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USING SOCIOGEN AND TECHNOGEN FACTORS IN AN ECOLOGICAL SAFETY AT THE REGIONAL LEVEL

Monitoring of ecological danger is executed in a region with the intensive loading. Established the most important factors in the formation of ecological danger and their sources. A technical decisions about the management of ecological safety in the zone of oil transportation industry and sources of man-made earthquakes. Introduced information technology for implementing sociogen factors of ecological safety management.

Keywords: ecological danger, ecological safety, technogen and sociogen factors, management, man-made earthquakes, sorbents

Харламова О. В. ВИКОРИСТАННЯ СОЦІОГЕННИХ ТА ТЕХНОГЕННИХ ЧИННИКІВ В ЕКОЛОГІЧНІЙ БЕЗПЕЦІ РЕГІОНАЛЬНОГО РІВНЯ

Виконано моніторинг екологічної небезпеки у регіоні з інтенсивним навантаженням. Встановлено найбільш суттєві чинники формування екологічної небезпеки та її джерела. Розроблено технічні рішення стосовно управління екологічною безпекою в зоні впливу нафтотранспортного комплексу та джерел техногенних землетрусів. Впроваджено інформаційні технології для реалізації соціогенних чинників управління екологічною безпекою.

Ключові слова: екологічна небезпека, екологічна безпека, техногенні та соціогенні чинники, управління, техногенні землетруси, сорбенти

Харламова Е. В. ИСПОЛЬЗОВАНИЕ СОЦИОГЕННЫХ И ТЕХНОГЕННЫХ ФАКТОРОВ В ЭКОЛОГИЧЕСКОЙ БЕЗОПАСНОСТИ РЕГИОНАЛЬНОГО УРОВНЯ

Выполнен мониторинг экологической опасности в регионе с интенсивной нагрузкой. Установлены наиболее существенные факторы формирования экологической опасности и ее источники. Разработаны технические решения относительно управления экологической безопасностью в зоне влияния нефтетранспортного комплекса и источников техногенных землетрясений. Внедрены информационные технологии для реализации социогенных факторов управления экологической безопасностью.

Ключевые слова: экологическая опасность, экологическая безопасность, техногенные и социогенные факторы, управление, техногенные землетрясения, сорбенты

Introduction

Problem statement. In some regions, an excessive concentration of technogen load, which in turn leads to the complications of relationships between socio-economic sphere and the environment and determines the presence of characteristic classes, species and subspecies of danger. [1] This determines the feasibility of a regional approach to the analysis of ecological safety problems [2]. But in the current research does not always take into account factors that affect the security situation.

In order to develop an effective system of ecological safety, there is an urgent need for monitoring of ecological danger analysis of specific dangerous factors in order to identify regionally significant components of the danger and its sources.

Contamination of environmental components dangerous chemicals is an important factor in shaping ecological danger for almost all regions of Ukraine [3]. In this case, for treatment of pollutants along with other widely used adsorption and absorption methods [4]. But most of it used for today sorbents is expensive, complex technology and regeneration [5]. The creation of new effective sorbents involving waste production and practical use in adsorption purification technology components from contamination of the environment is one of the priorities of the technical environmental safety.

Thus the creation of complex technical decisions technogen and sociogen factors of management of ecological security in the region is an important area of research.

Formulation of goals and tasks of the article. The purpose of the study is to develop a set of management measures for regional ecological safety significant components of ecological danger.

To achieve this goal in the work dealt with the following objectives:

- Setting an example of concrete technologically laden region real state of ecological danger formed sociogen factors, determine the results of experimental studies of the most influential factors of ecological safety management ;

- Development of effective sorbents based on residues from agriculture and introducing them to contaminated wastewater;

- Carrying out on the basis of technical and technological trends in the management of regional ecological safety research to develop specific technical solutions to reduce the environmental impact of sources of environmental danger.

Material research and discussion

We proved that the scientific basis must create an effective system of ecological safety is to identify and study factors shaping of ecological danger [6].

How landfill of experimental studies we selected Kremenchug socio-economic zone (KSEZ) - a region of intense technological activity, where there is a neighborhood danger of different origins, unfavorable positioning of sources, lack of environmental awareness of the population (Table 1).

Table 1

Manifestations of of ecological danger in the study region.

Effects of ecological manifestations danger	Location manifestations of danger	Main factors
1. Significant deterioration of groundwater quality	The northern and southern outskirts of the city of Kremenchug	Migration of pollutants in subsurface horizons of waste placement
2. Damage to structures for various purposes	Residential and industrial buildings	Man-made earthquakes
3. Contamination of the water basin harmful substances	Surface waters	Industrial and household and domestic waste
4. Contamination of environmental components	Residential areas and industrial zones	Low level of environmental awareness

For example, the collection of municipal solid waste (MSW) in KSEZ found insufficient environmental awareness (subspecies dangers emerging spiritual and cultural factors [7]) - expressed a desire to sort waste only 29% of the sample population. As a result of our proposed information campaign significantly increased environmental awareness - interest in the separate collection of waste by 87% of recipients. The third round of the survey (after the implementation of the waste management) showed that 82% of real-sorted waste and place them in the appropriate containers. Conducting the experiment results have confirmed the validity of a particular subspecies sociogen factors in the management of environmental safety.

In KSEZ major sources of ecological danger on flushing-curing station that is designed to prepare the tank before filling oil surrounding fluids are technological ponds where solid bottom sediments (SBS). Biotechnology disposal SBS based on the ability of microorganisms mineralize petroleum hydrocarbons by means of enzyme systems under aerobic conditions and includes several steps (Fig. 1). As a result of the proposed technical solution eliminated the source of ecological danger.

As part of monitoring the state of ecological dangers of technogen earthquakes (TE) revealed residents' complaints for violations of health, fixed cracks in the walls of buildings, by instrumental measurement parameters seismic vibrations soil and structural elements of buildings. Summary results of experimental studies are presented in Figure 2. Installed size impact zones (300, 25, 7, and 15 m) for various types of TE.

To check the uniformity and reliability of experimental data, the statistical analysis. Calculated maximum value τ - Student criterion (0.08) is much smaller than the critical (1.67). Thus, the hypothesis of the analyzed

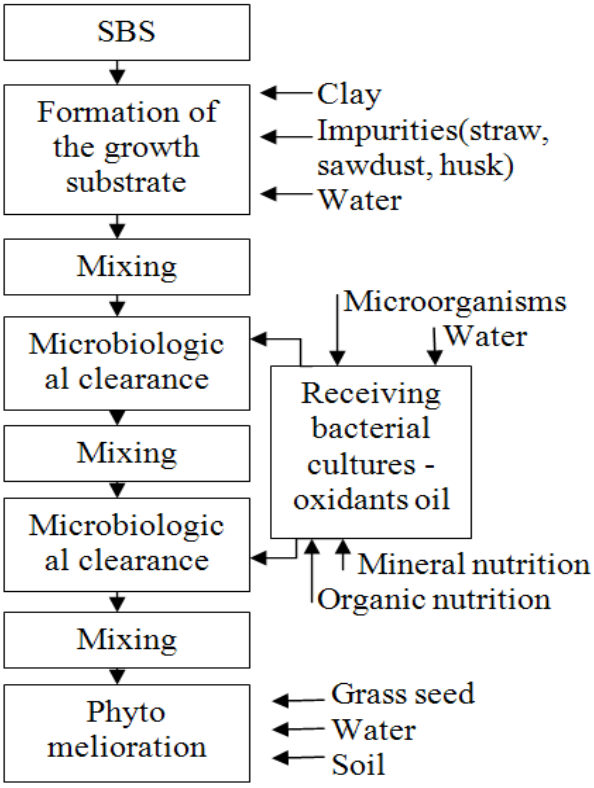

Figure 1 – Process of manufacturing operations solid bottom sediments disposal.

variant belonging to the sample confirmed and sample data are considered homogeneous probability level of 0.95. Reliability of the data is tested using the method for straight diagrams.

As technical management measures proposed ecological safety: speed limits and weight of vehicles, increasing the damping seismic waves - arrangement seismic safety trenches, planting trees with developed root systems. Established that as a result of the above measures seismic vibrations intensity decreases by 1.3 - 1.7 times.

A method of producing a sorbent using buckwheat husks modified as a result of joint grinding and mechanical activation. Investigations purification process fat-containing wash water obtained sorbent revealed that at 15 minutes, there is adsorption fat level 91% (Fig. 2a), the efficiency of wastewater from oil process (Fig. 2b) is 99.95%. We investigated the possibility of using a sorbent for adsorption of ions of iron and zinc (Fig. 3). It was established that the maximum removal of these ions is achieved at pH = 9. Figure 5 presents the adsorption isotherm of the above process. These data experimentally tested for representativity.

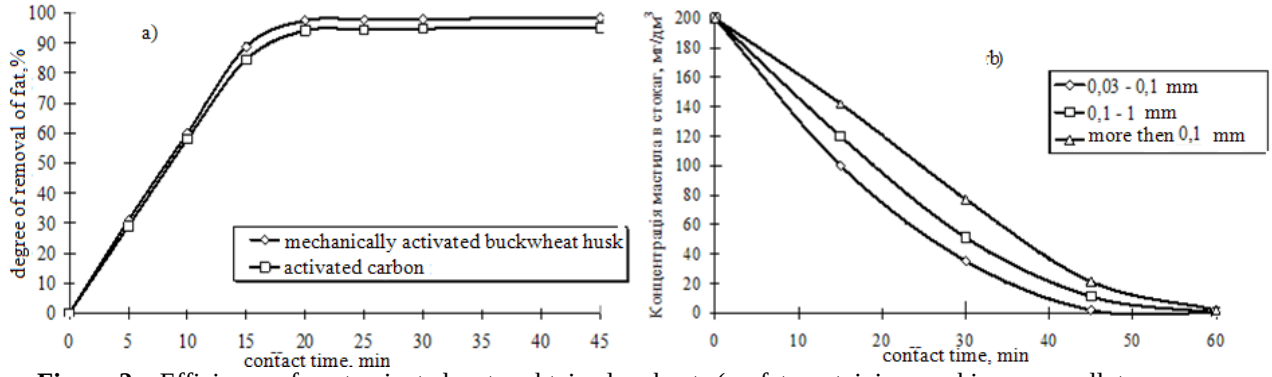

Figure 2 – Efficiency of contaminated water obtained sorbents (a - fat-containing washings, - a polluter - manufacturing, oil)

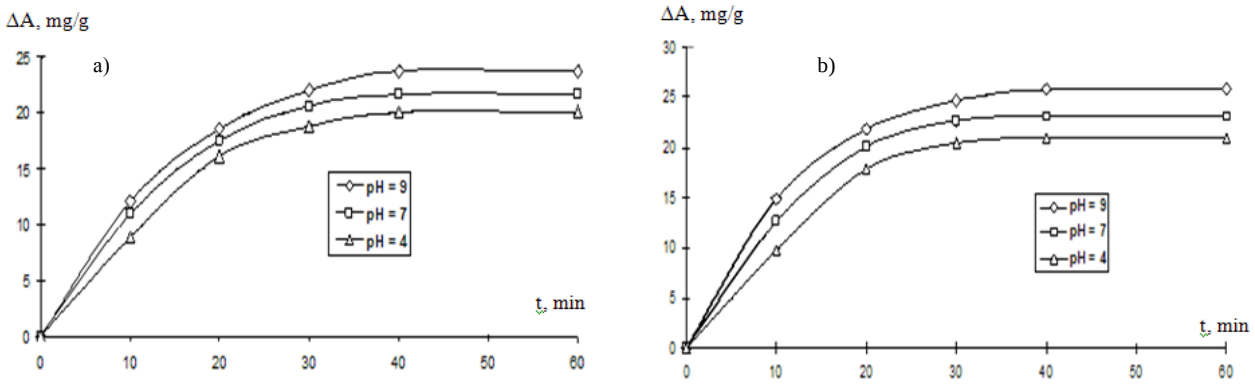

Figure 3 – Dependence of the degree of saturation of the sorbent iron ions (a) and zinc (b) from time to time at different pH values

Conclusions and recommendations for further research

1. The features of the formation of ecological danger as a result of regionally significant factors for its occurrence. In particular region revealed prevailing types of sources of danger.

2. Experimental study of the effect sociogen factors on the state ecological danger on case of collection of solid waste. Developed by IT, the implementation of which gave an opportunity to raise the ecological awareness of the population, resulting in reduced strain on overcrowded landfills for waste disposal, reduced human impact on people and the environment.

3. A technical management solution ecological safety based on technogen factors:

- In the zone of oil transport complex - disposal of solid sediment, which is based on the use of natural processes of self-purification, intensified technical and technological methods, it provided an opportunity to eliminate sources of ecological danger;

- In zones technogenic earthquakes - speed limits and weight of vehicles; provide attenuation of seismic waves through the improvement of seismic protective trenches and planting trees with developed root systems, resulting seismic intensity fluctuations decreased to 1.3 - 1.7 times.

4. Using the method of mechanical activation improved method of producing sorbents based on residues from agriculture (prepared solution of Patent of Ukraine for useful model). Experimentally confirmed that the developed sorbents effectively purify wastewater from fat, oil and heavy metals. Their application allows to recycle waste agriculture and reduce revenues to environmental pollutants.

5. In further studies, we plan to carry out pilot scale implementation of the developed system of ecological safety.

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