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Methanol Regeneration Technology for Compressor Stations of the Main Gas Pipeline

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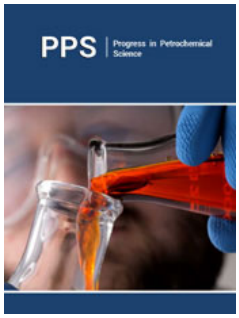
ISSN: 2637-8035



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Submission: July 27, 2021

Published: August 30, 2021

Volume 4 - Issue 2

How to cite this article: Paranuk AA, Khrisonidi VA. Methanol Regeneration Technology for Compressor Stations of the Main Gas Pipeline. Progress Petrochem Sci. 4(2). PPS. 000583. 2021.
DOI: 10.31031/PPS.2021.04.000583

Abstract

The authors have proposed an original scheme of methanol regeneration in the conditions of compressor stations, which makes it possible to separate the azeotropic solution by the adsorption method. When implementing this scheme, a certain grade of zeolite is used, which makes it possible to separate solutions at the molecular level using the molecular sieve properties of the adsorbent

Keywords: Regeneration gas; Adsorbent; Zeolite; Separator; Liquid hydrocarbons

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The unique adsorption properties of natural zeolites open up new prospects for their application in industry. For example, in such areas as natural gas dehydration, water purification, removal of nitrogen compounds from wastewater [1,2]. Thus, the scope of their application is very broad. Due to the structure of the framework of zeolites, most zeolites can be used as molecular sieves, which opens up a whole area for the use of natural zeolites as cheap adsorbents in technological processes. For example: A method for separating an azeotropic solution by adsorption methods on natural zeolites. The initial azeotropic solution (Figure 1) from the separator for further processing is fed into the pipeline (1) by means of pumps (2) through the pipeline into the adsorbers with zeolite (3) under the action of the pumps, the solution is forced from the bottom up through the block of adsorbers into the pipeline (5). After saturation of the adsorbent with a solution, it is necessary to switch the taps and stop the pumping for the regeneration of the zeolite. Zeolite can be regenerated in 2 ways.

The first method is provided for the cases of the implementation of this technological scheme in the conditions of the main compressor station with its own drying system using solid absorbers, since in such schemes there is a natural gas heating furnace for their own needs. Therefore, it is possible to use part of the regeneration gas for the desorption of the zeolite [3-5]. To implement the stages of desorption, it is necessary to supply natural gas to the adsorber from top to bottom (4) at a temperature of 250 0C. After desorption, the mixture is fed to a separator, where droplet moisture is taken, and after the separator to a heat exchanger where the gas is cooled, and then back to the adsorber for cooling. Thus, the system turns out to be closed [6,7].

The second method provides for the creation of its own installation for obtaining regeneration gas, and since the zeolite is well desorbed by nitrogen at a temperature of 250 0C. This scheme can be implemented as follows: the installation for producing nitrogen from air supplies nitrogen to the heater and after the heater the nitrogen heated to the required

temperatures is supplied to the adsorber. After desorption, the mixture enters the separator, where the liquid fraction is discarded, and then enters the heat exchanger where it is cooled to the required temperature and then returned to the adsorber for cooling [8-10].

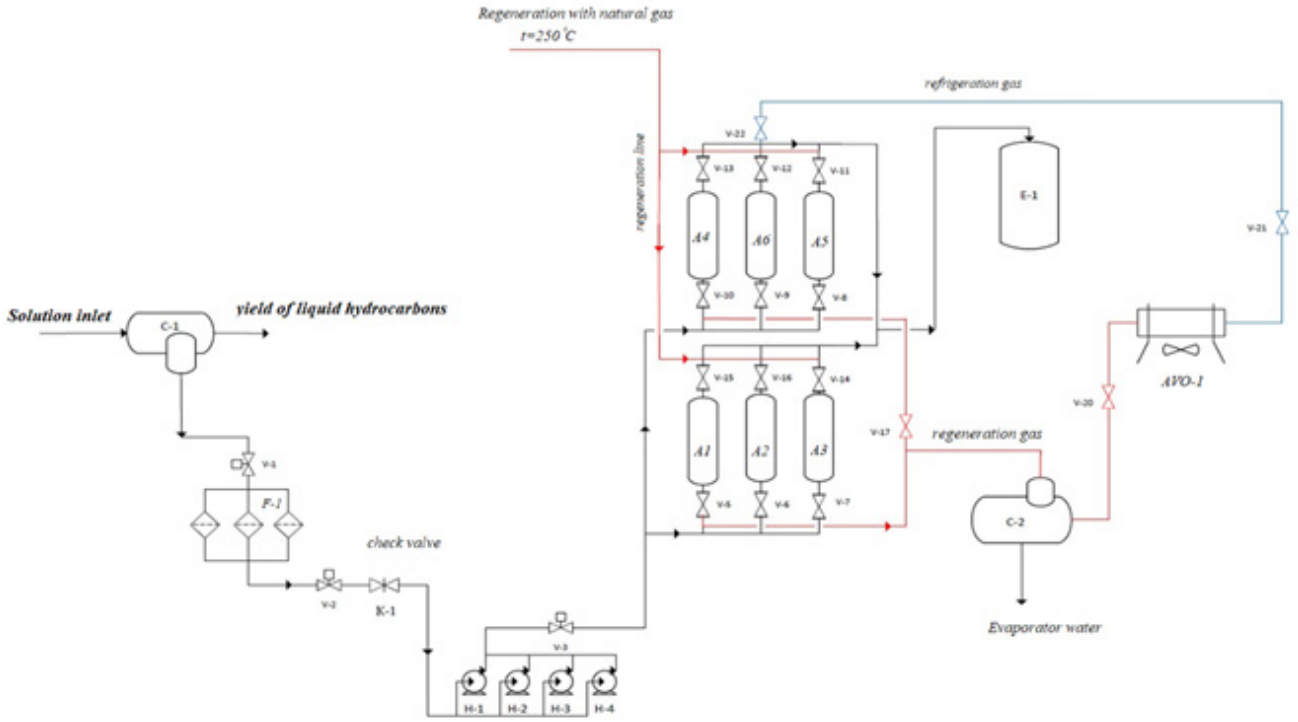

Figure 1: Technological scheme of the unit for the recovery of methanol from aqueous solutions. C-1-three-phase separator; V-1, V-2, V-3, V-4, V-5, V-6, V-8, V-9, V-10, V-11, V-12, V-13, V- 14, V-15, V-16, V-17, V-20, V-21, V-22 -shut-off and control valves with remote control; H-1, H-2, H-3, H-4 - pump unit; F-1-block of filters; A1, A2, A3, A4, A5, A6 - block of adsorbers; C-2 - two-phase separator; E-1 - methanol collection tank; K-1 - check valve; AVO-1 - air cooler.

Conclusion

The authors have proposed a new technology that has been tested in laboratory conditions and is unique; this technology has a number of features that are not presented in this work. In general, it can be noted that the proposed regeneration scheme has a number of features over other methods of methanol regeneration and is more environmentally friendly and energy efficient, in particular, compared to the rectification method of methanol regeneration.

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