ABSORPTION OF NITROSE GASES USING A SOLUTION OF IRON SULPHIC OXIDE AND OBTAINING SODIUM NITRITE

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It is known that the chemical industry makes a significant contribution to the progress of the development of our country. The most serious environmental problem of the industry is the emission of exhaust gases containing toxic substances, including nitrogen oxides. The maximum allowable average daily content of nitrogen oxides in terms of N_2O_5 in the atmospheric air of populated areas should not exceed 0.1 mg/m^3 while meeting the requirement for a one-time maximum content of nitrogen oxides not more than 0.3 mg/m^3. In the production of nitric acid, the main problem is the emission of nitrous gases and the development of methods to reduce their emission. There are various ways to neutralize nitrous gases: purification of gases from nitrogen oxides in an equal-flow hollow tower; purification of gases from nitrogen oxides in combined type apparatuses; purification of gases from weakly oxidized nitrogen oxides, absorption of nitrogen oxide by ammonium sulfite solutions; oxidation and absorption of nitrogen oxides by aqueous solutions of oxidizers; purification of gases from nitrogen oxides with aqueous solutions of hydrogen peroxide; absorption of slightly oxidized nitrogen oxides by aqueous solutions of potassium permanganate; absorption of highly oxidized nitrogen oxides; studies of the absorption of nitrogen oxides by organic sorbents; adsorption of nitrogen oxides by solid sorbents; purification of gases from nitrogen oxides and other impurities with peat-alkaline sorbents to obtain peat-nitrogen fertilizers; absorption of nitric oxide by solutions of ferrous sulphate [1].

However, this problem has not yet found its exhaustive solution. A detailed study and analysis of the methods of absorption of nitrogen oxides by water is a chemisorption process leading to the formation of a multicomponent system containing the initial NO, N_2O_4, NO_2, N_2O_3 and the final products H_3O^+, NO_3^-, NO_2^- consists of the following stages: diffusion of nitrogen oxides (NO, NO_2) from the gas phase into the liquid through a two-layer film at the gas-liquid interface; the formation of nitric and nitrous acids as products of the interaction of nitrogen oxides with water; decomposition, or rather the disproportionation of nitrous acid and the return of the formed nitric oxide to the gas phase [2].

In this work, solutions of ferrous sulphate having concentrations from 5 to 40% were used for the study. The purpose of this work is not only the absorption of nitrous gases, but also its use to obtain sodium nitrite. For the experiments, a laboratory setup was used, consisting of five reaction vessels, the first reactor for producing nitrogen oxides, and four main reactors - absorbers of nitrogen oxides. In the first reactor, a mixture of nitric oxide is formed by the interaction of copper with non-concentrated nitric acid (59%). The rest of the reactors absorb the incoming nitrogen oxide from the first reactor. For the experiment, 20 ml of ferrous sulfate solution were placed in four reactors (absorber volume 50 ml).

Nitrogen oxides obtained in the first reactor were passed through the solution using a water jet pump. After the end of the experiment, all solutions were collected together, brought to the mark of 100 ml, from which an aliquot was taken to determine nitrogen. In addition, the solution was regenerated and nitric oxide was obtained in a concentrated form, and it was absorbed using a sodium hydroxide solution. Chemical analyzes of the solutions obtained at various stages of the experiment established a change in the content of the initial components and the products of their interaction. Preliminary results of the analysis and calculations showed that with the use of ferrous sulphate solutions for the absorption of nitrogen oxides in

four absorbers, it is possible to absorb up to 84.17% of nitrogen oxides and obtain sodium nitrite of a given quality.

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2. Atroshchenko V.I., Kargin S.I. Nitric acid technology. M.: Goshimizdat, 1969. p. 302-312.