

Fig. 1. Sorption of morphine ions (in % based on absolutely dry mass of resin) by the ion exchanger KU-1 in the hydrogen form, from morphine hydrochloride solution:
1) normal resin; 2) thermally treated resin.

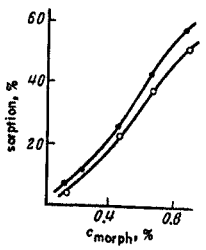


Fig. 2. Sorption of morphine ions by the ion-exchange resin KFU in the sodium form from morphine hydrochloride solution. Notation as for Fig. 1.

for a few hours diminishes its selectivity towards the ion of quinine. Heating the cation-exchange resin KU-2 at 185° for 1 day makes the exchange of organic ions slower[2], but the position of equilibrium remains practically unchanged.

It was of interest to investigate the effect of low-temperatures on the properties of ion exchangers. The resins KU-1, KU-2, and KFU in the hydrogen and sodium forms were kept in an air-dry state at -20° for 48 h without change in their swelling power. Further investigation was carried out with deeper cooling. The above three resins in the air-dry state (containing 16–19% of moisture) were immersed in liquid nitrogen for 10 h. After withdrawal from the nitrogen, they were left in air at room temperature for 24 h. No apparent change was observed in the treated resins. The resins KFU and KU-2 in the sodium form showed hardly any change in their original capacity after subjection to low temperatures, as judged from their absorption of calcium ions under static conditions.

The swelling of the thermally treated ion-exchange resins had increased on the average by 15–20%. This increase is probably explained by a loosening of the structure of the resin. In the air-dry state the resins contain free water, which obviously expands on rapid cooling, with some distortion of the resin framework.

In view of the increased swelling of exchangers which have been subjected to preliminary freezing, they would be expected to sorb organic ions better than would the untreated exchangers. The experimental results plotted in Figs. 1 and 2 confirm this. The experiments were carried out under static conditions. Identical weights (based on the absolutely dry mass) of the pretreated and untreated resin were immersed in morphine hydrochloride solutions of various concentrations. After equilibrium had been established (48 h), the amount of morphine remaining in the solution was determined, and the quantity of morphine which had been absorbed was calculated.

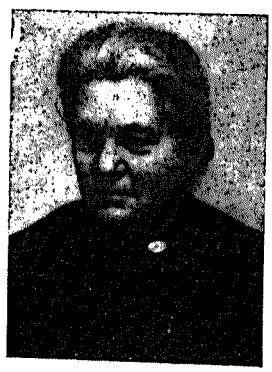
Thus the thermal treatment of condensation cation-exchange resins at both high and low temperatures provides a method for varying their selectivity, especially in the sorption of large organic ions. Pretreatment of the exchangers at low temperatures have the obvious advantage compared with high temperature that no breakdown of ionogenic groups occurs in the former case.

1. N. G. Polyanskii and G. L. Shik, Vestnik Tekh. Ekonom. Informatsii, No. 3, 43 (1960).
2. N. G. Polyanskii, Izv. Vys. Ucheb. Zaved., Khim. i Khim. Tekhnol., 3, 276 (1960).

Kharkov Chemical and Pharmaceutical Scientific Research Institute

Received 7th January 1965

MISCELLANY



NATAL'YA ALEKSEEVNA BAKH (70th BIRTHDAY AND 45 YEARS OF SCIENTIFIC WORK)

May 2nd, 1965 was the seventieth birthday of an eminent scientist, the physical chemist Natal'ya Alekseevna Bakh.

Natal'ya Alekseevna Bakh is the daughter of A.N. Bakh who was a revolutionary and the founder of the theory of oxidative processes; she was born and educated in Switzerland. In 1920 she graduated from the faculty of physics and mathematics of the University of Geneva and in the same year came to live in the USSR where she became one of the first workers at the Karpov Institute of Physical Chemistry (at that time the Central Chemical Laboratory of the Supreme Economic Council). Her first studies at A.N.Bakh's laboratory were concerned with enzyme action and catalyst poisoning. She was also developing a method for the preparation of hydrosulphite and its derivatives.

In 1927 N.A.Bakh began research into electrokinetic processes in the Department of Surface Phenomena of the same Institute. She established a connection between the colloidal and electrochemical behaviour of a series of systems. Positively charged and negatively charged hydrogen sols of platinum were prepared for the first time. The results of these studies furnished the material for her doctorate thesis. She was also engaged on a parallel series of studies concerned with the mechanism of charcoal activation and high-temperature oxidation of graphite.

In 1938 she began investigating the mechanism of the action of graphite and carbon black in the Leclanche cell; this proved industrially valuable, since imported carbon black could be replaced by that produced in the Soviet Union.

Since early in 1941 Bakh worked at the Institutes of the Academy of Sciences of the USSR — at the Colloid and Electrochemical Institute, the Institute of Physical Chemistry, and the Institute of Electrochemistry. During the Second World War she directed work on defence problems for which the Government awarded her the Order of the Red Star.

During the post-war period Bakh led research in a new direction, initiating the first systematic Soviet studies of the chemical action of ionising radiations, laying the foundation of radiation chemistry in the Soviet Union. The work of Bakh and her colleagues contributed greatly to the development of this science. The first studies dealt with the radiolysis of aqueous solutions and organic compounds, developing later into independent sections: radiation chemistry of water and aqueous solutions, and radiation-induced oxidation and radiolysis of organic compounds.

Investigation of aqueous solutions, carried out on solutions of oxygen-containing anions, demonstrated the laws of radiation-induced transformations and clarified the mechanism of the formation of molecular products of water radiolysis. The investigation of the valency states of plutonium under the influence of radiation has been of great importance.

Bakh's work on the radiation-induced oxidation and radiolysis of organic compounds established the main laws of these processes. The nature of the action of radiation in different temperature ranges was established for the oxidation of a wide range of compounds. A study was made of the early stages of radiation-induced oxidation which occur, as had been found, with the formation of a labile complex of oxygen with radicals which breaks down when oxygen is removed and gives stable oxidation products in the presence of oxygen. The demonstration of these general laws has opened the way to a rational control of oxidation processes.

Theoretical investigation into the radiolysis and radiation-induced oxidation of solvents and extracting agents led to technological recommendations. The work on the industrial radiation-induced modification of polymers, directed by Bakh over the last few years, has led to the production of materials with valuable semiconductor properties.

Bakh was the first to organise the training of specialists in radiation chemistry in the Soviet Union. Since 1950 she has been Permanent Professor of Radiation Chemistry at the Moscow State University. She has supervised the work for 2 doctorate and 17 Candidate theses.

She has played a great part in the organisation of scientific research in radiation chemistry. She has for many years worked with the Commission on the use of isotopes and radiations in science and national economy; she organised the First and Second All-Union Conferences on Radiation Chemistry; at present she directs the Radiation Chemistry Section of the Scientific Council on the Chemistry of High-Energy Particles of the Academy of Sciences of the USSR. Professor Bakh has often represented with distinction Soviet science at foreign meetings.

Professor Bakh has been awarded three orders and a medal of the Soviet Union for her great services. She is full of vigour and energy for further creative work. She has our heartfelt wishes for new successes in her fruitful activity.

N.N. Semenov, A.N. Frumkin, and *P.I. Dolin*



ALEKSANDR IL'ICH BRODSKII
(70th BIRTHDAY)

June 19th, 1965 is the seventieth birthday of the outstanding physical chemist, Academician (Academy of Sciences of the Ukrainian SSR) Aleksandr Il'ich Brodskii, Corresponding Member of the Academy of Sciences of the USSR.

A. I. Brodskii was born at Dnepropetrovsk, the son of an engineer; in 1922 he graduated from the Chemistry Faculty of Moscow University. From 1921 he was an Assistant, then Reader; in 1925 he became Professor and, from 1930 to 1941, held the Chair in Dnepropetrovsk centres of higher learning; from 1943 to 1949 he was Professor at the Moscow Steel Institute.

Professor Brodskii's main scientific work has been connected with the Pisarzhevskii Institute of Physical Chemistry of the Academy of Sciences of the Ukrainian SSR. He was one of its founders, being a departmental head until 1939 and Director of the Institute since that year.

In 1925 Brodskii obtained his doctorate; he was elected an Academician of the Academy of Sciences of the Ukrainian SSR in 1939 and a Corresponding Member of the Academy of Sciences of the USSR in 1943.

Brodskii's scientific work is distinguished by a remarkable ability to pose and solve the most topical, important, and general problems, using the most effective methods for this purpose. He has a highly developed sense of the new, the ability to foresee the main direction of scientific development and to communicate his enthusiasm for the new to others.

Brodskii's early research dealt with the theory of electrolyte solutions. He considered critically the physical basis of the electrostatic theory of solutions and the limits