

Dealing with pollution in electrochemical processing – and elsewhere

by Alex Yelshin

A scientific meeting last year drew attention to the environmental pollution problems in the electrochemical processing industries. Our correspondent reports on the proceedings – and goes on to discuss what needs to be done generally to resolve the USSR's ecological problems

The galvanic plants of engineering and electronic industries are serious sources of environment pollution in the USSR. The problem is that potential pollutants of this kind are dispersed through the countryside and cannot always be kept under control.

In June last year, an All-Union scientific meeting entitled *The Progressive Technologies of Electrochemical Processing of Metals and Ecology of Galvanic Plants* was held in Volgograd. The proceedings of the meeting contain more than 130 abstracts with more than 40% of them touching upon ecology problems of galvanic plants.

Some abstracts are concerned with the use of electrochemical processes to produce porous media and filter elements. In particular, the Polytechnic Institute of Novopolotsk presented information on the potential possibilities of using electrochemical methods for:

- Production of filtering media by direct electrochemical methods through electrolytic metal deposition on a substrate, maintaining the conditions required for dendrite formation followed by imparting the required surface properties to a porous structure;
- Production of composite porous media from a mixture of electroconductive and nonconductive particles on fibre materials;
- Production of filtering media using a method of porous media formation by orientation of magnetic particles in a magnetic field and applying a galvanic coating to keep them in place.

Metallisation. Investigation of a process of chemical metallization of non-metal powder (graphite powder in particular) was presented by the Chemico-Technological Institute of Ivanovo. Its aim was to impart magnetic properties to the surface of particles by means of a Fe-Ni alloy coating. The possibility of codeposition of Fe and Ni on a graphite

powder surface by hypophosphite was determined. Variations in solution composition for metallizing and temperature permitted them to obtain a coating with Fe content within 10-87%. The additive was found to exclude the operation of surface activation before Fe-Ni deposition from the process and to conduct metallization in one stage.

Ni coating. To increase fire safety the same Institute presented an electrochemical method for the Ni protective coating of filtering net, which is used in oxygen cleaning systems. The coating quality increases with current density increase, and with forced circulation of electrolyte. As a result, this electrochemical method of protective coating gives the possibility to control mesh size and increase net strength against hydraulic shock.

Cu coating. The electrochemical deposition of a copper coating for creation of a capillary structure of a heat pipe was shown as having prospects (Polytechnic Institute of Kiev and NPO 'Bolshevik'). A pore effective diameter of 34 microns and porosity of 40% were reached for a capillary structure of heat pipe by using this method.

Galvanic problems. Most of meeting's abstracts on environmental control were as a rule devoted to local problems of galvanic plants' waste water treatment for concrete enterprises.

The waste water treatment problems discussed can be grouped as follows:

- Application of membrane technology (UF and RO) and home-produced ion-exchange membrane for electro-dialysis sewage disposal of galvanic plants; Filtration;
- Electrochemical methods of sewage disposal; for example: Using water electrolysis for sewage pH changing and the flotation process (Mendeleev Chemico-

Technological Institute of Moscow); Electrochemical waste water treatment with abrasive-mechanical activation of electrode (Institute of Applied Physics of Academy of Sciences). Here fine abrasive particles work as scrapers to prevent passivation of reaction surface of porous composite cathode; Complexing polymer use etc.

□ Application of natural materials for galvanic waste water treatment. In particular pyrites, limestone and pitch coal are utilized as reducers or adsorbents for heavy metals ions.

□ Application of galvanic waste products as additives in the production of bricks and other building materials and as additives in slurry for oil-well cementation.

Ecology. Increased attention is being paid to ecology problems both in the field of galvanics and in general. An immediate task as regards waste water is to create far-flung networks of specialised firms for waste control and treatment. These local firms specialising in solving environmental control problems can promote progress in ecology especially of small enterprises which often have most primitive waste water treatment plants.

But local solutions of environmental problems can be reached first of all if the main factors causing unsatisfactory conditions of environment are removed eg:

- Economical and political crises which do not allow large controlled investments to be made in ecology control;
- Imperfection of ecology control laws not making enterprises deeply interested in waste treatment;
- Rigid planning of economics in conditions of falling production making extremely tragic use of such sanctions as stopping or closing ecologically dangerous plants;
- Supermonopolization of industry and presence of giant factories;
- Obsolescence and physical wear of equipment at many factories that lead to increases in accident rates and deterioration of wastes;
- Increase of productivity of technological equipment over designed capacity with waste water treatment system productivity remaining the same (without reconstruction) etc;

As we can see, the state of ecology depends on present-day and future political and economical changes connected with Perestroyka (expanding enterprises self-dependence and/or privatization, demonopolization, etc).

Sewage sludge under discussion

The application of sophisticated methods for the disposal of sewage sludge and dusts, and the cost-effective drying of sewage sludges, were the subjects under discussion last October at the offices of KHD Humboldt Wedag among an invited group of experts.

The group included people from government agencies,

regional councils, power plants and engineering offices, and operators of waste and hazardous waste incineration facilities. There were also people from industry and technical colleges.

During the whole-day seminar, under the general title 'Product and Process Development with Responsibility', KHD, which engineers specific methods for the disposal of problematical waste, was able to discuss with the

participants their extensive experience in this field and the results obtained from their own research and development work.

The programme included a tour of the company's own R & D centre in Cologne Porz to demonstrate the results and potential of the methods presented during the discussions, as well as an extensive social programme.

KHD Humboldt Wedag AG, D-5000 Köln 91, Postfach 910457, Germany.

DPE name change

To emphasize that it is part of the Danish Nordfab group of international companies, DPE will in future be known as Nordfab DPE.

'Although we were acquired by Nordfab four years ago we have continued to use our original name, but feel that the time is now right to become fully identified with them,' said MD Jim Watson.

Nordfab DPE Ltd, Rosse Street, Off Thornton Road, Bradford BD8 9AS.