tests at stationary experimental laboratory on Black Sea coast, with purpose of establishing the most important physical-chemical constants immediately in natural conditions.</p> <p>* Creating laboratory installations and test equipment.</p> <p>* The following works were carried out for studying of sea water structure (full chemical and microbiological analysis)</p> <p>* Determination of dynamic exchanging capacity of clinoptilolite. Full scale realization of ion-exchange process for the purpose of clinoptilolite extraction from sea-water requires estimation of character of dependence of adsorption ability of clinoptilolite on temperature in the dynamic conditions.</p> <p>* Clarification and biological purification of drink water;</p> <p>* Preliminary filtration of industrial waters;</p> <p>* Clarification of alcoholic and non-alcoholic beverages;</p> <p>* Filtration of fruit and vegetable juices;</p> <p>* Purification of oil products, chemical solutions and generally, preliminary preparation, filtration and clarification of liquid substances.</p> <p>* The receipt of microfiltration membranes of various pore sizes and porosity making them of fluoroplastic, a thermo – and chemically stable polymeric material using in medical and food industries.</p>	
	<p>Please, confirm your agreement on data publication and dissemination</p>
<p>I agree with the publication of the data on the web-site http://www.incoeeca.net and dissemination among Mobility National Contact Points of the EU MS and AC (YES/NO)</p>	<p>YES</p>
<p>Date</p>	<p>11.12.08</p>