The last equation can be used to calculate contaminant concentration in soil depending on time and contaminant concentration in air, as well as to determine background change of pollutant in the ecosystem using experimental data.

There are five different coefficients in the equation (5). They can be calculated using experimental data from five different years. National environmental monitoring system gives necessary data to use the equation (5) to simulate the critical load.

ECOLOGICAL ASPECTS OF RATIONAL USE OF RAW MATERIALS OF THE FACTORY "STROYFARFOR" JSC "KERAMIN"

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The factory "Stroyfarfor" JSC "Keramin" is specialized in the production of sanitary ceramic products. A significant part of the raw materials used in production are imported from outside the Republic: The Ukraine, Russia, etc. Waste water generated in the production, represent a multi-component, resistant to segmentation of the slurry, the treatment efficiency does not exceed 60 %, which allows the reuse. The formed sediment containing a significant amount of valuable raw materials is shipped and transported to landfills. Separate discharge and treatment of qualitatively different wastewater will reduce the share of waste to reduce the environmental tax for the disposal of precipitation in landfills, and therefore reduce the cost of production.

Keywords: plant "Stroyfarfor", clay materials, zircon concentrate, kaolin, slip, glazes, waste water, precipitation JSC "Keramin" unites three divisions: manufacture of ceramic tiles; the factory "Stroyfarfor"; Minsk ceramic factory.

The factory "Stroyfarfor" was organized in 1985 on the basis of pilot production of sanitary ceramic and by the end of the year produced 73 thousand sanitary ceramic ware – toilets, sinks, flushing cisterns. Currently the plant produces over 1,8 million products per year.

The main raw materials used in production are: raw materials are clay, alumina, kaolin, emaciated materials (sand, feldspar, pegmatite, and gypsum), zircon, nepheline and datolite concentrates, dyes, other chemical products and ancillary materials. A significant part of the raw materials used in the manufacture of products and imported from outside the Republic of Belarus, does not contain refractory clays, feldspars and kaolins. In the total volume of purchased raw material resources, the share of the Ukraine accounted for over 60 %, Russia – more than 30 % and 5 % – Belarusian raw materials. Imports are purchased for a small share of high-quality dyes and auxiliary materials. Thus, the main supply of high-quality clay, kaolin, zircon concentrate (used in production of glazes and enamels, providing product desired thermal and chemical resistance, abrasion resistance and gloss) are made from oil fields in the Ukraine.

For the production of sanitary ceramics two kinds of technology are used: with the use of plaster molds and machines for pressure casting in polymer form. Mechanized stands casting in plaster molds is the traditional equipment for the production of sanitary ceramics. Automated test benches pressure casting in polymer form (Italian SACMI equipment) installed in 2009 are the latest achievement in the production of sanitary ware, which allows to reduce the production time significantly and to improve the quality of the product. In addition, the company has introduced automatic glazing installation robot spraying (manufactured by SACMI). This equipment allows to cover the entire surface with the glaze evenly and ensures the high whiteness of products.

JSC "Keramin" pays great attention not only to the introduction of new innovative technologies, but also to the protection of the environment. There is the reverse system of water supply and sewage water. With the exception of the wastewater of "Stroyfarfor", the cleaning efficiency does not exceed 60 %, which allows it to be reused. Wastewater represent a multi-component, resistant to segmentation of a suspension. It contains particles of quartz sand with a size of 50–100 microns, the particles of kaolin with a size of about 10 microns, and colloidal suspended matter, which represents the remains of a Frit with a particle size of less than 0,1 microns. The sediment containing a significant amount of valuable raw materials is shipped and transported to landfills.

The technological process of production of sanitary products can be divided into the following stages: preparation of the slip, glaze preparation, casting on the mechanized stands, injection moulding, enrobing products and their firing. It is possible to distinguish three types of wastewater of fundamentally different composition. The first is wastewater generated after washing of the mixer for the preparation of the slip and mechanized forms that contain relatively inexpensive components. The second wastewater is generated after washing of the mixer for preparation

of glazes and glazing installations containing the remains of the most expensive raw materials. The third is the wastewater from automated booths molding, composed of detergents containing chlorides and phosphates. All three types of wastewater are currently mixed at the enterprise, which greatly complicates their composition, and, consequently, the ability to clean and reuse the wastewater, and precipitation.

Thus, a separate diversion of qualitatively different waste waters, their monitoring, and analysis of oxide composition of precipitation will allow to offer optimal technology for reagent-free precipitates with the subsequent return into production. These activities will reduce the share of waste to reduce the environmental tax for the disposal of precipitation in landfills, and therefore reduce the cost of production.

ISOLATION AND PHYSICO-CHEMICAL CHARACTERISTICS OF EXTRACELLULAR LACCASE FROM THE FUNGUS GANODERMA LUCIDUM

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The object of the study was enzyme laccase from the basidiomycete Ganoderma lucidum. The purpose of this study was to develop a method for obtaining highly active and stable intracellular laccase from the mycelium of Ganoderma lucidum. It is shown that intracellular laccase from the mycelium of Ganoderma lucidum is a highly active and stable enzyme and can find wide practical application.

Keywords: biocatalytic technologies, remediation, laccase, phenol-containing xenobiotics, basidiomycete Ganoderma lucidum.

In connection with the growing technogenic burden on the environment, the use of biocatalytic technologies in industry and the remediation of contaminated natural resources, such as water and soil, has become increasingly important in recent times, because of their environmental safety [1]. Promising techniques of environmental remediation include "enzymatic purification", based on the use of natural enzymes (lipases, xylanases, oxidoreductases) to activate the processes of irreversible degradation of various pollutants [1].

Laccases (p-diphenol: oxygen oxidoreductase, EC 1.10.3.2) can oxidize a wide range of phenol-containing xenobiotics and catalyze the reduction of molecular oxygen to water, bypassing the stage of hydrogen peroxide formation [2].

The urgent task of modern ecobiotechnology is to search the new sources of highly active and stable forms of laccase, study the properties of these enzymes and develop methods for their effective use.

In this study, intracellular laccase from the mycelium of deep cultivation of Basidiomycete *Ganoderma lucidum* was isolated and characterized.

The purpose of this study was to develop a method for obtaining highly active and stable intracellular laccase from the mycelium of *Ganoderma lucidum*. The method is based on monitoring of the growth of mycelium and enzymatic activity of laccase, as well as on comparing the catalytic characteristics of intracellular and extracellular phenoloxidases of this fungus.

The mycelial growth was monitored from the second to the tenth day. The activity of intracellular and extracellular oxidoreductase was determined spectrophotometrically, by oxidation of the specific substrate of ABTS. Catalytic properties (Km, optimal pH and temperature, inhibitors effect) were determined with various mono- and di-phenolic compounds. All the values obtained for laccase were recalculated per 1 gram of dry mycelium and compared.

As a result of the study, the optimal time for cultivation of the mycelium of the mushroom *Ganoderma lucidum* was established for obtaining intracellular laccase – 7 days. It is shown that intracellular laccase has a high enzymatic activity to the phenol-containing substrate, similar to the activity of extracellular laccase from *Ganoderma lucidum*. For the isolated enzymes, the kinetic parameters of oxidation reactions of phenolic compounds, the optimum pH of laccase activity, the effect of temperature on the enzymatic activity, and the sensitivity of the isolated enzymes to a number of inhibitors were compared. It is shown that intracellular laccase from the mycelium of *Ganoderma lucidum* is a highly active and stable enzyme and can find wide practical application.

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