TRANSLATION

METHOD OF OBTAINING 60- TO 70-PERCENT NITRIC ACID

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A method is known of obtaining weak nitric acid through the oxidation of NO and the absorption of NO_2 from nitrose gases obtained by the conversion of ammonia, according to which the absorption of the oxides of nitrogen with the formation of nitric acid is combined with the oxidation of nitric oxide. Such a combination makes difficult the selection of production conditions which are the best for the two processes.

A method is proposed according to which the processes of oxidation of NO by oxygen into NO_2 and the absorption of NO_2 go on separately under conditions which make possible intensification of each of the processes.

For this the nitrose gases are subjected to oxidation by circulating nitric acid and are directed for absorption by water into the upper part of an absorption column. In this process one gets nitric acid, and the remaining gas containing nitrogen and nitrogen oxide by a liquid absorber of NO, for example, a solution of $FeSO_4$. The solution obtained in the absorption is subjected to heating, and the nitrogen oxide given off in this process is oxidized by the air and absorbed by nitric acid obtained in the upper part of the absorption column. The unabsorbed oxides of nitrogen are conducted into nitrose gas which is obtained by the conversion of the ammonia.

In the drawing there is presented a technical layout which explains the

proposed method.

The nitrose gas from the contact unit in which the oxidation of the ammonia is accomplished passes into the intensive gas cooler 1 for the condensation of the water vapor out of the gas. From the cooler 1 with a temperature of 40 to 45°C containing about 12% of nitrogen oxides already partially oxidized (the degree of oxidation $\alpha \approx 20\%$) and 3% of oxygen by the gas blower 2 is passed onto the oxidation of the nitrogen oxide into the column 3 flushed by the circulation of nitric acid which is cooled in the outlying cooler 4. Into the colum 3 there passes also a gas with 32% of NO + NO_2 ($\alpha \approx 49$—50%) with the first stage of absorption, which is accomplished in the lower section of the absorber, column 5.

Further on the nitrose gas is fed into the upper section of the absorption column 5.

Water for the acid formation and dilution of the nitric acid is introduced in two places—the water condensate onto the upper plate, the acid condensate from the gas cooler 1 onto the plate with the corresponding concentration of nitric acid ($\sim$ 13% HNO_3).

From the lower plate of the upper part of the absorption column 44-percen HNO_3 flows.

Out of the column 5 the gas which contains nitrogen oxide only in the form NO (10.5%) and hardly containing oxygen at all, passes into the absorber 6 flushed by a 20-percent solution of $FeSO_4$ or by other absorbent.

The gas coming out of the absorber 6 either is ejected into the atmosphere or is used for technological purposes, since it represents almost pure nitrogen (with an admixture 0.05 to 0.1% of NO).

The absorbing solution preliminarily heated in the heat exchanger 7 passes to the column of regeneration 8 where at 80 to 90°C, where there occurs the breakdown of the complex $FeSO_4$—NO with the separation of nitrogen oxide.

The obtaining in the column of regeneration 8 of practically pure nitrogen oxide occurs and this nitrogen oxide passes into the oxidizing apparatus 9 with the heat-exchange device.

The gas coming out of the oxidizing apparatus 9 passes at first for the first stage of absorption into the lower section of the column 5 where there occurs the partial changing over of the nitrogen oxides into nitric acid, and then into the column 3. Due to the high concentration of nitrogen oxides in the gas the production acid coming out of the column 5 contains $\sim$60% HNO_3. After its bleaching in the apparatus 10 it passes into the collector of the production 11.

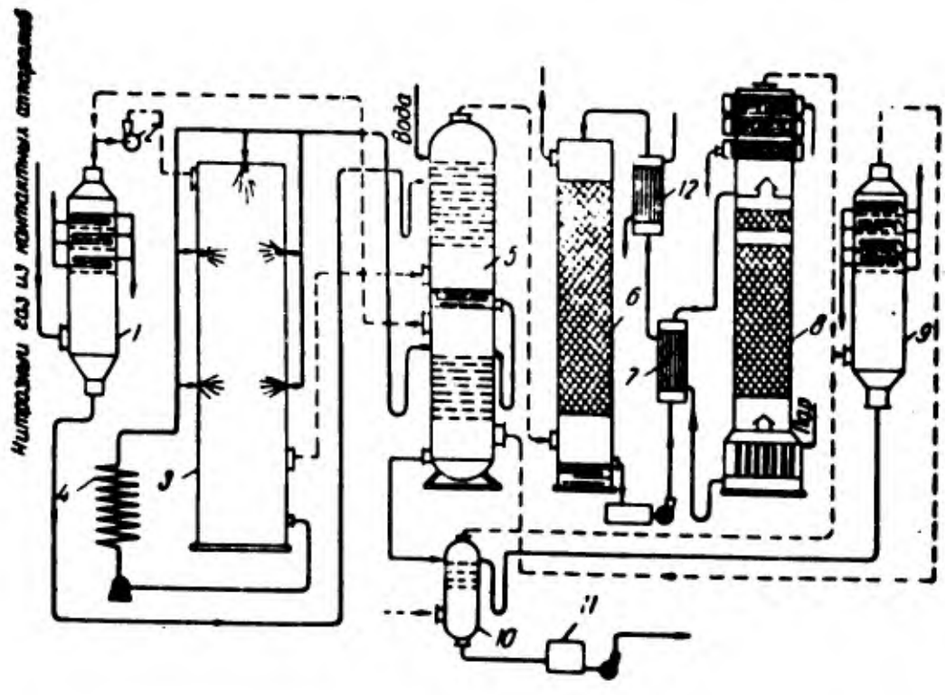

Fig. 1. Wording left: nitrose gas from contact apparatus

From the column of regeneration 8 the solution having given off part of its mass in the heat exchanger 7, and to the spent solution from the absorber 6 and cooled down to 25 or 30°C in the cooler 12, passes onto the absorption of the nitrogen oxide.

The production of nitric acid with the circulation of nitrogen oxides can

be accomplished both in the atmosphere and at high pressures.

Object of the Invention

A method of obtaining 60- to 70-percent nitric acid through oxidation and absorption by water of nitrose gases obtained by the conversion of ammonia which is distinguished by the fact that for the purpose of intensification of the process and the obtaining of a high degree of utilization of the nitrogen involved, the nitrose gases are subjected to oxidation by the circulation of nitric acid and are directed for absorption by water into the upper part of an absorption column, while the remaining gas which contains nitrogen and nitrogen oxide is treated with a liquid absorbent, for example, the solution of $FeSO_4$, the solution obtained being subjected to heating, and the nitrogen oxide separated in this way oxidized by air and directed into the lower part of the absorption column for absorption of the nitric acid obtained in the upper part of the absorption column while the unabsorbed nitrogen oxides are directed into the nitrose gas after conversion of the ammonia.

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