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Sorption and Catalytic Method of Cleaning of Gas Emissions from Heterocyclic Connections - Products of Incomplete Oxidation

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ABSTRACT. In article the processes peelings technological surge enterprise from gas mixtures are characterized beside particularities: first, gases, thrown in atmosphere, have it is enough high temperature and contains the big amount of dust that greatly obstructs the process an gas purifications and requires preliminary preparation leaving gas; secondly, concentration gaseous and vaporous admixtures more often changes in broad interval under big frequency of time.

KEYWORDS: cylinder, sulfur, gas-holder, water-pressure bottle, compressor, reometra, mixer, samplers, syringe, furnace, reactor, electric furnace, potentiometer, temperature.

I. INTRODUCTION

The Methods peelings industrial surge from gaseous admixtures on nature courses physic-chemical processes are divided on four groups: washing surge solvent admixture (the method to absorptions); washing surge solution reagent, linking admixture chemical (the method chemisorption); the absorption of the gaseous admixtures hard active material (the method to adsorptions); the absorption of the admixtures by using the catalytic conversion.

The problem of environmental protection from technogenic emissions of toxic heterocyclic chemicals is important for advanced industrial regions which economy considerably is based on chemical productions, oil processing, petro-chemistry and power system.

Development of the industry and power of the country is inevitably connected with significant increase in pollution of atmospheric air the flue gases containing harmful organic impurity of heterocyclic structure that makes negative impact on biological conditions of activity of society.

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II. SIGNIFICANCE OF THE SYSTEM

In article the processes peelings technological surge enterprise from gas mixtures are characterized beside particularities: first, gases, thrown in atmosphere. The study of literature survey is presented in section III, methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and conclusion.

III. LITERATURE SURVEY

Potential emission of vapors of harmful heterocyclic organic compounds and sour gas mixes and hydrocarbons – products of incomplete burning of hydrocarbon fuel mix of heat power installations in a year makes astronomical figures[1]. Therefore it is necessary to take all measures for removal of products of incomplete burning – hydrocarbons of heterocyclic structure, poly-nuclear aromatic hydrocarbons, including sour gas components from flue gases before their emission in the atmosphere, or to make sure of what concentration of harmful substances, including acids as a result of issue does not exceed 0,1-1mln^{-1} even in that case when atmospheric conditions do not promote its dispersion.
For the last decades deterioration of atmospheric air, especially in areas with the developed industry is observed. These enterprises release into the atmosphere a significant amount of products of incomplete burning - hydrocarbons of the heterocyclic building that leads to relative increase in their concentration in atmospheric air[2-3].

IV. METHODOLOGY

As at us in the country, and abroad so far in a ground layer of the atmosphere increase in height of the chimneys releasing the burning products containing numerous products of incomplete burning into the atmosphere was considered as one of fixed assets of decrease in concentration of harmful gas components. Under favorable weather conditions they provide dispersion of emissions on big squares. However the basic lack of this method is that at the same time the adverse effect of emissions on the environment is not eliminated, and only slows down. It should be noted that at emergence of the descending air flows (atmospheric inversions) the disseminating ability of pipes decreases almost to zero therefore concentration of products of incomplete burning at the Earth's surface sharply increases and there is a danger of sharp poisoning of people and animals.

Recently many various ways of the solution of this problem are offered. However most of them were not beyond laboratory researches and only the few are tested in skilled working conditions.
The main requirements imposed to modern ways of cleaning the industrial furnace gases from acid gases and products of incomplete burning, the having heterocyclic structure carbon / hydrocarbon fuel mix come down to need of an exception of process of preliminary cooling of the thrown-out gas stream and also to that methods were available also inexpensive, are simple for execution of the technological scheme. The way should not demand reorganization of the existing technological lines, not occupy big floor space, not demand a consumption of auxiliary materials, lead to other emissions, not cause additional measures for safety measures and labor protection, etc.

The main components of a research are conservation, rational use of natural resources and creating favorable conditions for accommodation of the population. The main attention is directed to implementation of technology catalytic oxidizing destruction of heterocyclic compounds, the sulfurs taking place in emissions of power stations with the subsequent to chemisorption of oxides in flue gases on firm poly-metallic absorbers of secondary origin.

V. EXPERIMENTAL RESULTS

Laboratory unit for purification of gas mix of acid gases and products of incomplete burning carbon / hydrocarbon fuel mix consists of the following knots: - knot of preparation of model gas mix;

- knot of carrying out experiments on purification of gas mix with a firm sorbent.

Model gas mix prepares by mixture gaseous acid gases and products of the incomplete burning carbon / hydrocarbon fuel mix arriving from a cylinder (I) through a gas-holder with a butter layer for prevention of dissolution of acid gases and products of incomplete burning carbon / hydrocarbon fuel mix in water. Constant water level in a gas-holder is maintained by regulation of a sheet of water in a water tower (3). Gas mixes up with the air given by means of compressor (4). Feed rate of acid gases and products of incomplete burning carbon / hydrocarbon fuel mix and air is regulated by the corresponding reometra (5), (6). The gas mix received in the mixer (7) goes to the reactor (11) warmed by furnace (12). Temperature in the reactor is regulated by a potentiometer (13). Installation is supplied with samplers (8), (14).

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When it is necessary to prepare model gas mix with water vapors, by means of the syringe (9) a certain amount of water in a system moves, and it heats up the furnace (10), then moves in mixer (7). Gas mix moves in the reactor from below. The reactor consists of cylindrical glass (from molybdenum or quartz glass depending on operating temperature) a vessel with the spherical punched partition in the lower part, it is supplied with a pocket for the thermocouple, has the lower and top side tubes for giving and removal of gas mix, the studied catalyst-hemo a sorbent in number of 20 g; and spherical inert nozzles load into the reactor through a side top tube. In the loaded state the sorbent occupies the catalyst-hemo between nozzle space in the reactor. The gas mix given under small excessive pressure, passing through the punched partition in the reactor, aspires up a way of the smallest closer to an external wall of the reactor. At the same time, putting pressure upon spherical nozzles from a wall, kind them from a wall in the radial direction. The space released after shift of a nozzle is occupied by a sorbent. Repeated repetition of such movement of a nozzle and sorbent imitates "the boiling layer". At the same time, as the level of a nozzle is much higher than sorbent level in boundaries nozzle space, ablation of adsorbent the leaving gas mix is insignificant. Besides, the top side opening on which the purified gas mix enters is filled with fiber glass.

Description of carrying out experiment. On the basis of literary data, taking into account availability and economic feasibility binary and polymetallic oxides of secondary origin with which experimental works on definition of extent of cleaning, adsorbent capacities on sorption of acid gases and other products of incomplete burning from process temperature and also from temperature of calcination of a sorbent were carried out were chosen as a sorbent. Preliminary experiments were made in vitro. The scheme of laboratory installation is submitted in the drawing.

Figure-1

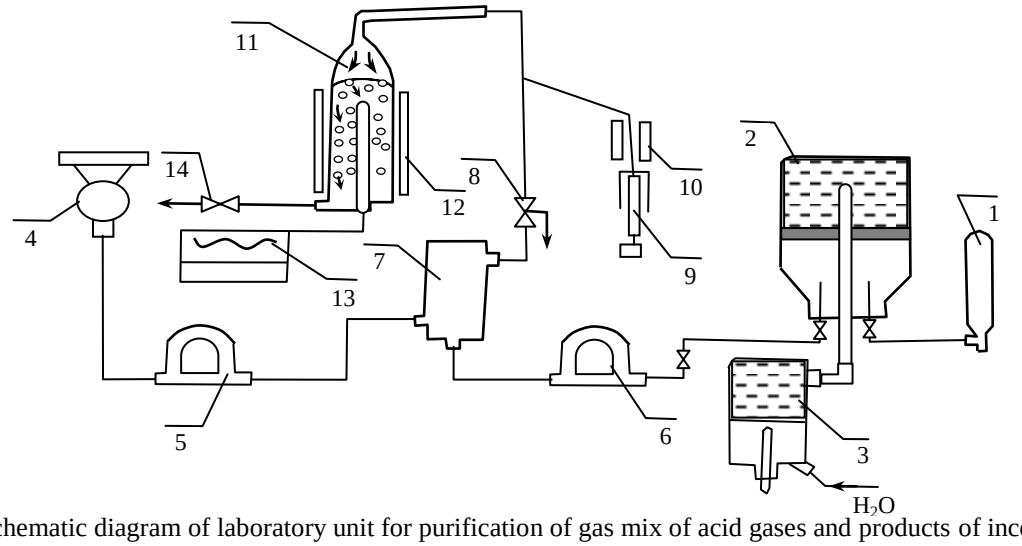

Figure - Schematic diagram of laboratory unit for purification of gas mix of acid gases and products of incomplete burning carbon / hydrocarbon fuel mix:
1 – a cylinder with liquid dioxide of sulfur; 2 – gas-holder; 3 – water-pressure bottle; 4 – compressor; 5,6 - reometra; 7 – mixer; 8,14 - samplers; 9 – syringe; 10 – furnace; 11 – reactor; 12 – electric furnace; 13 – a potentiometer for measurement of temperature.

Loaded 20 g into the reactor the are fresh calcinated model binary and poly-metallic oxides of secondary origin. Gas mix was passed through a layer of a sorption and catalytic system at a constant volume speed of the 9000th Part-1 and temperature 100, 150, 200, 300, 400, 500, 600, 700, 800 °C.

On the basis of experimental data it is possible to determine absorbing ability of a sorption and catalytic system (capacity by sorption of oxides of sulfur) by measurement of amount of the absorbed substance in unit of mass or sorbent volume.

VI. CONCLUSION AND FUTURE WORK

As a result of studying of interaction of acid gases and products of incomplete burning carbon / to hydrocarbon fuel mix with a poly-metallic sorption and catalytic system it is established that some poly-metallic oxides of secondary origin can be recommended as a sorbent for one-time gas purification with the subsequent receiving salts of the

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corresponding metals at those enterprises where there is a possibility of the subsequent recovery of acid gases and products of incomplete burning carbon / hydrocarbon fuel mix.

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