Evaluation Of The Efficiency Of Dust And Gas Treatment Plants In Asphalt Plants

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Abstract: This article presents the standards and calculation methods for the study of atmospheric pollution from industrial facilities. Calculations of technological equipment and the efficiency of the dust and gas treatment plant. The results of inventory, regulation of emissions of pollutants entering the atmosphere are considered. Questions on studying of the equipment on cleaning of a dust-gas, methods on increase and efficiency of work of the equipment are highlighted. Analyses of harmful substances entering the atmosphere from the production of asphalt concrete were performed. Also, hydrodynamic regimes of bubbling absorbers for Samarkand asphalt plant are presented.

Keywords. Flow, inorganic dust, efficiency, hydrodynamic mode, bubbling absorber, speed, layer, density, gas-containing.

INTRODUCTION

Over the past decade serious practical steps, that would significantly change the attitude of the human community to nature, to the problem of its preservation, to ensure the sustainable development of future generations. The bank of unsolved environmental problems continued to increase. There are many reasons for this, and among them, not least is the weak professionalism of the decision makers in the field of environmental protection, in particular, in its protection from industrial waste. The above fully applies to the problem of protecting atmospheric air from dust and gas emissions. Methods. The following methods are used to determine the composition and amount of pollutants in the exhaust gas streams:

- theoretical (balance);
- calculation and analytical (experimental);
- reporting - static.

The theoretical method allows to establish the composition and quantity of pollutants on the basis of drawing up thermal and material balances of technological processes taking into account the chemical composition and properties of raw materials, fuel, materials, structural and geometric features of units, technological parameters, processes that ensure maximum performance of units and data on specific emissions of pollutants of the operated equipment. It is used in the design of new industries, as well as for the analysis of existing technological processes and is the most promising. The calculation and analytical method consists in determining the parameters of the emission sources, the volume output of the contaminated gas, the analysis of the composition and concentration of pollutants in conditions close to the existing technological processes. The calculation and analytical method is the most commonly used in the practice of industrial production. Reporting-static method is a set of techniques and methods of statistics, revealing the laws of determining the composition and quantity of pollutants produced in the production of specific products. Its application is allowed in the production, which established a systematic analysis of emissions of pollutants and their specific amount. The main parts. A large number of sources can significantly pollute the air. Low sources are those, in which the emission is lower than 50 m, and high sources are meant as an emission higher than 50 m. Conventionally they call sources that have an air-gas mixture temperature above 50° C; at lower temperatures, emissions are considered cold [1,6]. Emissions of enterprises of different industries and transport contain a large number of various harmful impurities. Samarkand ELUP is located in the town Farkhad, Samarkand city. The main activity of the enterprise is the production of asphalt-concrete mix and concrete products. The production capacity of the enterprise is 200 thousand tons per year of asphalt concrete mix, and production of 10 thousand m³/year of reinforced concrete structures. Asphalt-mixer brand AMMAN with a capacity of 160 tons at one o’clock. The production activity of the enterprise is carried out on the same industrial site, in the following workshops and areas: administrative and household buildings, crushing and screening workshop, asphalt concrete workshop, bitumen storage, cement storage, boiler room, reinforcement workshop, machine shop, garage, workshop for manufacturing concrete products (road borders), fuels and lubricants. On the territory of Samarkand ELUP, 38 emission sources were identified, pollutants occur as a result of the operation of the following equipment and technological operations: Asphalt-mixing device "AMMAN" - 1 pieces. The plant capacity is 200,000 tons of asphalt concrete per year with a capacity of 160 t / h. Opening hours 1300 hours / year. The aspiration system cyclone degree of purification -85% is installed in the equipment. Annual gas consumption is 660 thousand m³/year.

RESULTS AND DISCUSSION

Calculation of inorganic dust emission, specific dust emission from an asphalt mixing plant according to the method, the concentration of dust entering the cleaning is 30g / m³. The volume of the gas-air mixture is 4,4m³/s (3,452nm³/s).

Inorganic dust B = C * Q :1000 = 61,7* 4,4:1000 = 0,271 t/c.

Inorganic dust M = B * T * 3600 :10⁶ = 0,271* 1300* 3600 :10⁶ = 1,26 t/y.

After cleaning, the inorganic dust enters the atmosphere:

Inorganic dust B = C * Q :10³ = 9,3 * 3,8:10³ = 0,035 r/c.

M = B * T * 3600 :10³ = 0,035* 1300 * 3600 :10³ = 0,163t/y.

The effectiveness of the dust-cleaning gas installation is determined by the formula:
The contact surface of the phases is determined by the surface of the bubbles in the gas-liquid layer. The specific surface of the contact phase \( \alpha_s \) per unit area of the plate is determined as follows:

\[
\alpha_s = \frac{6 \varphi_h n}{d_n} \frac{6 \varphi_h o}{d_n (1 - \varphi)}
\]

Where \( \alpha = \alpha_s / h_n \) is the specific contact surface per unit volume of the gas-liquid layer: \( d_n \) is the bubble’s diameter. Plate full flow resistance

\[
\Delta P = \Delta P_1 + \Delta P_2 + \Delta P_3,
\]

The hydraulic resistance of a dry plate is determined by a formula that takes into account local resistance:

\[
\Delta P_1 = \varepsilon \frac{p r o^2}{2}
\]

The resistance, caused by the surface tension forces, that arise when gases exit from the holes of the dish into the layer of the absorption solution is determined by the formula

\[
\Delta P_3 = \frac{\sigma \Pi}{\pi D_{eq}}
\]

\( \Pi \) and \( S \) - the perimeter and cross-sectional area of the hole (slot);

\( D_{eq} \) - equivalent diameter of the hole (slot).

The resistance of the gas-liquid layer approximate is taken to be equal to the static pressure of the layer:

\[
\Delta P_2 = g \rho x h_0 = \rho_s h_p
\]

where, \( \rho_1 \) and \( \rho_2 \) are the densities of the light liquid and foam, respectively. For vehicles with a moveable nozzle also characterized by the presence of several hydrodynamic modes of operation. During operation the production of bricks will form the following types of waste primary production: overburden, defective brick mounding Department, a defective brick drying Department, defective burnt bricks of waste coal ash. Coal ash meets the above requirement, as many cement plants use ash as an additive in clinker grinding. (V.F.Maximov, Wolf I.V). The use of waste power plants allowed to increase the production of bricks grades 125 and 100, significantly improve its presentation and 30% reduce the amount of marriage (Chistyakov B. Z.) Improving the efficiency of industry it is necessary to consume unconventional energy. Solar energy the direction of non-traditional energy, based on the direct use of solar radiation to produce energy in any form.

CONCLUSION

The proposed bubble absorber with the establishment of an asphalt concrete plant, the effectiveness of the dust of the gas treatment plant asphalt concrete plant increases from 87 % to 99%.

REFERENCES
