SAFE TECHNOLOGY FOR DETERMINING THE ORGANIC COMPOSITION OF VAPOR SEPARATED IN BUSINESSES WITH SORBENTS MADE FROM INDUSTRIAL WASTE

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Abstract In this article, the relevance of the problem of evaporation in the processes of transportation and storage of oil and petroleum products is indicated, the available methods of its solution are presented. The problem of pollution of the environment with petroleum products in one way or another is typical for areas related to the oil production and oil refining industry, but recently this problem has become a real "scourge" for all major cities.

Keywords: pollution, road transportation, Oil refineries, vapor, industrial waste.

INTRODUCTION

The expansion of road transportation, which has resulted in an increase in the number of automatic filling stations, has inevitably resulted in petroleum product contamination of the atmosphere, soil, surface, and groundwater, which is a major environmental issue.

Every year, between 50 and 90 million tons of hydrocarbons are discharged into the atmosphere, according to various estimations. Oil refineries and the oil and gas industries bear a large share of the blame. The particular losses of hydrocarbons due to evaporation in oil refineries around the world range from 1.1 to 1.5 kg per ton of product.

During the "breathing" of tanks during the filling and emptying of oil reservoirs, significant pollution of the atmosphere with petroleum product fumes occurs. Oil products have to carry more than 20 loads from the time of extraction to direct use, with 75% of losses due to evaporation and only 25% due to accidents and leaks.

Most “breathable” tanks are accumulated in oil fields, oil pumping stations, and reservoirs of oil refineries. It accounts for about 70% of all oil product losses at refineries.

Atmospheric pollution by oil and oil products vapors also occurs when loading automobile and railway cisterns on overpasses and refueling vehicles at gas stations. The specific loss of petroleum products in the loading of railway cisterns is several times higher than the loss from tanks. The loss of hydrocarbons during “big breathing” occurs as a result of the compression of the vapor-air mixture (---) in the gas cavity of the reservoir (-) by the liquid entering it.

When the pressure in HP --- reaches a certain limit value, a portion of the PVA is released into the atmosphere through a special “breathing” valve.

Losses from “big breathing” are determined by a number of factors: the volume, temperature and gas saturation of the oil product sent to the tank, the concentration of oil vapor in the PVA, and the pressure in the HP. During the tank filling process, the amount of vapors in the HP increases, but the bulk of the hydrocarbon vapors accumulates during the storage of the petroleum product. The average annual loss from “Big Breath” is about 0.14% of the volume of oil stored.

Reducing the amount of hydrocarbon emissions into the atmosphere can be achieved in a variety of ways: improving the sealing of containers; Decrease in absolute values of temperature of HP and stored products, and also decrease in amplitude of their oscillations; decrease in HP volume in the reservoir; capture the vapors of hydrocarbons formed in the tanks.

At present, personal computers and pontoons are the most widely distributed abroad as a means of reducing hydrocarbon losses. They provide a significant reduction in losses and are relatively inexpensive and simple. Abroad, the share of tanks with computers and pontoons exceeds 60% of the total number of reservoirs. The share of computer and pontoon tanks in our country is about 20%, but this is one of the most common means of reducing losses, because there are still many tanks that do not have any reducing means.

The use of computers and pontoons is associated with a number of design and technological challenges that make them difficult to use. The main ones are:

- uneven loading of atmospheric precipitation, breakage of guide pipes, subsidence and clogging of piers and pontoons as a result of the formation of solid sediments on the reservoir walls;
- the loss of hydrocarbons from the reservoir's moist walls; the likelihood of air chemicals contaminating stored oil products; and the increased risk of fire and explosion.

The utilization of compression systems to capture light fractions utilizing liquid-gas jet devices is one of the most promising directions in the development of hydrocarbon vapor traps (jet-compressor blocks). Due to the energy of high-velocity currents in the working media, PVA —- is squeezed in various phases of aggregation (liquid, two-phase gas-liquid combination). Steam recovery units can be utilized as a lubricant entering the tank at these light ends, and the recovered vapors can then be fed straight to the oil product. The circuit is closed in this scenario.

Reactive compressor blocks (JCU) for capturing light fractions provide high reduction of losses, low metal and capital density, simple and reliable operation. The operation of the jet apparatus (ejector) is stable with significant fluctuations in the parameters and fractional composition of the exhaust gas.

SCU's operating philosophy is as follows: The working fluid is pushed to the ejector by a nozzle and receives a passive vapor-air mixture flow from the reservoir. Part of the energy of the working fluid is squeezed out and transferred to the passive flow during phase mixing. Simultaneously, a process of intense condensation of hydrocarbon vapors takes place. The liquid-gas combination created at the ejector's outlet is separated in the separator, after which the compressed air is dried and sent to be purified or released into the atmosphere, while the working fluid is delivered to the pump's input.

The system provides a heat exchanger to remove excess heat, as well as pipes to supply fresh working fluid to organize the system and to remove excess working fluid with condensed hydrocarbon vapors. However, such devices are not yet used in industry due to the lack of information on operating processes in two-phase reactive devices that are part of the LCS for capturing light fractions. The use of liquid gas jet devices (ejectors) in such I&C systems is associated with a number of features.

- First, the working fluid and compressed vapors are a mixture of wide fractional composition, making it difficult to design such ejectors.
- Second, the reciprocal parallel processes of condensation and absorption in jet apparatus affecting the efficiency of this type of compressor block are actively continuing.

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