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METHOD OF DEVELOPING A THREE-LEVEL STRUCTURE OF THE OPTIMAL CONTROL SYSTEM FOR THE PRODUCTION OF PHOSPHORIC ANHYDRIDE (P_2O_5)

Abstract. This article examines the approach already used to manage the production of phosphoric anhydride (P_2O_5) and suggests a new three-level structure to optimize this process. For the purpose of standard functioning of the concept of rational management of phosphoric anhydride, its work should be approved together with the software ensemble of the wearable degree (process automated control system – automated management concept of scientific and technical actions), since information for the purpose of mediocre PACS degree operates from wearable degree meters, and the discovered rational motion systems are implemented together with the support of wearable degree meters. managing controllers. In order to implement our control algorithms, proper subsystems of a mediocre degree of the required data should be guaranteed. This note discusses the list of data needed for the purpose of the control subsystem, the methods of its processing, and the representation of the software and hardware provision of the control subsystem.

Keywords: phosphoric anhydride, intelligent technologies, optimal control, process, fuzzy systems, oxidation, combustion, yellow phosphorus.

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Introduction. For the purpose of standard functioning of the concept of rational management of phosphoric anhydride, its work should be approved together with the software ensemble of the wearable degree (process automated control system – automated management concept of scientific and technical actions), since information for the purpose of mediocre PACS degree operates from wearable degree meters, and the discovered rational motion systems are implemented together with the support of wearable degree meters. managing controllers. In order to implement our control algorithms, proper subsystems of a mediocre degree of the required data should be guaranteed. This note discusses the list of data needed for the purpose of the control subsystem, the methods of its processing, and the representation of the software and hardware provision of the control subsystem.

If this configuration is modeled down to 400°C in an airtight tube, a polymer model comes out, composed of endless layers of PO_4 tetrahedra along with single

(3 and 4) air atoms. Prolonged preservation of this food in an airtight tube at a temperature of 450°C is accompanied by its transition to a different polymer configuration. This is a more stable version of phosphoric anhydride. The purest phosphoric oxide is completely devoid of fragrance.

Production of phosphoric anhydride from phosphorus. It was put into use in 2014. The initial information for the purpose of design was: The Plan of the Kazniihimproekt Partnership. Semi-production installation according to the manufacture of phosphorous anhydride with a capacity of Fifty kg/hour according to phosphorus, together with the use of phosphorus combustion heat and the production of "commercial" phosphorous anhydride R2O5(R4O10). This test procedure (OPPU) is aimed at the utilization of heat generated as a result of the interaction of phosphorus combustion, as a result of which the production of crystal phosphoric oxide R2O5(R4O10) is carried out.

Procedure for extraction of phosphoric anhydride. The connection of phosphorus with oxygen, therefore, leads to the formation of different goods. When phosphorus is burned, its main compound, phosphoric oxide (P_2O_5), is formed in the presence of excess air (or atmosphere). On the contrary, during combustion, when there is a lack of atmosphere or slow oxidation, phosphoric oxide (P_2O_3) is formed in the main.[1] The procedure for the extraction of phosphoric anhydride from phosphorus consists in the oxidation (combustion) of phosphorus according to the interaction (1):

$$\frac{P_4}{62}+\frac{5O_2}{160}\rightarrow\frac{2P_2O_5}{222}+Q \qquad (1)$$

The oxidation (burning) of phosphorus by the line of interaction, together with the formation of P_2O_5 in the absence of the densest phosphorus oxides, can only be assumed to be the presence of heat earlier than 773-873ºC and an excess of air of at least 30%. From the yellowish phosphorus base of workshop No. 5, phosphor operates in the dosing department according to pipelines along with heating. In a single difficulty, to the dosing department. There are 8 dispensers for the purpose of preservation, type 101/9-16, with a capacity of Thirty-two m^3 of any, according to 4 containers for the purpose of any jet. The preservation dispensers, type 101/9-16, are equipped with paddle agitators, which from time to time turn on and form a homogeneous composition. In order to strengthen phosphorus in liquid storage, dispensers are made together with a shirt, according to which moisture circulates along with a temperature of 70-90°C.

After pre-settling in the dispenser for at least 2 times, the phosphor, according to the pipeline concept, is fed into a water channel (montejus), type 401. Phosphor is supplied from the fluid collector through the pipeline along with heating to the phosphorus combustion chamber, type 402. Before combustion, the phosphor flows through a heat exchanger located inside the combustion chamber. Phosphorus vaporization occurs due to the result of the heat of its combustion. Phosphorus is burned out by a line of its spraying with a pressure of at least 0.45 MPa squeezed by the atmosphere. A small air space is heated in a heat exchanger art. T-05 before being fed into the nozzle.T-05 up to a temperature of at least 353°C, which is regulated by the mechanism art. T-1707.

The effect of the compressed air supplied to the nozzle is regulated by the art mechanism. R-304, which sends a warning to the main control panel. When the pressure decreases, phosphorus delivery to the combustion column is automatically interrupted.[2]

The available practical activity of controlling the effect of phosphoric anhydride production. Industrial manufacturing is usually divided into several scientific and technical activities. Any scientific and technical procedure in the total production cycle contains its own task, in coordination with which specific conditions are imposed on the tree: the provision of either the highest productivity, the established or optimal product features, the established or lowest price of the material (semi-finished products) and electricity per piece of finished product and prospector.letter. [3,4] In the industry, P_2O_5 is acquired by the thermal method. Temperature method (providing the purchase of pure phosphoric oxide) It contains the main stages: the burning (oxidation) of simple phosphorus in the excess atmosphere and the removal of fog from the gas phase.

There are 2 methods of extracting P_2O_5: oxidation of pure P (extremely rarely used in the industry) and oxidation of aqueous P in water

Phosphorus pentoxide, acquired during combustion and cooled in advance, is fed into a recovery boiler for cooling. The method of extraction of phosphoric anhydride begins with difficult scientific and technical actions.

The phosphor in the dispenser settles at a temperature of 70-85°C. Accordingly, according to its own chemical properties, the phosphor in heat earlier than +70°C switches to a hard position; and in heat further than +43°C, the phosphor switches to a watery configuration. In the dispenser, the phosphor settles together with water and nitrogen, thus, as well as the element prevents the formation of a toxic gas – phosphine. The density of phosphorus in the dispenser is distributed in a similar way, the fact that someone sits at the bottom, in this case, the period, as well as moisture of considerable temperature, fills the upper part of the dispenser with Thirty cm, and the element is located among them in the dispenser.

Since the heat in the dispenser is 70°C, phosphor and moisture do not mix in any way. The phosphor in the watery version comes out of the dispenser and is fed into the burner. A small air space is supplied to the burner from both edges, and cool moisture acts together with the outer edges, which comes out in warm annular jets.

This rule is constant in order to maintain a stable temperature. In this case, a small air space enters the burner along with 2 edges: the rule of action is 1 – the phosphor is sprayed in the middle, and the 2nd – according to the province, provoking the phosphor in a similar way to the twisting display. This guarantees the absolute property of phosphorus. In the burner, the phosphor burns out in a fever of 1500°C-2000°C. After combustion, the phosphor in the gaseous version acts in the recovery boiler in order to cool down.

The recovery boiler is folded from the covered brick (in order to increase the fire resistance of the materials used) together with the pipe from the inside.According to this pipe, cool moisture passes through, and a place remains between the brick and the pipe, through which a gaseous phosphor flows. Moisture flowing from inside the pipe cools the heated phosphor. A drum partially filled with water is defined in the upper lobe of the recovery boiler. Cool moisture can help keep the heat in the heat recovery boiler in a homogeneous stay. The moisture flows through the pipes and will return to the drum after the end of the cycle. Moisture acts in the heat recovery boiler with a low fever, and the presence of a rather significant one comes out of it. If there is a small amount of water in the drum, the tube may melt. In order to eliminate this, the water size should be constantly monitored.

The watery phosphor is fed into the heat recovery boiler at a temperature of 1800-2000℃, and comes out of it in a gaseous state at a temperature of 430-480℃. Bypassing the conveyor, the heat of phosphorus in the gaseous state decreases over time, and someone slowly transforms into a pigment. However, R2O5 is used to extract high-quality dried phosphorous precipitation of R2O5. This method of extracting R2O5 is considered economically interesting. Personally, the procedure is quite simple for the purpose of applying scientific and technical installation, which contains 4 alternating periods. Required food items: yellowish phosphor, element, moisture and a small air space.

Materials and methods. *Three-level control concept for the effect of phosphoric anhydride production.* The hierarchical management rule implies a multi-stage management movement system, at which point any management period contains its own management items and missions. The control target is considered to be the result of the established technical and economic characteristics of the movement. The scientific and technical order, the presence of which is achieved by the established characteristics, is called the best. Movement characteristics should be maintained regularly, as well as as close to their best values as possible. [5,6] The regulation of scientific and technical action can be formed in 2 periods. In the upper stage, the target of management is considered to be the selection of a rational order of the scientific and technical movement. The subject of management is considered to be a complete scientific and technical procedure together with scientific and technical equipment.

In this case, the goal of monitoring at the bottom stage is considered to be providing the smallest deviations of scientific and technical characteristics from their best meanings. This control task is relatively simple and consists in stabilizing the movement characteristics. In this case, instead of the term “control”, I will use the name “regulation". In the lowest period, the scientific and technical procedure is considered equally as a set of ordinary (simple) actions, which, along with the scientific and technical devices in which they take place, are considered subjects of regulation of this period.

I have analyzed the supervision of single scientific and technical actions together with the target of extracting established technical and economic characteristics. But the presence of power in the company as a whole creates similar missions and control problems that cannot be attributed to single scientific and technical actions. There are problems of timely management of workshops, manufacturing companies, planning reserves of material, semi-finished products and finished products. For this reason, the enterprise management procedure must contain the only way to find a solution to these problems. This is the highest hierarchical degree.

Similarly, the management structure of the current industrial enterprise is characterized by 3 degrees of administrative hierarchy. The lowest degree (I) is shown in this way by what are called local adjustment concepts, the functions of which combine to stabilize single scientific and technical characteristics. Such elementary problems are solved by mechanical devices in the absence of the role of a person, and for this reason, the concepts of control of the wearable hierarchical degree are called the concepts of mechanical control (Installation). The subjects of adjustment in this case are considered to be simple movements together with proper scientific and technical devices.

The subsequent hierarchical degree (II) forms the concepts of management of scientific and technical activities. The subjects of management in this degree are considered to be integral scientific and technical movements together with scientific and technical equipment and local automated control systems. Here they find a solution to the problem of optimizing scientific and technical action systems. In addition, the management functions in this case include the detection and prevention of abnormal (adventurous) systems, the transfer of equipment in scientific and technical schemes, and the calculation of technical and economic characteristics of actions. These control functions are relatively difficult and do not have all the chances to be fully assigned to the mechanical apparatus. For this reason, scientific and technical action management concepts use PCs for the purpose of scientific and technical action management (PCC), and the PCC dispatcher participates in the management actions. Such management concepts are called automated management concepts for scientific and technical activities.

Without exception, all organizations are governed in the most significant hierarchical degree (III). The subject of management here is considered to be all manufacturing and special equipment without exception (including additional work: supplies, sales, restoration, planning and prospector.letter.), as well as automated control systems (ACS) of the past hierarchical level. It is necessary to solve the difficulties of managing absolutely all production activities together with the use of PCC and the interest of operators. The management concept in this context is referred to as the Automated Enterprise Management Concept (AEMS). As part of other studies, the concept of the coal game score is also being investigated and developed. The article presents the results for the consistency of coal and crushed straw, but the technology can also be used for other types of consistency.[7]

Research results and discussion. When developing a subsystem, one can use further integration into an automated hardware management system, which will increase the efficiency of both hardware, and software. [8,9]. Where the concept of a three-step procedure for diagnostics of a thermal power plant turbine unit is used instead of creating diagnostic mathematical models and object failure models [10]. Where you can immediately develop an algorithm for diagnostics of equipment for the production of phosphoric anhydride using advanced intelligent technologies.

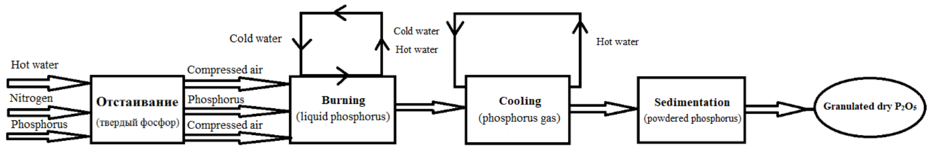

Figure 1 Stages of obtaining dehydrated P_2O_5

Conclusion. The developed three-level structure for controlling the production process of phosphoric anhydride (P_2O_5) allows us to specify the tasks under study.

As already noted, the upper level of management can be attributed to both the APCS and the AEMS. Such systems, although they require the development of algorithms and programs, but most likely their development can be attributed to engineering and economic tasks, since their algorithms do not require deep scientific research. The daily productivity of furnaces depends on many factors: market demand, technical condition of the main and auxiliary equipment, availability of raw materials, etc. Calculation of the furnace capacity is based on known balance equations that take into account the physical and chemical properties of raw materials. Therefore, we did not set the task of synthesizing algorithms for implementing the top level of control.

At the middle level, the tasks of optimizing the technological modes of processes are solved. In addition, the control functions at this level include identifying and eliminating abnormal (emergency) modes, switching equipment in technological schemes, calculating technical and economic indicators of processes, etc.

At the lower level, the objects of regulation are elementary processes with corresponding technological devices.

The task of the lower level of management is to stabilize the process modes, which are set manually by process operators.

In APCS the operation of the technological complex is monitored by numerous sensors-devices that change the parameters of the technological process (e.g., temperature and thickness of rolled sheet metal), they monitor the state of the equipment (turbine bearing temperature) or determine the composition of the original materials and the finished product. There can be from several tens to several thousands of such devices in one system.

The automation scheme for the development of an automated control system is a kind of integrated functional scheme of a technological control object, covering the so-called “field equipment” of the lower level of the system and showing its connections with devices, control computer equipment and control points of a higher level.

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ФОСФОР АНГИДРИДІН (P_2O_5) ӨНДІРУДІ ОҢТАЙЛЫ БАСҚАРУ ЖҮЙЕСІНІҢ ҮШ ДЕҢГЕЙЛІ ҚҰРЫЛЫМЫН ӘЗІРЛЕУ ӘДІСІ

Аңдатпа. Бұл мақалада фосфор ангидридін (P_2O_5) өндіруді басқарудың бұрыннан қолданылған тәсілі қарастырылады және осы процесті оңтайландыру үшін жаңа үш деңгейлі құрылым ұсынылады. Фосфор ангидридін ұтымды басқару тұжырымдамасының қалыпты жұмыс істеуі үшін оның жұмысы тозатын термометрдің бағдарламалық ансамблімен (ТП АБЖ – ғылыми-техникалық іс-шараларды басқарудың автоматтандырылған тұжырымдамасы) бірлесіп бекітілуі керек, өйткені орташа термометрдің мақсаттары үшін ПАКС тозатын термометрлерден жұмыс істейді, ал анықталған ұтымды қозғалыс жүйелері тозатын термометрлерді қолдаумен бірге жүзеге асырылады. басқару контроллері. Біздің басқару алгоритмдерімізді іске асыру үшін қажетті деректердің орташа дәрежесінің тиісті ішкі жүйелеріне кепілдік берілуі керек. Бұл жазбада басқарушы ішкі жүйені тағайындау үшін қажетті мәліметтер тізімі, оларды өңдеу әдістері, сондай-ақ басқарушы ішкі жүйенің бағдарламалық және аппараттық құралдарын ұсыну қарастырылады.

Тірек сөздер: фосфорлы ангидрид, зияткерлік технологиялар, оңтайлы басқару, процесс, нақты емес жүйе, тотығу, жану, сары фосфор.

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МЕТОД РАЗРАБОТКИ ТРЕХУРОВНЕВОЙ СТРУКТУРЫ СИСТЕМЫ ОПТИМАЛЬНОГО УПРАВЛЕНИЯ ПРОИЗВОДСТВОМ ФОСФОРНОГО АНГИДРИДА (P_2O_5)

Аннотация. В данной статье рассматривается уже используемый подход к управлению производством фосфорного ангидрида (P_2O_5) и предлагается новая трехуровневая структура для оптимизации данного процесса. С целью нормального функционирования концепции рационального управления фосфорным ангидридом, ее работа должна быть утверждена совместно с программным ансамблем носимого градусника (АСУ ТП – автоматизированная концепция управления научно-техническими мероприятиями), так как информация для целей посредственного градусника ПАКС оперирует с носимых градусников, а выявленные рациональные системы движения реализуются совместно с поддержкой носимых градусников. управляющих контроллеров. Для реализации наших алгоритмов управления должны быть гарантированы надлежащие подсистемы посредственной степени требуемых данных. В данной заметке рассматривается перечень данных, необходимых для назначения управляющей подсистемы, методы их обработки, а также представление программного и аппаратного обеспечения управляющей подсистемы.

Ключевые слова: фосфорный ангидрид, интеллектуальные технологии, оптимальное управление, процесс, нечеткие системы, окисление, горение, желтый фосфор.