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Analysis Of Improved Methods For Determining Last Generations Of Pesticides In Water Water

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Abstract

As a result of the treatment of crops with pesticides, groundwater and surface water bodies are quickly polluted. This article discusses methods for treating wastewater that is generated when pesticides are applied to crops and orchards. It is noted that chlorinated benzene is used in the production of pesticides, fungicides and deodorants all over the world. Chlorinated benzene is considered one of the strongest and most toxic. The article explores the combined use of ultrafiltration, nanofiltration and reverse osmosis methods for wastewater contaminated with pesticides. It is recommended to use nanophotocatalysts to protect the environment. The effect of pesticides on groundwater and surface water bodies after their use in agricultural crops in the regions of Uzbekistan has been studied.

Keywords: groundwater, water pollution, polyethylene, pollution index, pathogenic microflora, ultrafiltration, nanofiltration.

Introduction

Currently, the treatment of crops with pesticides is carried out at a rapid pace, and pollution of groundwater and groundwater is one of the most pressing problems.

One of the most global challenges of our century is preventing water pollution. In almost all rural areas of the country, wastewater is absorbed by groundwater without additional treatment. This leads to groundwater pollution.

Currently, much attention is paid to the prevention of water pollution. Domestic waste water is treated at certain facilities and discharged into water bodies. At the same time, water bodies are polluted to a certain extent. This is evidenced by the fact that in recent years our government has adopted a number of decisions, which are mainly aimed at improving the sanitary state of water bodies [1]. Below we will look at an analysis of the latest generation of pesticide removal best practices from wastewater.

Track membrane filters can be used to improve the quality of drinking water, reduce the concentration of radionuclides in it, and reduce the content of heavy metals, pesticides and pathogenic microbes. [2] Purified water from this filter traps and retains trace elements useful for the human body. The filter consists of two track membranes and three types of polyamide, held together by polyethylene films. Purified water is produced from polyvinyl chloride pipes with a diameter of 5 mm and a length of 1.5 m.

[3] Methods of purification of natural and waste waters from various toxic compounds are considered in the literature. Dispersed and emulsion mixtures, electromagnetic pulmonary (electroclimatic), electromagnetic pulmonary (electromagnetic) electrochemical substances, if electrons are soluble (humic, hydrofluoric acids, dyes, surfactants) and ions, are influenced by aluminum and iron hydroxides. Dissolution of soluble organic molecules, pesticides and herbicides by electrochemical treatment followed by adsorption of activated carbon gives the desired results.

[4] The literature states that butachlor and ronstar are the most common herbicides. Due to their high strength, they have a high water pollution index. Photodegradation is one of the simplest and most cost-effective ways to remove pesticides from the environment. Photosensitizers are used to separate pesticides from wastewater by absorbing light energy. [4] Diethylamine has been used in the literature as a photosensitizer. The purification of river water samples has been studied. Gas chromatography was used to determine the amount of pesticide in the water. Irradiation was carried out on a sunny day for 0, 8, 16, 32, 64 hours. As the exposure time increased, the concentration of both herbicides in the water began to decrease. Determined the rate of purification and half-life of butachlor and ronstar in filtered and unfiltered water. The decrease in butachlor and ronstar increased by 3.1 and 3.2 times, respectively, when diethylamine was mixed. It was found that the decrease in the half-life of butachlor and ronstar in unfiltered water is associated with the action of photosensitizers.

[5] 4-Chloro-tolyloxide-propynic acid used in the literature is widely used in agriculture. 4-Chlorine Tolyloxide differs from other pesticides by its high potency, toxicity and biodegradability. 4-Chloro-tolyloxide propynic acid enters and pollutes surface or underground water sources. In a photocatalytic process in the laboratory, the violation of the structure of 4-chloro-tolyloxypropic acid was investigated. A medium-pressure mercury lamp was obtained as a source of ultraviolet radiation. Powdered titanium dioxide was prepared as a 345 nm catalyst in a mercury lamp. The process was carried out in a stream of oxygen. It has been shown that the most effective wastewater treatment is the complete destruction of propynic acid 4-chloro-tolyloxide.

[6] The literature suggests that groundwater sources in industrialized regions are polluted by various pollutants and pathogenic microflora. In this case, the use of three-stage filtration is the most convenient method of water purification: ultrafiltration; nanofiltration; reverse osmosis. Ultrafiltration removes colloidal particles, microorganisms and viruses from water. Nanofiltration removes pesticides and softens water. In reverse osmosis, the salts are separated and deionization occurs.

[7] In the literature studied the electrochemical synthesis of an aqueous solution of sulfuric acid with a concentration of 40-96 percent. In the case of sulfuric acid treatment with pesticides, we pass the liquid through a constant electric current (current density 1 A / cm2). In an aqueous solution of sulfuric acid, pesticides can be produced as suspensions or emulsions. In this environment, all organic components are destroyed. The process is carried out at an ambient temperature of at least 50 degrees. At ambient temperatures below 50 degrees Celsius, pyroxide compounds can form during the oxidation of pesticides. This leads to secondary water pollution. The process is carried out at a pressure not exceeding atmospheric pressure. In this method, all organic substances are oxidized, that is, they are adsorbed on the cathode surface in the form of a sulfuric acid solution or in the form of a suspension.

[8] The literature states that benzene chloride is used in the production of pesticides, fungicides and deodorants around the world. Chlorinated benzene is one of the strongest and most toxic. The process of changing the structure of hexachlorobenzene in a model anaerobic reactor was studied experimentally in the laboratory. In this process, the hydrogen index was 7, the temperature of the active substance was 30 degrees, and the biomass concentration was 2.68 g / l. The amount of hexachlorobenzene in the test water was 2-50 mg / L, the maximum rate of dechlorination of hexachlorobenzene was 0.30 mg / L per day.

[9] The literature on the treatment of wastewater from pesticides in gardens was reviewed. Wastewater treatment was carried out in a multistage mode. First, water is poured into a cylindrical container using a mixer. The required amount of flocculant is added to this container and the resulting mixture is filtered. Many types of fabrics are used as filter media. The amount of dry matter in the concentrate should not exceed

50%. At the next stage, the mixture is quenched and sorbed using activated carbon. Sorption

Implemented in 3 stages.

[10] The literature deals with the treatment of sediments formed after wastewater treatment. Sediment can contain a large amount of pesticides, halogenated hydrocarbons and toxic chemicals. A method for treating such deposits with pesticides using iron and sulfur compounds is proposed. Iron sulfide was used in the experiment. The iron content in iron sulfide is 3.7-14%. In the experiment, the content of tetrachlorethylene in the sediment was 50 mg / l, the purification effect was 98%.

[11] The literature discusses the combined use of ultrafiltration, nanofiltration and negative osmosis. These processes are called baromembrane wastewater treatment processes. Ultrafiltration is used to remove bacteria and viruses, while nanofiltration purifies up to 95% of soluble organic matter. Thus, pesticides, nitrates, halogen compounds, mutagenic heavy metals and other highly toxic compounds are purified. Reverse osmosis can be used to desalinate water, change the salt content of water, and obtain the purest water possible. This is how the Rucheek membrane structure works. The installation consists of a stage of preliminary purification, membrane separation and filtration of low molecular weight organic substances using a carbon filter. Secondary biological contamination is sterilized using an ultrafiltration device.

[12] A standard method for purifying drinking water has been studied in the literature. It is proposed to standardize the following methods: filtration - in this process, pesticides are captured using activated carbon; iron, manganese and sludge are retained by the sand filter; colloidal substances using a membrane filter, bacteria, viruses, nitrates and sulfates using a nanofilter; dissolved salts are retained by reverse osmosis. It has been shown that this modular system can be developed in a wide range.

“Silcarbon Aktivkohle GmbH” [13] is one of the largest activated carbon mining companies in Europe. The company suggested using traditional coconut oil with activated carbon as an adsorber. This adsorbent material cleanses the body of water-soluble organic substances (phenols, pesticides, herbicides), eliminates the need for water and improves its supply.

[14] In the literature, water-based pesticides - atrazine and thymazine at concentrations of -5 mg / L were developed in accordance with the drinking water preparation process, for which four types of membrane ultrasound are used. Experiments have shown ways to remove pesticides from filtered water, drinking water and river water. Atrazine-95% and Semazine-85% in the membranes of the first and third circle, respectively. However, the rate of transmembrane excitation did not decrease. Oxygen consumption in river water increased by 85%.

[15] The literature discusses the use of activated carbon and other methods of preparing fresh water for living rooms, swimming pools and aquariums. Silver activated activated carbon was used to kill bacteria.

[16] In the literature, it is recommended to use nanophotocatalysts to protect the environment. The mechanism of photocatalytic decomposition of pollutants on the catalyst surface has been studied. Photocatalytic methods of industrial effluent purification from oil products, pesticides, paper and paints have been studied. The use of photocatalytic methods for purification of drinking water and atmospheric air is considered. There are reports of the use of photocatalytic disinfectants and UV absorbers as self-cleaning coatings. It has been shown that the use of nanotechnology along with traditional methods is one of the most advanced methods of our time.

In [17] recommended the use of ultrafiltration and evaporation techniques to remove pesticides from water. Strong organic matter is destroyed by electrolysis. In the process, hydroxyl radicals with high activity are formed in front of the electrode. The destruction process is carried out with the help of hydroxyl radicals. Wastewater treatment is carried out continuously after filling the tank. When the container is full, the sensor beeps and the device starts up.

In [18] came to the conclusion that the deep photochemical process of organochlorine pesticides, in addition to direct exposure to ultraviolet radiation, leads to the formation of a complex, ie, an oxidizing oxidant, which is included in ultraviolet radiation and from the outside. When using this method, the specific energy consumption can be reduced to 0.3-0.9 kWh / m3. This increases the competitiveness of the proposed method. This method can be used for deep purification of chemically contaminated waste water, natural waters, as well as for purification of biologically treated water from organochlorine compounds, phenol and oil products.

In [19] developed a method for the treatment of xenobiotics. Wastewater, which belongs to the xenobiotic group, is not biodegradable and highly toxic. It has been proven in the laboratory that these compounds can be destroyed by photocatalytic processes. The pesticide paraquat has been developed as a model pesticide. The module is located inside the reactor vessel. Titanium dioxide (catalyst) as a source of ultraviolet radiation and a protective coating applied in the form of a film with a thickness of 35.5-118 nm. The pesticide of the module is destroyed by 99% if it is in the reactor for 12 hours. When using a catalyst, the destruction of the pesticide does not exceed 50%.

Lindane is a pesticide and is widely distributed in urban and industrial wastewater [20]. Lindane's chemical name is gamma-chlorocyclohexane. The pilot tested various doses of wastewater containing lindane. According to the results of laboratory studies, 67-90% of flax seeds are removed in the first sorbents. In this case, the destruction of the sorbate was 4-26%. In an active country, only 0.1-2.8% of linden is concentrated. This means that up to 61% of lindane can be recovered from wastewater during biodegradation.

In [21] studied the use of membrane bioreactors in urban wastewater treatment plants. Heavy metals, pesticides and endocrine-active compounds can be highly purified using membrane bioreactors. During the operation, the following problems arose:

- when the amount of water in the office reaches the maximum level, the structure does not have time to process;

- economically impractical with high energy consumption.

An additional system has been proven to eliminate the indicated drawbacks, namely, the possibility of obtaining the necessary indicators in combination with a membrane filter with a transmembrane and a pressure gauge.

In [22] discusses the problem of separating organochlorine compounds from drinking water. Dissolved organic matter is rare in groundwater sources, but pesticides, heavy metals, surfactants, and petroleum products are widespread in surface water sources. The most convenient way to purify this waste is to organize the sorption process using activated carbon. Dioxin is the most dangerous for human health. Dioxins are formed during the disinfection of drinking water with chlorine. In addition, dioxins are present in large quantities in polyaromatic and polychlorinated compounds. It is recommended to use chlorine-free alternative methods of disinfection of drinking water and fill the drinking water treatment plant with sorption filters.

In [23] studied the use of large amounts of pesticides in agriculture and, as a consequence, the release of pesticides into drinking water sources. The sorption method is recognized as the most effective method for purifying drinking water from pesticides, but due to the high cost of commercially available sorbents, it is not economically feasible when treating large volumes of drinking water. Therefore, it is recommended to use old car tires as a cheap sorbent. The size of the rubber parts is 0.15-0.3 mm, the surface area is 0.45-0.78 m2, the thickness is 0.12-0.14. For the experiment, 2,4-dichlorophenoxyacetic acid and an atrazine concentration of 4 mg / l were obtained. The kinetics of the first and second herbicides in the sorption process coincided. After 180 minutes, the average herbicide concentration was 1.0 mg / L.

In [24] it was reported that endocrine substances enter the human body through drinking water, disrupting the work of the hormonal system. Pesticides, industrial chemicals and natural endocrine compounds form the basis of endocrine substances.

Sources of drinking water are the result of irrigation of endocrine crops and agricultural fields. The study used 4 nonylphenol, beta-extradiol, estrone, estriol, 17 alpha-ethinylestradiol, and progesterone. The effect of hypochlorite on the oxidation of these organic substances in the form of oxidants has been studied. The maximum destruction of endocrine substances is sodium at a pH of 8.5. It is reported that all endocrine substances, except for progesterone, are destroyed.

[25] Artesian water with a high arsenic content has been studied in the literature. The concentration of arsenic in groundwater was 187 mg / l. According to the World Health Organization, the amount of arsenic in water should not exceed 10 mg / L. In addition, the presence in groundwater of such pesticides as dichlorphos, atrazine, diazinon was studied. The laboratory studied methods for purifying groundwater from the above pesticides using a membrane nanofilter and reverse osmosis. The filtration process was carried out at a pressure of 6.8 and 10 bar, 300 mg / l of arsenic and 2-4 mg / l of pesticides. Transmembrane flow 58-99 l / m2. 83.1-89.1% of arsenic and 40.7-39.3% of pesticides were extracted from groundwater by this method.

[26] The literature investigates the increase in the amount of pesticides in the

drinking water source and how they are treated when a drinking water treatment plant is built in a region where a large livestock company is located. In addition, the region has sanatoriums that can accommodate hundreds of thousands of people, and irrigation is widely developed. As a result, pesticides, nitrates and biological waste were dumped into the river, which is the source of drinking water. The station was reconstructed in order to improve the technology of drinking water purification. Additional powdered activated carbon and an ultrafiltration process are included. As a result, microorganisms, viruses and bacteria with a size of more than 0.01 microns were found. In the winter season, the water treatment plant has a capacity of 2,000 m3 / day and 8,000-18,000 m3 / day at its own time of the year, which is very popular with tourists.

Methods for producing guanide-polyhexamethylguanide in industry [27] have been studied in the literature. The main practical feature of guanide-polyhexamethylguanide is that this substance has a wide spectrum of biological activity, low harmful properties, is completely soluble in water, does not have biodegradation, corrosivity, color and odor. The polymer and its aqueous solution can be stored naturally. guanide-polyhexamethylguanide has the property of separating organic and inorganic water-soluble substances - pesticides, heavy metals, radioactive substances. guanide-polyhexamethylguanide has the property of a cationic flocculant, so it flocculates particles effectively.

[28] The sorption process of separating pesticides from drinking water is studied in the literature. Natural sorbent-mineral saponite and mineral bedillite mineral saponite were used to purify drinking water from pesticides. Mineral saponite is a substance rich in cation exchange resins of potassium, cesium, sodium and calcium. Atrazine, simazine, metribucin were chosen as model herbicides.

[29] The literature examines the use of dichlorvos in the cultivation of corn and its entry into natural water sources. dichlorvos is distinguished by its strength and toxicity. The destruction of dichlorophos in the photocatalytic process has been studied in the laboratory. In addition to dichlorvos, orthophosphate was added to the test water and added to the aerated reactor. A UV irradiator was installed in the middle of the reactor. TiO2 was added to the water in an amount of 6.06 · 10-5 g / l, wavelength 360-380 nm, pH = 4.0. It turns out that the destruction of dichlorvos is carried out in several stages. Monomethyl phosphate was formed as an intermediate. From this it was concluded that the method was effective.

Surface water sources are often contaminated with water-soluble pesticides [30]. The process of photocatalytic production of electricity using solar energy for the treatment of pesticides in natural water sources has been studied. The reactor has a capacity of 75 liters and a parabolic game throughout its volume. In the reactor, 200 mg / L of fenton reagent and TiO2 catalyst were mixed. Added five types of pesticides - 50 mg / l. At the end of the experiment, they turned out to be completely mineralized.

[31] The literature describes the process of purification of organic substances using a horizontal biofilter. The horizontal biofilter is filled with gravel. With the help of a horizontal biofilter, pesticides, phenols, organophosphorus and organochlorine compounds can be separated from the water. Lindane, pentachlorophenol, endosulfate and pentachlorobenzene were added to the first group. The destruction efficiency was 90%. In the second group, allachlor and chlorpyrifos were added. The effectiveness of the defeat was 80-90%. Mecoprop and simazine were added to the third group. The destruction efficiency was 20%. In the fourth group, clofibrin and diuron were isolated in very small amounts.

[32] The technology of extracting organophosphate pesticides from wastewater using sorbents from food industry residues has been studied in the literature.

Chlorpyrifos, propenfos, methylparathion and malathion were used as pesticides. Coconut shells, rice husks and peat were used as sorbents. The content of organic carbon in the sorbent is 35.4-45.4%. The pH of the aquifer ranges from 3 to 7. In the experiment, the sorbent was placed in a column. The best results were obtained using coconut shells.

[33] In the literature, the process of industrial wastewater treatment with the pesticide deltamethrin (DM) has been studied. A two-stage cleaning procedure was carried out using a laboratory method. At the first stage, highly oxidizing ozone was used, and at the second stage, a biological treatment method. At the first stage, up to 90% of ozone-ultrabine radiation was achieved, and at the second stage, 95% of ozone-ultrabine radiation and biological treatment were achieved.

Pesticide bushes are most commonly used to disinfect crops [34]. Butachlor is not biodegradable and there is a high risk of penetration into surface and groundwater sources through soil penetration. The laboratory studied the method of butachlor extraction by the photocatalytic method. TiO2 was used as a catalyst. The solution was passed under ultraviolet light and treated with hydrogen peroxide.

The amount of pesticides produced after industrial wastewater treatment and irrigation of crops, the allowable amount in groundwater basins can be seen in the table below.

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Indicators	Norm (ПДК)	Results
1.The number of bacteria of the Escherichia coli group (BGKP), in 1 liter	1000	1200
2.Number of pathogenic enterobacteriaceae, in 1 liter	Отс.	н/о
3. Suspended substances, mg / l	1,5	7,5
4.Hydrogen index (pH)	6-9	7,4
5.Dry residue, mg / l	1000	1560
6.Ammonium nitrogen (NH4 +), mg / l	1,5	6,1
7.Nitrate nitrogen (NO3), mg / l	45	92
8.Nitrite nitrogen (NO2-), mg / l	3	5,5
9.Total hardness, mg-eq / l	7	9,3
10.Sulfates (SO4), mg / l	400	930
11. Chlorides (Cl), mg / l	250	395
12. BOD full. , mg O2 / l	3,0	15,9
13.Manganese (Mn), mg / l	0,1	0,46
14.Copper (Cu), mg / l	1,0	2,2
15. Iron (Fe), mg / l	0,3	1,5
16.Zinc (Zn), mg / l	3,0	13,9
17. COD, mg O2 / l	15,0	75,0
18.Phosphates, mg / l	1,1	4,7
19.Aluminum (Al), mg / l	0,2	0,9
20.Cadmium (Cd), mg / l	0,001	0,005
21. Nickel (Ni), mg / l	0,1	0,29
22. Mercury (Hg), mg / l	0,0005	0,0009
23. Lead (Pb), mg / l	0,03	0,15
24. Chromium (Cr), mg / l	0,05	0,25
25. Butachlor, mg / l	0,04	0,1
26. Organochlorine birikmalar, mg / l	0,5	1,1
27. Dioxin, mg / l	0,3	0,6
28. Phosphorus compounds, mg / l.	0,3	0,7
29. Phenol, mg / l	0,06	0,1
30. Pesticides, mg / l	2,8	4,1

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