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THE PROCESS OF PURIFICATION OF AQUEOUS SOLUTIONS WITH THE USE OF MATHEMATICAL PLANNING OF EXPERIMENT

The construction of mathematical models of technological processes of natural phenomena based on the use of special methods of experiment planning. Experiment planning is the management process, the phenomena of incomplete knowledge of the mechanism of the phenomenon process.

Experimental design methods are based on obtaining a mathematical model in the form of a polynomial.

$$y = b_0 + \sum b_i x_i + \sum b_{ij} x_i x_j + \sum b_{ii} x_i^2 + \cdots$$

where b_0, b_i, b_{ij}, b_{ii} – polynomial coefficients; x – the factors influencing the process, phenomena(e.g., pressure, temperature, etc.) y – state variable object of study. The simplest form is a linear polynomial equation:

$$y = B_0 + B_1 x_1 + B_2 x_2 + \ldots B_n x_n$$

A linear polynomial is obtained by using a special setup of the experiment according to a definite plan, presented in the form of a matrix of experiment planning. The main advantage of the factorial experiment is the simultaneous variation of all factors, which leads to lower errors in the estimation of the coefficients of polynomials in N times (N is the total number of experiments).

Formally, the technique of arraying planning comes down to the method of alternation of signs of levels.

Conducting a factorial experiment is carried out according to the following algorithm: build a planning matrix; experiment in accordance with the plan matrix; calculate the coefficients of the linear polynomial (regression equation); calculate the error of experience; check the significance of regression coefficients; find the optimal solution process.

In the work we would have to build a mathematical model of the extraction of mercury from the solution in the production of chlorine and alkali by electrolysis of sodium chloride in mercury cathode.

As state variable we choose the indicator "mercury content of the output of the process". As the electrolyte solution discharged into the water basin, the purpose of modeling is to determine these parameters, in which the mercury content in the solution is minimal. Technological scheme of production of chlorine and alkali as shown in Fig.1. The cleaning process of the solution is carried out by extraction method. Extraction depends on the speed of rotation of the stirrer, the temperature of the solution, and the residence time of the solution in the reactor.

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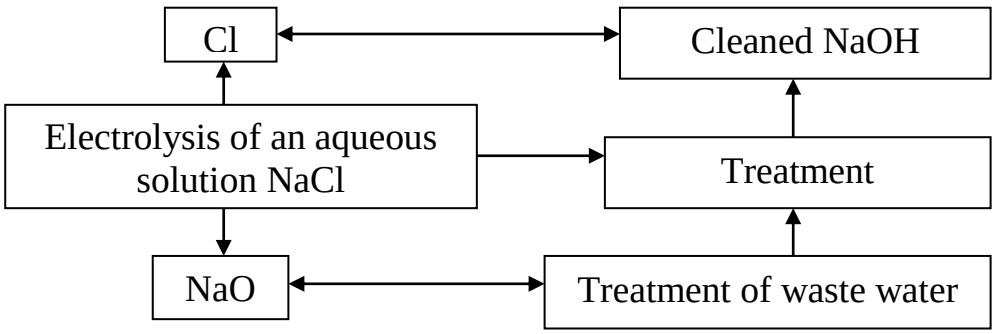

Fig.1. Technological scheme of production of chlorine and alkali by electrolysis of sodium chloride in mercury cathode

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ОЦІНКА НЕВИЗНАЧЕНОСТІ ПРИГОТУВАННЯ БУФЕРНИХ РОЗЧИНІВ

Виконання вимірювань масової концентрації фторидів з іонселективним електродом можуть заважати речовини, що утворюють плівку на робочій поверхні електрода. Дуже каламутні проби фільтруємо через фільтр та проводимо ультразвукову пробопідготовку.

Фториди утворюють досить міцні комплекси з рядом металів. Найбільший вплив при аналізі природних і очищених стічних та технологічних вод надають високі концентрації заліза і алюмінію. Додавання буферного розчину, що містить в своєму складі ацетат натрію, цитрат натрію, ЕДТА, в значній мірі зменшує їх вплив за рахунок руйнування комплексів.