AK-1-1 SELF-CONTAINED ELECTROCHEMICAL SYSTEM

Description
The self-contained electrochemical system was designed to extract silver from all types of waste fixers. The principle of operation is based on the use of volume-porous flow cathodes. The solution being treated is passed through the cathode pores, and, under the action of the electric potential, the metal ions present in the solution are discharged at the cathode. The AK-1-1 system incorporates an immersed module and a power supply and control unit. In operation, the module is immersed directly in the working reservoirs; no additional vessels, pumps or tubing are required. The power supply and control unit (designed at the Industrial Automatic Systems company, Novosibirsk) maintains the required electrolysis mode and cathode potential and gives a signal when the treatment process is over.

Outward appearance of the AK-1-1 system.

Technical specifications

<table>
<thead>
<tr>
<th>PM-1-1 immersed module</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>overall volume</td>
<td>10 dm³</td>
</tr>
<tr>
<td>mass</td>
<td>12 kg</td>
</tr>
<tr>
<td>cathode matrix</td>
<td>metallized syntepen</td>
</tr>
<tr>
<td>overall cathode surface</td>
<td>20 dm²</td>
</tr>
<tr>
<td>anode</td>
<td>graphite</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Power supply and control unit</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>maximum current load</td>
<td>50 A</td>
</tr>
<tr>
<td>maximum output voltage</td>
<td>10 V</td>
</tr>
</tbody>
</table>

Technological appraisal and economic benefits
In the treatment of photographic solutions, the AK-1-1 system offers the following advantages over available homemade and foreign analogs:
- reliability and compactness of the design, small overall dimensions, and small weight;
- high rate of treatment of solutions (10-15 liter/h);
- high capacity of the porous cathode matrices with respect to silver (2-6 kg of silver for an initial matrix weight of 40-50 g);
- prevention of thiosulfate ion reduction and creation of conditions for recycling fixer solutions;
• low residual content of silver (not higher than 10–20 mg/liter);
• high silver content in the annealed cathode matrix (97–99 %).

Application areas
Silver extraction from any types of waste fixer and fixing-bleaching solutions.

Development stage
Small-scale production at the Institute of Solid State Chemistry and Mechanochemistry, SB RAS.

Patent situation
Patents were granted in the Russian Federation (2001 and 2002).

Commercial offers
Manufacture and supply contract.
License agreement.

Estimated Cost
The cost of an AK-1-1 system is US$ 3000.
The cost of an additional cathode matrix is US$ 15.

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