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METHODS FOR REDUCING DUST FORMATION AT OIL PLANTS AND CREATION OF NEW CYCLONE DESIGNS

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ABSTRACT

The reasons for the large amount of dust generated at the initial stages of the cottonseed oil production process and ways to reduce it are considered, which can pollute production premises and atmospheric air, worsen the working conditions of workers and employees, and cause them to contract an occupational disease.

While great research is being carried out around the world to maintain an ecologically clean environment, the dusty air coming out of oil refineries in our republic also causes some damage to the ecology of the environment.

To solve this problem, it is necessary to select cleaning methods taking into account the composition of the dust when cleaning dust-laden air entering vacuum cleaners. A large amount of dust is released at all stages of primary processing of cotton seeds.

This dust pollutes the air of industrial premises and the atmosphere, worsens the working conditions of workers and employees, and can cause occupational diseases in them. Cyclone separators are widely used at the initial stages of the process of obtaining oil from cotton seeds at all oil mills and oil processing plants in our republic.

The oil and fat industry organizes processes for receiving, storing, preparing for processing and drying cotton seeds. When setting up an environmentally friendly oil production plant, it is important to capture the resulting dust.

One of the important tasks is to conduct targeted scientific research in areas such as the development of effective dust removal technologies. Models of cyclone separators have been in use for over a century without modification, but in reality, oil mill cyclones are designed to separate solids from process gas streams.

The main focus is on finding new ways to improve technological parameters. Recent studies have also commented on the evaluation of geometric effects in improving equipment performance. A conventional cyclone mainly consists of a cylinder equipped with a tangential inlet, a dust chamber and a vertical outlet pipe in a conical cleaning vessel, commonly known as conical cyclones.

The dusty air flow then enters the cyclone tangentially with a very high angular velocity, and the flow begins to rotate and changes its direction from the top of the conical section to the bottom. Therefore, dust particles are collected in a dust collection chamber connected to the bottom of the cone section, and the dust-cleaned air is directed upward and exits through the cyclone.

Based on the dynamic analysis of the movement of harmful compounds along the suction speed in the air flow during the primary treatment of cotton seeds, conducting theoretical research to develop methods for simulating and increasing the efficiency of newly simulated cyclones is a requirement today.

Currently, it is necessary to take urgent measures not only to improve the technological processes of receiving, cleaning, drying, storing and processing cotton seeds, but also to improve dust removal and atmospheric air purification systems.

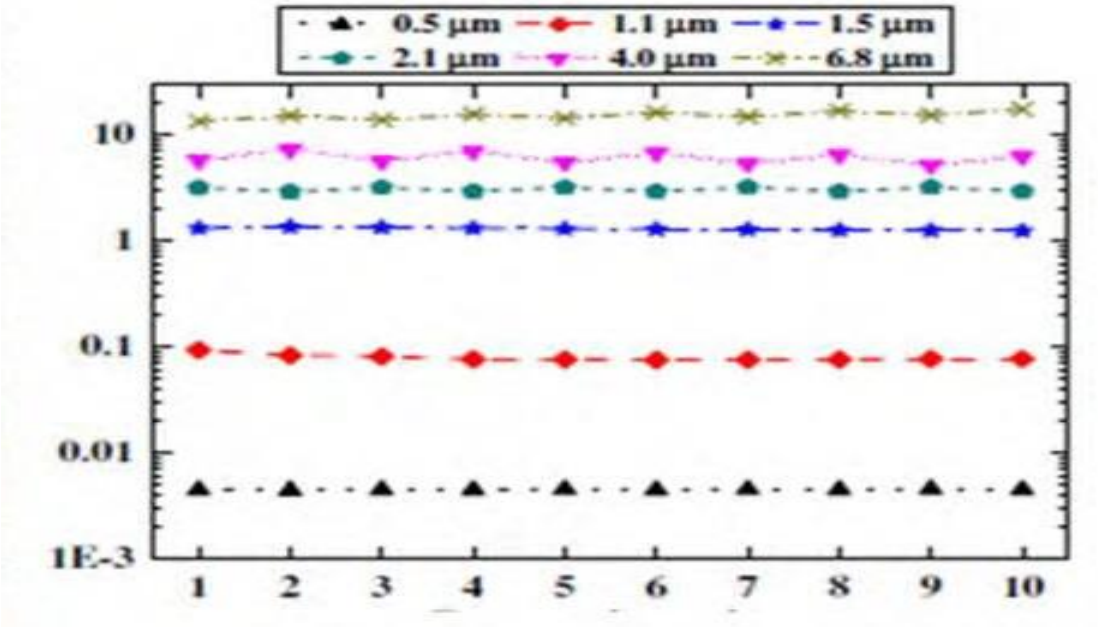
Based on the amount of dust emitted into the atmosphere at oil and gas enterprises, it is classified as follows.

- fine mineral dust measuring 0.1 mm-0.2 mm;

- organic dust from 0.1 mm to 0.315 mm, consisting of crushed parts of plants (stems, stems, inflorescences, leaves);

- short fibers of different lengths - dust with large particles up to 0.4 mm wide, specific to the type of cotton seed being processed;

The percentage of mineral and organic dust in cotton seeds also depends on the stages of technological processes. At the beginning of the process, that is, in the pneumatic transport system of cotton seeds, cotton seeds can contain up to 10-20% organic and 80-90% mineral dust, depending on the mass of the dust. To determine these values and regardless of the variety of vacuum cleaner designs, the effectiveness of any type of vacuum cleaner depends on the properties of the dust it removes. That is, the morphological characteristics of dust particles, shape, chemical composition of dust, density, contact surface, stickiness, friability, spreadability, hygroscopicity, etc. depend on it.



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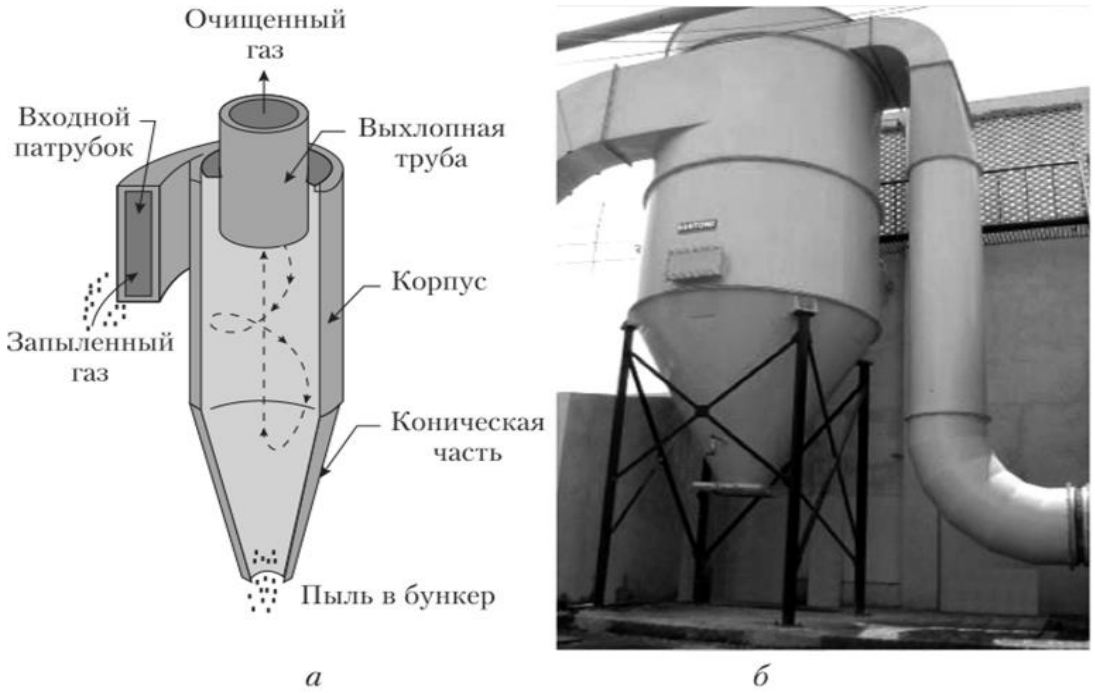
A good knowledge of the properties of dust allows us to draw informed conclusions about their danger in sanitary and hygienic conditions and long-term suspension in the air. This, in turn, makes it possible to choose the right dust collection method and equipment, and implement technological solutions aimed at reducing dust formation at least a little. In order to determine the physical and chemical characteristics of dust, an experiment was conducted on the dust flow of dust collectors and dust taken from the bunkers of oil and fat factories.

The main part of the dust consists of mineral and organic mixtures of various sizes. Their size ranges from 15-45 microns to 0.5-0.7 mm, and due to their lightness they fly and remain suspended in the air for some time. (picture 1)



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The main indicator characterizing the effectiveness of any device for cleaning dust from dispersed compounds is the cleaning coefficient %.

According to studies of the physical and mechanical properties of dust and its composition, there are a number of difficulties in cleaning dust generated in the processes of cleaning cotton seeds from impurities, depilation, scalding, separating and separating the core from the husk, and they cannot be cleaned using any equipment for cleaning from dust.

Therefore, changing the design of currently used dust collectors is one of the most effective ways to capture dust generated in the oil and fat industry and effectively clean it. In addition, the use of chemical methods for cleaning such dust can also give the expected effective result.

Therefore, it is advisable to use solutions with surfactants to capture dust. Due to the high viscosity of such solutions, dust will adhere better than ordinary water. To do this, it will be necessary to analyze the scientific research conducted.

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