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TO STUDY THE OPERATION OF THE FRACTIONATING APPARATUS IN INCREASING THE EFFICIENCY OF SEPARATION OF HYDROCARBON FRACTIONS

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The rectification process is carried out in column apparatuses, and the apparatus has appropriate internal devices. With the help of these devices, gas mixture flow interconnections and necessary temperatures are provided. The internal devices of the column consist of plates with different structural designs or nozzles made of different materials, which provide gas-liquid interaction.

Any connection devices used in rectification columns, as well as nozzles, are subject to specific technological requirements during their design, taking into account the specific production conditions of the rectification column. The main technological requirements include the following indicators: - the possibilities of having the smallest values in relation to the height of the theoretical plates equivalent to them, or having the mass transfer coefficients in high values; - the low value of the hydraulic resistance to its flow during the movement of the substance in the gas state; - the substance has a high level of ability to conduct gas and liquid states; - the properties of keeping gases and liquids on their surfaces in small amounts during their movements.

In order to achieve such indicators in the nozzles, first of all, the nozzles should have a high free volume fraction and a shaped geometric surface as much as possible. In addition, the main technical requirements for nozzles include ease of manufacturing technology, minimal material consumption, and the need to be made of corrosion-

resistant sheet steel for long-term corrosion resistance even in aggressive corrosive environments. In some cases, even if the complex configurations of the nozzles give good results, there will be no opportunities to use them because the technology of their preparation in production conditions is too complicated. Therefore, it is recommended to use on a large scale in production only if they have sufficiently good technological characteristics and their mass production technology is simple.

One of the main directions of improvement is perforation of the walls of the tank in order to increase the surface of interconnection and organize the flow of liquids in the walls. The use of this method is carried out in order to increase the permeability of gases and liquids, increases the washability of the inner surfaces of the nozzle, and reduces the hydraulic resistance.

Pall nozzles are one of the types of nozzles that are used on an industrial scale. This nozzle element is also made in the form of a cylinder with equal outer diameter and height. grooves are made, and with the help of stamping, the bent part of the groove is directed to the inner part of the cylinder. In addition, in order to increase the mechanical strength of the element, 2-3 transverse bends are made on the side surfaces. This construction of the nozzle element, being very close to the geometric parameters of the Raschig tube, increases the throughput by 1.2 times compared to it, reduces the hydraulic resistance by 1.6-4 times in different regimes of gas and liquid flows, and increases the separation efficiency of the mixture of light components by 25 Increases to % [6].

Another way to improve nozzles with a ring is to reduce the ratio of the height and diameter of the ring. For the above constructions, its value is equal to 1, but this value should be reduced, that is, the height of the ring should be smaller than its diameter. Making the ring look like a mini ring increases the hydration of its inner surface, reduces the degree of curvature and, as a result, increases its efficiency. In this case, it is necessary to take into account only changes in the density of enthronement of peoples.

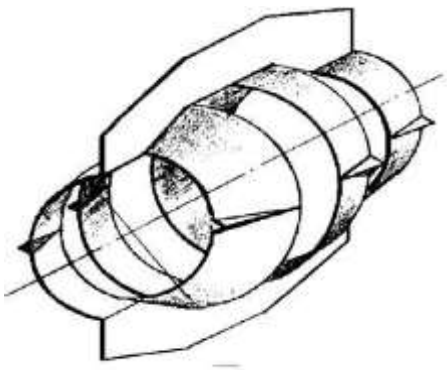
For connecting currents, the inner surfaces of Rashig's rings are rough and less than their outer surfaces. The disadvantages of this type are elements in a new form, that is, the inner surface and the outer surface are not flushed with the same liquid, and they are not connected to the gas flow. In order to prevent this, in order to ensure mutual connections of liquid and gas flow, the construction of saddle-shaped nozzles was used. Berl saddles and Intalox saddles began to be widely used from this type of nozzles. Intalox saddles are curved metal elements, 4 grooves are made in the transverse

direction, and the carved part is curved in the opposite direction, and 2-4 bends are made in the opposite direction. This nozzle has 7% more efficiency and 1030% more throughput compared to Pal rings, and hydraulic resistance is 2 times less.

In order to have the same wettability of the inner and outer surfaces, to ensure the same connection of phases, the S-shaped nozzle constructions, which are implemented with the use of simple technological operations in terms of creating wide surfaces and in terms of preparation, began to be used. Also, various modifications of S-shaped nozzles were started to be produced from the point of view of separation of gas fractions. In this case, the development of nozzles with a spiral design was taken into account, as well as ensuring the combined movement of gas and liquid flows, as well as expanding their interconnection surfaces.

Based on the above, it should be noted that irregular nozzles are still widely used as the main element of rectification columns in the separation of multi-component light gas mixtures.

In recent years, in the production of irregular nozzles, nozzles of the "Injekhim" construction, which are technologically simpler compared to other nozzles, have been used. This type of nozzle has been widely used on an industrial scale due to its high mass transfer characteristics and minimum hydraulic resistance (Figure 1.1). Figure 1.1. Different options of tubular elements recommended for the improvement of the rectification column in the separation of multicomponent light hydrocarbon mixtures. [5-7]



In the design of tubular rectification columns, the structures and sizes of tubular elements are considered as the main acceptable parameters. Therefore, their construction and hydrodynamic conditions in the column should have the following

characteristics for different types of nozzles: - very good distribution of irrigation fluids, having geometric surfaces on the surface of the nozzle that ensure the connection of flows; - create a rolling motion, have acceptable structural details, increase the rate of mass exchange, and have a low hydraulic resistance; - the presence of a large number of phase connection surfaces and the provision of phase turbulization; - the surfaces formed during their use should have higher conductivity and so on.

The rectification column is equipped with an easy-to-manufacture "Injekhim" nozzle design, which has high mass transfer characteristics and creates favorable hydrodynamic conditions. The nozzle of this type of structural design occupies the largest free volume in the inner part of the column, ensures the flow of liquid in the film mode, causes a sharp decrease in the combined outflow of steam and liquid, and a decrease in hydraulic resistance. Especially due to the presence of additives in the composition of the vapor and liquid phase, the formation of a coating on the surface as a result of polymerization prevents the reduction of its working characteristics. The fact that the design of the nozzle does not have a very complex structure allows it to be made from sheet stamps, and as a result, the cost is low. [6-7]

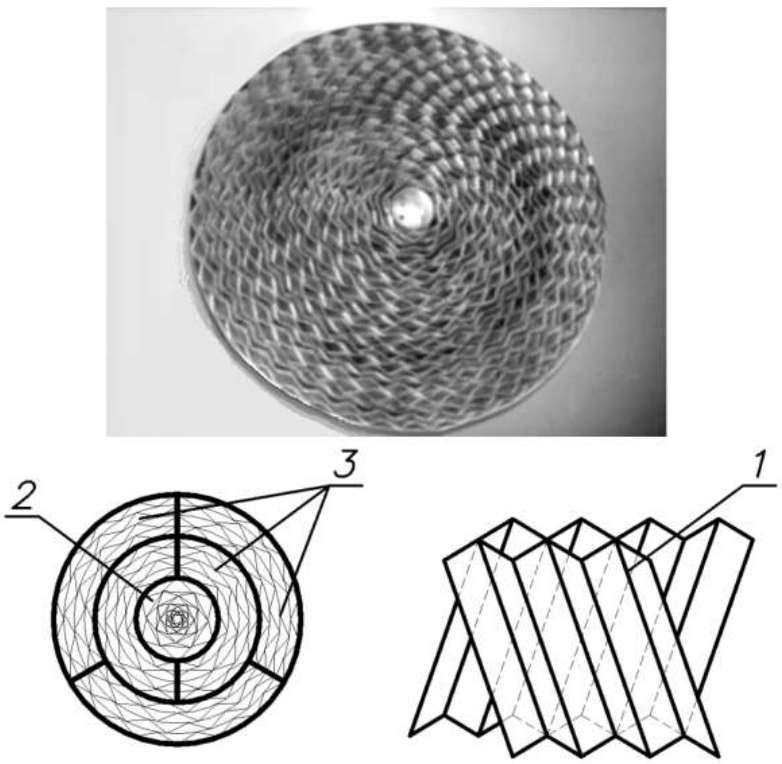


Figure 1.2. General view of Nasadka

The specifications of the nozzle element of the above Injexim type are as follows:

- nasadki material
- steel - element dimensions
- 70x40 mm - relative surface
- 98 m^2/m^3 - relative free volume
- 0.96 m^3/m^3 - Number of elements per 1 m^3
- 13550 pieces - bulk density - 248 kg/m^3

Summary

To find a solution to the problem, you can see the issue of improving the column through the following options: - replacement of plates with full nozzles; - partial replacement of plates with nozzles and the use of a column with a combination of nozzles and plates; - using only nozzles through internal structural changes of the column in order to ensure steam-liquid movements in straight and crossed flows; - step by step use of irregular and regular nozzles in separate sections; - plates using irregular and regular nozzles in a combined way and placing the irregular section at the top of the column.

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