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ANALYSIS OF THE REASONS FOR THE PRODUCTION OF SECONDARY GASES AND THEIR PHYSICAL-CHEMICAL PROPERTIES IN EXISTING CHEMICAL INDUSTRY ENTERPRISES IN THE FERGANA VALLEY

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ABSTRACT

The article examines the study of physical and chemical properties of secondary gases emitted from chemical industry enterprises and solving the problems of gas disposal based on their analysis. In the article, the theoretical justification of the hydrodynamic forces acting on the secondary gas in the chemical industry and the efficiency of the device are developed.

KEYWORDS

waste gases, cleanable gas, hydraulic resistance, symonic, viscous, gas flow.

Introduction

The fight against atmospheric pollution with toxic gas and various wastes is an integral part of the problem of nature protection. Because atmospheric pollution not only affects the earth's atmosphere, but also endangers human life and the surrounding environment.

The problem of keeping the atmosphere clean has been of interest to humanity since ancient times. Previously, the air was polluted only above and near industrial facilities, but now, emissions from industry, transport, energy, and other sources are causing air pollution in large districts and areas thousands of kilometers away.

That is, as a result of the daily increase in human demand for products obtained by natural and artificial means, along with the creation and production of new types of products by production enterprises, environmental pollution is increasing. It's also getting faster. The main purpose of separation of solid or liquid particles contained in industrial mixtures is to reduce air pollution, the separation of valuable products or the removal of harmful substances that negatively affect technology and equipment is one of the important factors that ensure the intensity of the work process.

Materials and Methods

In order to increase the effectiveness of prevention of such unfortunate consequences, the need to analyze the physical and chemical properties of dust coming out of industrial enterprises is increasing more and more.

One of the main technological processes of chemical, food, building materials production, pharmaceutical and other industries is the purification of polluted gases, dust, pesticides, and toxic substances of various structures. Therefore, the separation of heterogeneous gas systems is one of the most relevant and widespread basic processes of chemical technology. However, in recent years, the moral obsolescence of dust gas cleaning devices is increasing the demand for the use of new modern technologies in the industry. This, in turn, requires an analysis of the causes and types of dusty gases coming out of production enterprises.

Because the existing dust collection devices cannot be created taking full account of the constantly updated technological processes and the physico-chemical properties of the waste generated in them.

Accurate knowledge of the properties of wastes in different states (gaseous, liquid or solid) generated during industrial production is an important factor for the correct selection of the method of their capture or neutralization, including increasing the efficiency of dust capture.

Also, correct solution of the problems of atmospheric polluting sources and their hazard assessment is one of the urgent tasks.

In one year, 103 billion tons of raw materials are processed, and various products are produced from them, and 2 billion tons of waste are released into the environment.

There are 865 different chemical compounds on Earth, 183 of which are dangerous for the environment.

According to the experts, about 4 million tons of harmful substances are added to the air of our republic every year. Half of these are carbon dioxide.

15% hydrocarbon emissions

4% sulfur dioxide

9% nitrous oxide

8% is solids

About 4% of the emissions correspond to specific acute toxic substances.

The most polluting elements of atmospheric air are carbon, nitrogen oxides, hydrocarbons and industrial dust. The results of environmental monitoring are presented in Annex A.

According to official data, 50 million tons of various hydrocarbons, 260 million tons of sulfur oxides, 60 million tons of nitrogen oxides, more than 2 million tons of dust and ash are being released into the atmosphere.

The analysis of the percentage indicators according to the share of industrial enterprises of annual emissions from various product production industries in the countries of the world showed that:

1. Construction materials industry 34.7%
2. Thermal power plants 29.5%
3. Motor transport 15.8%
4. Black metallurgy 12.4%
5. Chemical industry 4.6%
6. Non-ferrous metallurgy 2.2 %
7. Oil processing 0.5%

8. Other industries make up 0.35.

This, in turn, poses urgent issues such as studying emissions from enterprises, finding effective solutions, using them in the process of re-production, and developing measures to protect the atmosphere.

The density, dispersion, adhesion properties, abrasiveness, wetting properties, electrical conductivity, shape of dust particles of industrial dust (aerosols) based on their physico-chemical properties, it is necessary to find a solution for the creation of devices and new types of devices on the basis of research. remains one of the issues.

The devices used in the treatment of industrial secondary gases are selected based on the physical and chemical composition of the treated gas, its average median size, and various mechanisms of the gas [1,2].

In the industry, there are dry and wet methods of cleaning secondary gases, and this type of equipment is considered to have small hydraulic resistance and high performance. But the level of dry cleaning is much lower than the level of manual cleaning. For this reason, the tendency to use the wet method in the cleaning of industrial dust and secondary gases is increasing in the world today. The wet method is effective in keeping particles with a high dispersion composition (particle size smaller than 5 μm) in a liquid medium. For example: it is 95-96% in the cleaning of fuel smoke generated in the boiler rooms of thermal power plants, secondary toxic gases released during the reaction process in the chemical industry, and paraffin smoke released during the refining process in the oil-oil combine [3].

Wet dust and gas cleaning devices have different designs, the most common of these devices are scrubbers. The main advantage of scrubbers compared to other devices of the wet method is that the waste water is less likely to clog the pipes of the device and the sludge formed during cleaning is less likely to stick to the walls of the device. In addition, it is highly effective in cleaning aggressive gases with high temperature and flow rate [4].

This method also has its own disadvantages, for example, it requires more energy for cleaning than the dry method, and it has to process dust and gases absorbed into the liquid medium. In addition, the efficiency of the scrubbers used in the industry does not always meet the requirements of the current environmental standards in terms of the PDK level of harmful substances released into the atmosphere. This is mainly due to the external influences imposed on the device and the high level of addition of dust and secondary gases to the gas stream.

Therefore, it is necessary to use new effective methods or the effect of external energy to increase the collision probability of dust and secondary gases with liquid droplets [5-9]. For example, the liquid used in the purification of high-temperature gases evaporates. But this steam is not used for gas purification. If ways and methods of using this steam are created, the energy used for cleaning can be reduced by 50%. In addition, most devices in use today collide with the liquid at a specific contact element. This, in turn, requires determining the limiting value of the gas velocity and the amount of particles in the stream. Because of this, mass exchange processes slow down or complete mass transfer becomes difficult. In this regard, it is more effective to determine and use the method of inertial transfer of gases directly into the internal environment of the liquid. Currently, a lot of scientific and research work is being carried out in this area [2,3,4,5,17].

Based on the above, we will consider some constructions, their advantages and disadvantages of devices that are currently in use and have been proven promising in scientific research [6-15].

In impact inertial devices, the dusty gas flow is directed to the surface of the liquid and the flow mixes with the liquid. As a result, a sudden change in the flow direction is observed. This condition ensures inertial attachment of particles to liquid droplets and absorption of dust particles into the liquid environment. (Figures 1a;b;c;d) [5-8].

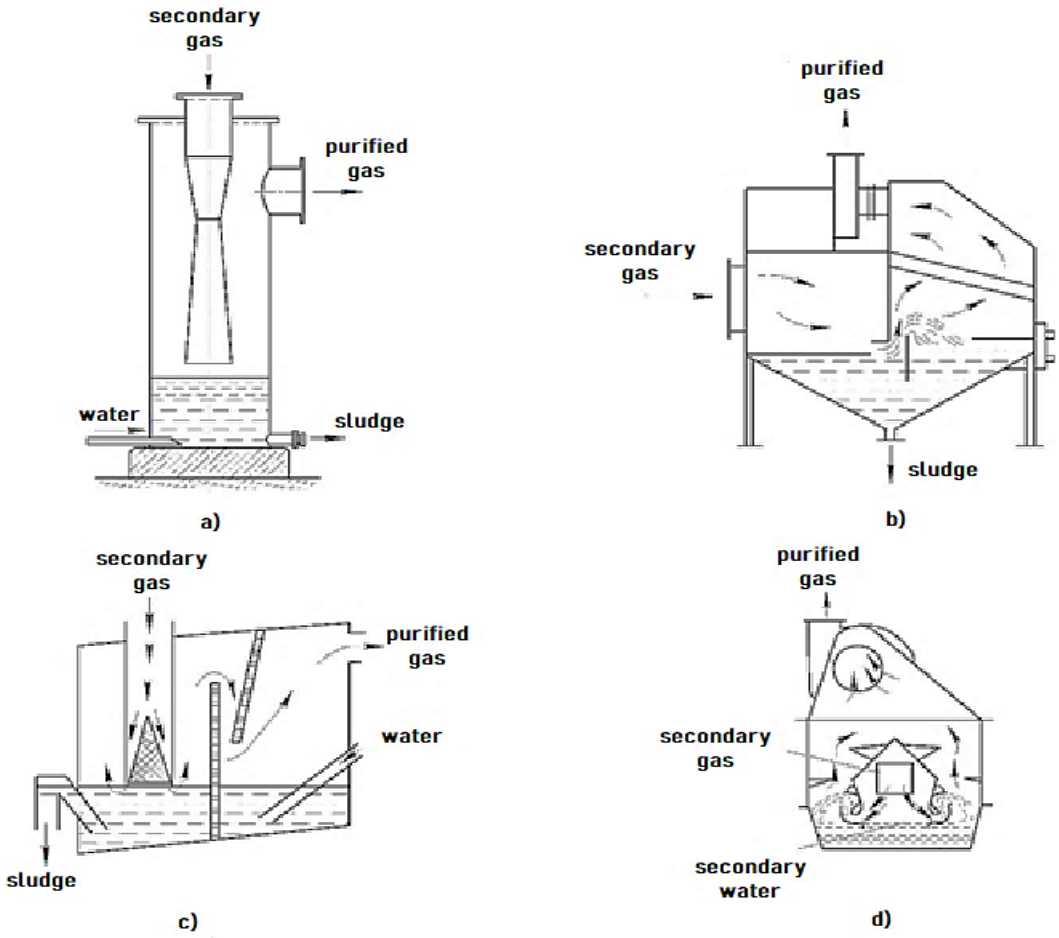

Fig. 1. Constructions of inertial dust cleaning devices
a-central pipe scrubber; b-FDA scrubber; c-Doyle scrubber; d-rotoclon

In inertial equipment, the flow of dusty gas in the liquid is in circular, lumpy and exponential (curvilinear) motion, and as a result, the process of violent mixing with the liquid occurs. In this case, it is necessary to provide a constant supply of water or absorbent liquid in order to compensate for the evaporation of the liquid, the increase in viscosity, and the losses in the discharge of the sludge.
For example, the simplest device of this type is a device with a central pipe (Fig. 1a) - devices of this type are mainly used for cleaning dusty gases (aggressive gases) of the chemical industry.
The principle of operation of the device is as follows: Dusty gas is introduced into the device through the venturi pipe (2) and when it reaches the throat part (3), the compression of the gas flow is observed (the flow speed in the throat part should not exceed 20 m/s, otherwise cleaning efficiency decreases). A certain part of the device body (1) is filled with the working liquid (the distance from the dust gas outlet of the pipe to the liquid level should not exceed 50 mm), the dust gas flow hits the liquid surface

from the outlet of the pipe, and with the liquid interfere with each other. As a result of mixing, the dust particles in the gas settle into the liquid medium, and the purified gas is discharged through the outlet pipe (4) of the venturi nozzle (2) vertical installation on the device body (1) allows to reduce the hydraulic resistance in the device. To keep the level of the working fluid in the device at the same level, a working fluid pipe (5) and a slurry pipe (6) are installed. The degree of purification in this type of devices reaches 97-98%. This condition depends on the average median size of the dust particle [18-24].

FDA scrubber (Fig. 1 b) - devices of this type are widely used in cleaning industrial secondary gases and fumes.

The principle of operation of the device is as follows: The purified gas is introduced into the body of the device (1) through the pipe (2) and passes through the labyrinth barriers (3). Barriers (3) are installed on the body of the device (1) in such a way that they ensure the forced contact of the gas flow with the working fluid (4) collected in the lower conical part of the device. This, in turn, increases the intensive washing of gas in the liquid and the cleaning speed of the device. This condition ensures a significant increase in device performance. Purified gas is discharged through pipe (6). In order to catch the liquid drops coming out with the gas, a drop returner (5) is installed in the body of the device. In this type of devices, the gas velocity does not exceed 10-15 m/s, so the degree of purification reaches 99% [25-29].

Doyle scrubber (Fig. 1 c) - devices of this type are used in industry for cleaning aggressive and high-temperature secondary gases. Since the performance is not very high, it has to be installed in series.

The principle of operation of the device is as follows: The secondary gas to be cleaned is directed to the body of the device (1) through a pipe (2) installed vertically. A conical nozzle (3) is installed at the exit hole of the pipe (2), which serves to increase the speed of the gas flow and spread it to the working fluid (4) filled to a certain level of the device. The gas to be cleaned is in direct contact with the working fluid and is cleaned in the liquid medium. Purified gas is discharged from the device through the pipe (5). In order to catch the liquid drops coming out together with the gas, drop return barriers (6) are installed in the body of the device. The working fluid is constantly poured into the device through the pipe (7). A siphon (8) is used to adjust the level of the working liquid and remove the sludge from the device.

Rotoklon (Fig. 1 d) - this type of device is widely used in the construction industry for cleaning high-volume fuel fumes.

The principle of operation of the device is as follows: a suction fan (2) is installed in the body of the device (1), which sucks the gas to be cleaned through the slot (3). In the intermediate process, the gas is directed between the baffle nozzles (4). Barrier nozzles (4) are placed close to the surface of the device filled with the working liquid, which ensures that the gas is in contact with the liquid and is cleaned in the liquid medium. Purified gas is discharged from the device through the fan (2). In order to catch the liquid drops coming out with the gas, the device body is equipped with a drop return barrier (6) with a small grid. The degree of purification in this type of devices is up to 95-97%.

Conclusion

It can be said that the main advantage of these devices is that the gas flow circulates many times in the liquid environment, and due to the fact that a certain part of the device is filled with liquid, the hydraulic resistance of the liquid flow is small. Such a situation requires constant maintenance of the optimal

liquid level during the operation of the devices. Otherwise, a decrease in the liquid level will lead to a decrease in the level of cleaning and an increase in hydraulic resistance in the device.
The main disadvantage of this type of devices is that the average median size of dust particles fed to the device should be higher than 4 μm.

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