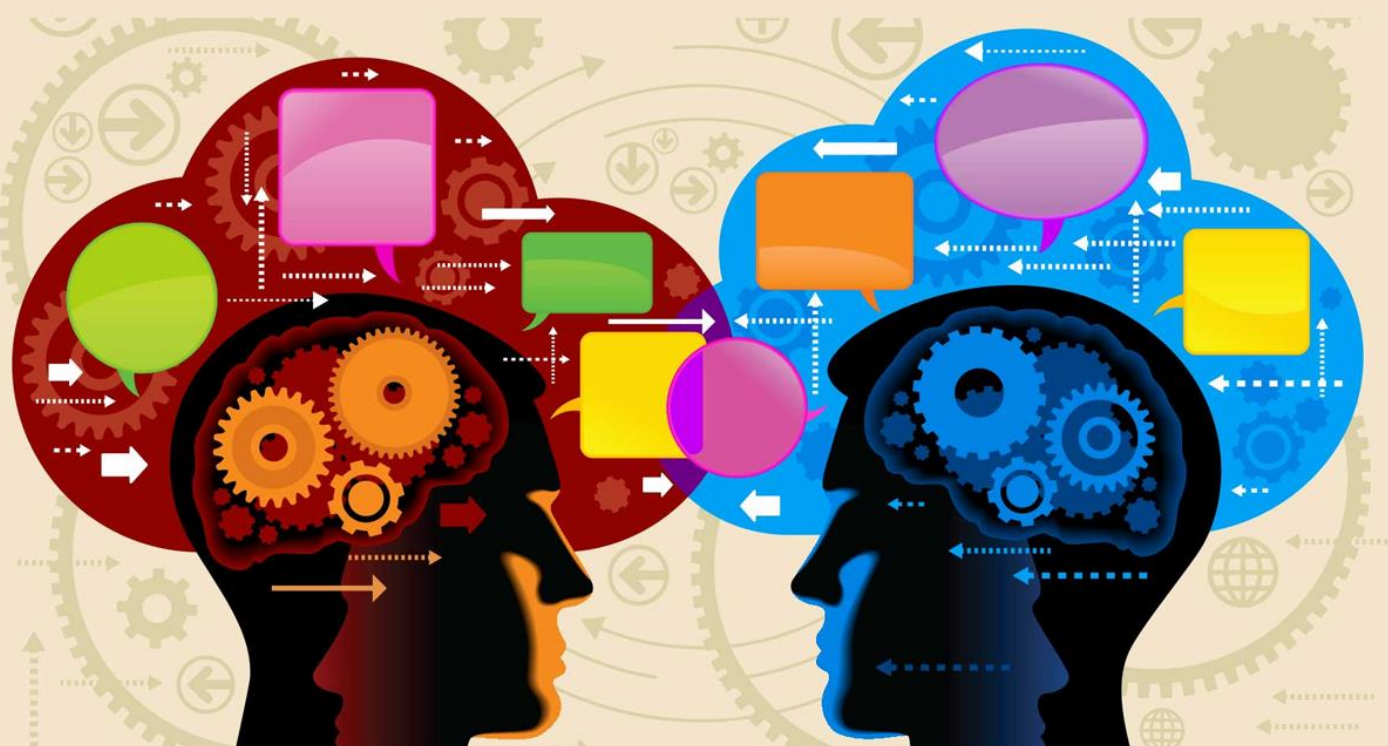


**SCI-CONF.COM.UA**

# **SCIENCE, SOCIETY, EDUCATION: TOPICAL ISSUES AND DEVELOPMENT PROSPECTS**



**ABSTRACTS OF V INTERNATIONAL  
SCIENTIFIC AND PRACTICAL CONFERENCE  
APRIL 12-14, 2020**

**KHARKIV  
2020**

# **SCIENCE, SOCIETY, EDUCATION: TOPICAL ISSUES AND DEVELOPMENT PROSPECTS**

Abstracts of V International Scientific and Practical Conference

Kharkiv, Ukraine

12-14 April 2020

**Kharkiv, Ukraine**

**2020**

2

**UDC 001.1**

**BBK 29**

The 5<sup>th</sup> International scientific and practical conference “Science, society, education: topical issues and development prospects” (April 12-14, 2020) SPC “Sci-conf.com.ua”, Kharkiv, Ukraine. 2020. 886 p.

**ISBN 978-966-8219-83-2**

The recommended citation for this publication is:

*Ivanov I. Analysis of the phaunistic composition of Ukraine // Science, society, education: topical issues and development prospects. Abstracts of the 5th International scientific and practical conference. SPC “Sci-conf.com.ua”. Kharkiv, Ukraine. 2020. Pp. 21-27. URL: <http://sci-conf.com.ua>.*

**Editor**

**Komarytsky M.L.**

*Ph.D. in Economics, Associate Professor*

**Editorial board**

Velichko Ivan Pavlovich (Ukraine)  
Velizar Pavlov, University of Ruse, Bulgaria  
Vladan Holcner, University of Defence, Czech Republic  
Haruo Inoue (Tokyo Metropolitan University)  
Gurov Valeriy Ivanovich (Russia)  
Bagramian Anna Georgievna (Ukraine)  
Pliska Viktoriya Andriyvna (Ukraine)  
Takumi Noguchi (Nagoya University)

Masahiro Sadakane (Hiroshima University)  
Vincent Artero, France  
Ljerka Cerovic, University of Rijeka, Croatia  
Ivane Javakhishvili Tbilisi State University, Georgia  
Marian Siminica, University of Craiova, Romania  
Ben Hankamer, Australia  
Grishko Vitaliy Ivanovich (Ukraine)  
Nosik Alla Vadimovna (Ukraine)

Collection of scientific articles published is the scientific and practical publication, which contains scientific articles of students, graduate students, Candidates and Doctors of Sciences, research workers and practitioners from Europe, Ukraine, Russia and from neighbouring countries and beyond. The articles contain the study, reflecting the processes and changes in the structure of modern science. The collection of scientific articles is for students, postgraduate students, doctoral candidates, teachers, researchers, practitioners and people interested in the trends of modern science development.

**e-mail:** [kharkiv@sci-conf.com.ua](mailto:kharkiv@sci-conf.com.ua)

**homepage:** <http://sci-conf.com.ua>

©2020 Scientific Publishing Center “Sci-conf.com.ua” ®

©2020 Authors of the articles

## ФАРМАЦЕВТИЧЕСКИЕ НАУКИ

- 37 *Пальчевська Т. А., Лисенко Ю. С., Гула Л. Д., Ражик А. В.* 160  
ЗАСТОСУВАННЯ БУРШТИНОВОЇ КИСЛОТИ ТА НАТРІЮ  
СУКЦИНАТУ У ФАРМАЦІЇ
- 38 *Соломенний А. М., Тарасекно В. О., Підлісний О. В.* 167  
РАНОВІ ПОКРИТТЯ

## ХИМИЧЕСКИЕ НАУКИ

- 39 *Ваишкурак У. Ю., Шевчук Л. І.* 170  
ДОСЛІДЖЕННЯ ВПЛИВУ УЛЬТРАЗВУКУ НА РУЙНУВАННЯ  
ДОМШОК БІЦИЛІНУ
- 40 *Верещак В. Г., Пасенко О. О., Мандріка А. Г.* 173  
ОТРИМАННЯ МЕТАНСУЛЬФОНАТУ СРІБЛА ДЛЯ  
МОДИФІКАЦІЇ БІОАКТИВНИХ СПОЛУК КРЕМНІЮ
- 41 *Зеленська К. В., Потаскалов В. А.* 175  
ФОТОКОЛОРИМЕТРИЧНЕ ВИЗНАЧЕННЯ ВМІСТУ  
АСКОРБІНОВОЇ КИСЛОТИ В ПРОДУКТАХ ХАРЧУВАННЯ
- 42 *Фурукіна М. І., Власенко Н. Є.* 182  
ВПЛИВ LI – ІОННИХ АКУМУЛЯТОРІВ НА ЛЮДИНУ ТА  
НАВКОЛИШНЄ СЕРЕДОВИЩЕ
- 43 *Чумак М. О., Потаскалов В. А.* 186  
ВИКОРИСТАННЯ АТОМНО-АБСОРБЦІЙНОЇ СПЕКТРОМЕТРІЇ  
ДЛЯ ЕКОАНАЛІТИЧНОГО КОНТРОЛЮ ВОДНОГО  
СЕРЕДОВИЩА

## ТЕХНИЧЕСКИЕ НАУКИ

- 44 *Bendiuh V. I.* 190  
SYSTEMATIZATION AND ACCESS TO THE LEGAL  
FRAMEWORK REGARDING TRANSPORT INFRASTRUCTURE  
USING SOFTWARE
- 45 *Radovenchyk Ia., Trus I., Senkova K., Poberezhniy M.,  
Radovenchyk V.* 198  
HOUSEHOLD SOLID WASTE MANAGEMENT IN UKRAINE IN  
2018
- 46 *Trus I., Radovenchyk Ia., Nosachova Ju., Hlushko O., Gomelya M.,  
Vozna I.* 205  
DEVELOPMENT OF A WASTE-FREE TECHNOLOGY OF MINE  
WATER DESULPHATIZATION INVOLVING THE USE OF LIME  
AND ALUMINIUM COAGULANTS
- 47 *Азарян А. А., Швець Д. В., Карабут Н. О.* 212  
РОЗРОБКА МАТЕМАТИЧНОЇ МОДЕЛІ ТЕХНОЛОГІЧНОГО  
ПРОЦЕСУ ПОДРІБНЕННЯ ЗАЛІЗОРУДНОЇ СИРОВИНИ НА  
РУДОЗБАГАЧУВАЛЬНИХ ФАБРИКАХ

48	<b>Банга В. І.</b> ЕКСПЕРИМЕНТАЛЬНИЙ СТЕНД ДЛЯ ДОСЛІДЖЕННЯ КОНУСНОГО РОБОЧОГО ОРГАНУ ІНДИВІДУАЛЬНОГО ДОЗАТОРА КОМБІКОРМІВ	215
49	<b>Гачак Ю. Р., Михайлицька О. Р., Козловець М. О., Прокопюк Р. Я., Лазаришин Б. А.</b> ФІТОДОБАВКИ ЯК СКЛАДНИКИ МОЛОЧНИХ ПРОДУКТІВ ЛІКУВАЛЬНО-ПРОФІЛАКТИЧНОГО ПРИЗНАЧЕННЯ	219
50	<b>Горовой С. А.</b> ЦЕНТРОБЕЖНЫЕ НАСОСЫ С РАБОЧИМ КОЛЕСОМ В ЩЕЛЕВЫХ ОПОРАХ – УПЛОТНЕНИЯХ	225
51	<b>Губська В. В.</b> МОДЕЛЮВАННЯ РУХУ ШАСІ ПО ПЕРЕШКОДІ У ВИГЛЯДІ СХОДОВОГО МАРШУ	230
52	<b>Иванов Е. М.</b> УЧЕТ ПРАВИЛ ЕСКД ПРИ МОДЕЛИРОВАНИИ ПРУЖИНЫ РАСТЯЖЕНИЯ В ПАКЕТЕ AUTODESK INVENTOR	236
53	<b>Каращук Н. М., Манойлов В. П.</b> ЕЛЕКТРОДИНАМІЧНІ ХАРАКТЕРИСТИКИ АНТЕНИ У ВИГЛЯДІ ВІДКРИТОГО КІНЦЯ ПРЯМОКУТНОГО ХВИЛЕВОДУ ІЗ ЧАСТКОВИМ ДІЕЛЕКТРИЧНИМ ЗАПОВНЕННЯМ ТА ШТИРЕМ ЗБУДЖЕННЯ	240
54	<b>Квитка Н. Ю.</b> ОПРЕДЕЛЕНИЕ СРЕДНЕГО РАДИУСА КАЛИБРА ПРИ ПРОДОЛЬНОЙ ПРОКАТКЕ	245
55	<b>Кисіль Ю. П., Болгова Н. В.</b> ВИКОРИСТАННЯ РОСЛИННОГО КОМПОНЕНТУ У ВИРО- БНИЦТВІ ЙОГУРТУ ФУНКЦІОНАЛЬНОГО ПРИЗНАЧЕННЯ	252
56	<b>Коновалов О. Ю., Кунах Н. І., Манько О. О., Нікіфоренко К. Б., Сотніченко Ю. О., Харлай Л. О.</b> ЕФЕКТИВНИЙ МЕТОД ДИНАМІЧНОГО ЗАХИСТУ ІНФОРМАЦІЇ НА ОПТИЧНИХ ЛІНІЙНИХ СПОРУДАХ КРИТИЧНОЇ ІНФРАСТРУКТУРИ	260
57	<b>Михайліченко В. В., Коваленко І. В., Власенко Н. Є.</b> ПЕРСПЕКТИВИ РОЗВИТКУ ПОРОШКОВОЇ МЕТАЛУРГІЇ	266
58	<b>Міщенко Л. Д.</b> СПОСІБ РОЗПІЗНАВАННЯ ФЕЙКОВИХ НОВИН	270
59	<b>Пивonos В. М., Пивonos В. В., Пивonos М. В.</b> СПОСОБ УСТРОЙСТВА БУРОВЫХ ПЛАТФОРМ В ПРЕДЕЛАХ ДОСЯГАЕМЫХ ГЛУБИН ВОДНЫХ АКВАТОРИЙ ДЛЯ ДОБЫ- ЧИ ПРИРОДНЫХ УГЛЕРОДОСОДЕРЖАЩИХ ИСКОПАЕМЫХ	273
60	<b>Правило В. В., Власенко Т. І.</b> ЗАСТОСУВАННЯ ІoT ДЛЯ ДОСЛІДЖЕННЯ ТРАФІКУ НА АВТОШЛЯХАХ	277

## HOUSEHOLD SOLID WASTE MANAGEMENT IN UKRAINE IN 2018

**Radovenchyk Iaroslav,**

PhD, Senior Lecturer\*

**Trus Inna,**

PhD, Senior Lecturer\*

**Senkova Kateryna,**

Student\*

**Poberezhniy Maksim,**

PhD- student\*

**Radovenchyk Vyacheslav,**

Doctor of Technical Sciences, Professor\*

\*National Technical University of Ukraine "

Igor Sikorsky Kyiv Polytechnic Institute"

Kyiv, Ukraine

**Introductions.** Each year, the country development level increases, due to the intensive growth of household solid waste (HSW) annually generated in Ukraine. At the beginning of the 21st century, the attention of the average citizen of Ukraine toward the HSW was limited to dumping it in a garbage can or container. Nothing more interested anyone other than specialists, and residents' questions arose only when spreading unpleasant odors from overcrowded containers or the garbage bin. Today there are too many HSW. The technologies and processes for their safe disposal or storage are insufficient and the pace of implementation is negligible. Therefore, the problems that accompany this type of waste have become too acute and dangerous. Each year of silencing or delaying the solution of these problems only exacerbates them, as well as magnifies and gives rise to new problems. Today, almost every country in the world, regardless of the level of its development, has faced the problems of HSW. Ukraine is no exception.

For poor countries and countries with economies in transition, where most HSWs are disposed of or incinerated, environmental and sanitary-hygienic problems are more acute. They include the pollution of atmospheric air, surface and groundwater, soil of adjacent territories with toxic substances, intensive development

of different species of birds, rats, fleas, pathogenic microflora for which the landfill became habitat. By taking into account fires and emergency emissions of the filtrate to the environment, one will understand that the landfill of an engineering facility, designed for long-term safe storage of HSW, is becoming a source of intense pollution because of hazardous chemical compounds and biological objects.

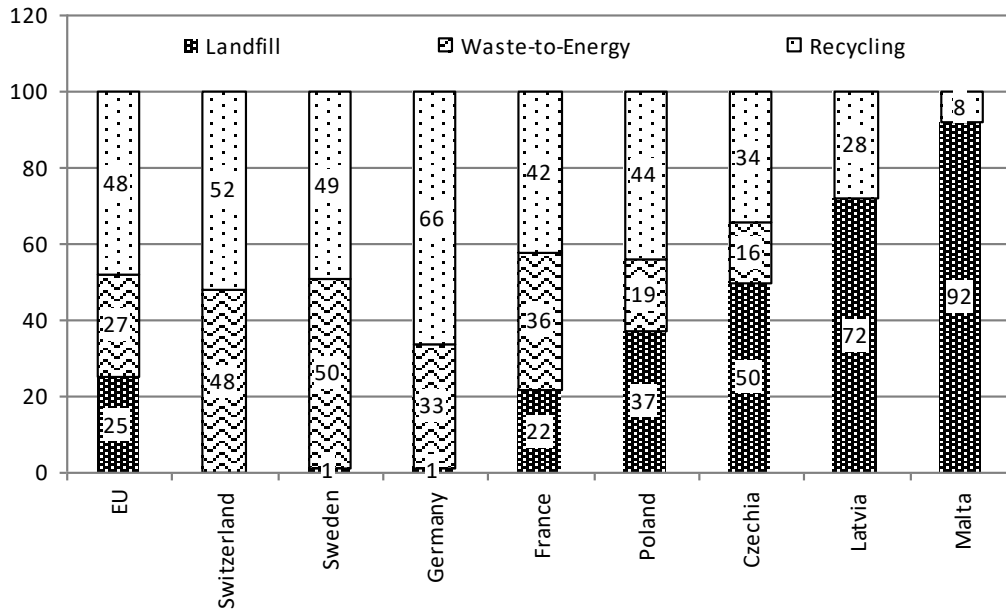


Fig. 1 Household solid waste management in 2016 year

Today there is no single approach to solving HSW problems. Each country chooses its own path depending on the specific conditions. According to the analysis of HSW management in some European countries, the results are extremely diverse. For the EU Member States, the average share of landfilled, incinerated or reused waste is 25% to 48%. Sweden and Germany dispose of less than 1% of waste collected. The rest are burned to produce energy, reused or composted. Nevertheless, there are opposite examples among EU countries. For example, Latvia and Malta dispose of 72% and 92% of their waste respectively. The remaining - 28% and 8% - are disposed of with the production of useful substances and materials.

EU directives are aimed at reducing the share of landfilled waste to 10% by 2035. A comprehensive multi-stage approach to solving problems of HSW is considered the most suitable for achieving such an indicator. Moreover, the waste management strategy also includes measures to minimize their generation.

**Aim.** The purpose of this study is to determine the condition of HSW management in the territory of Ukraine in 2018 and to explore the most appropriate way to tackle existing challenges in this field.

**Results and discussion.** Data from the Ministry of Regional Development, Construction and Housing and Communal Services of Ukraine indicate that 78% of the country's population was covered by HSW removal services in 2018. However, in Volyn, Cherkasy and Odessa regions, this figure was only 61% and 63% respectively. By studying the problem more deeply, one will discover that the situation at the district level is even worse. Thus, in the Polissya and Stavishchansky districts of Kyiv oblast, only 10% of the population is covered by HSW removal services. All in all, the following statistical information will cover 78% of the Ukrainian population. During 2018, 54.0 million m<sup>3</sup> / 9.1 million tons of HSW were collected in Ukraine. The vast majority of waste (94.23%) is landfilled at 6.1 thousand landfills with a total area of over 9.1 thousand hectares. Based on the data from the experts of the National Clean City Project on the concentrated morphological composition of waste, Ukraine loses 808 thousand tons of paper and cardboard, 1116 thousand tons of polymers, 1134 thousand tonnes of glass, 82 thousand tonnes of ferrous and 27 thousand tonnes of non-ferrous metals, 236 thousand tonnes of textiles, 82 thousand tonnes of wood, 2614 thousand tonnes of organic waste each year. Without any exaggeration, these huge resources can be used to meet the needs of Ukrainian people without destroying or polluting the environment. For example, the USA, Germany, Japan, France produced out of recycled materials 20% of aluminum, 33% of iron, 50% of lead, 44% of copper 15 years ago. In the US alone, HSW recycling annually generates more than 2 billion dollars in revenue. Our achievements in this field are much more modest.

In 2017, 2.02% (1.09 million m<sup>3</sup> / 208 thousand tons) of HSW was burned in Ukraine. The combustion was carried out at one incinerator plant, and three incinerator installations. Kyiv incinerator plant "Energya", one of four enterprises of this type, was built on the territory of Ukraine in the late '80s. Incinerator plants in Kharkyv, Sevastopol, and Dnipropetrovsk have not been operating for a long time.



There are constant problems with landfill №5 in Pydhyrtsy, so Kyiv incinerator plant "Energya" often has to help the capital to reduce the severity of environmental problems but it helps only partially. At a capacity of 240,000 tones per year, the plant burns 20 - 30% of HSW generated in Kyiv but the price of this process is too big. The entire gas cleaning system is limited to filters to remove dust and ash particles. All other pollutants are released into the environment without interruption. The list of pollutants is extremely illustrative. This includes dioxins, furans, polyaromatic hydrocarbons, heavy metals, hydrochloric, sulfuric acids, etc. Against this background, nitrogen oxides and carbon monoxide appear to be worthless. Even the strict environmental monitoring at the plant can't help solving these acute environmental problems. According to various experts, the cost of the sophisticated gas purification system for incinerator plants can reach 50% of the total cost of the plant.

In 2018, 5.77% of the total amount of HSW was disposed of by different methods. 13216 m<sup>3</sup> / 1640 tones of organic waste were processed at the composting sites, which is less than 0.03% of the total amount of HSW collected. One can reasonably assume that this area has not been born in Ukraine yet. There are only a few examples of implementation of composting by environmental activists and indifferent citizens in rather limited territories of a few regions. At the same time, this method is quite widespread abroad because it allows obtaining additional organic fertilizers, as well as significantly improving the quality of the secondary raw materials collected from the HSW streams during processing at the waste processing plants. For example, the first bio-container in Germany was installed in 1985. Today, even ordinary citizens have no doubts about the feasibility of such a system for collecting and disposing of food waste, and bio-containers are installed in every yard in Germany, as well as in Austria, Luxembourg, Denmark, and other countries. In total, Germany utilizes more than 70% of food waste and receives over 6 million tonnes of organic fertilizers annually.

In addition, 1.51% (813 thousand m<sup>3</sup> / 260 thousand tons) of the HSW collected in the territory of Ukraine in 2018 was sent to 25 waste-disposal enterprises

located in different regions. By taking into account the gross collection of HSW, one can assume that this method is quite progressive for Ukraine. However, it should be borne in mind that the quantity and quality of recyclables in such a waste treatment system is significantly reduced as a result of repeated mixing and overloading. When it is possible to remove up to 80% of reusable substances and materials from the total HSW stream by using the separate collection, then in the case of gross collection and subsequent sorting, this figure is usually reduced to 5 - 20%. The selected raw materials quite often require additional processing.

In 2018, a separate HSW collection was introduced in 1181 settlements of Ukraine. It should be noted that this number increased by 359 settlements since 2017. Although this figure is only 4.2% of the total number of settlements in Ukraine, it seems that priorities in the treatment of HSW in the territory of our country are beginning to emerge. As a result of the separate collection of HSW in 2018, almost 1.2 million m<sup>3</sup> / 146 thousand tones of various materials were delivered to secondary raw materials. They are mainly selected for further processing and reuse of paper, cardboard, glass, ferrous and non-ferrous metals, PET bottles, polyethylene, organic waste, rarely batteries, Tetra-Pak packaging, textiles, rubber. In fact, Ukraine does not have enough experience in sorting HSW yet. As the experience of EU countries shows, working with the public is the most difficult problem in implementing a separate HSW collection system. All the benefits of this method can be undermined without an active and conscious position of the population. At the same time, about 70% of the total cost of implementing a separate HSW collection is spent on education and campaigning for the preparation of public consciousness. Another 20% of the cost is spent on building the system and its management structure, and only 10% is spent on solving technical problems.

Summarizing the above, one can identify the main problems that hinder the rapid implementation of separate collection of HSW today: the lack of interest of the residents in the separate collection, as it is connected with the necessity of installing additional containers in the kitchen, bringing 3 to 4 packages in containers instead of one, the necessity of separating waste, etc.; absence of significant real results of

separate collection, since the contents of containers are quite often removed before transportation to the processing plant by persons for whom the collection of secondary raw materials is the main source of existence; the lack of correspondence between container volumes and the waste volumes, resulting in the rapid filling of some and the long empty state of the others. In this case, many inappropriate wastes are dumped in empty containers. Besides, an important role is played by the timely replacement of empty containers; even under the most favorable conditions, some residents, because of their upbringing, nature, and social status, categorically refuse to collect separately, and in some cases, it negates all successful work.

Despite all the difficulties of establishing separate collection of HSW, there is no alternative to it. In combination with other methods (incineration, disposal, etc.) it is possible to effectively tackle existing challenges.

The bulk of HSW in Ukraine is being disposed of today. Despite the enormous loss of natural resources, Ukraine continues to clutter its territory. According to official statistics, there are 6107 landfills in Ukraine now covering an area of 9172 hectares. These figures should be treated very carefully because a more detailed study of the above data raises a number of questions. For example, the permanent management of the Kyiv City State Administration is concerned about the congestion of both Kyiv landfill sites. There are no more such landfills in Kyiv in 2018, according to the report "Sanitary cleaning". This report also implies that almost 16% of Ukraine's landfills do not meet safety standards. At the same time, 741 landfills in Vynnytsia region, 339 landfills in Rivne region and 283 landfills in Chernivtsi region don't meet the safety standards. Also, there are 324 inactive landfills with a total area of 686 hectares. By the end of 2018, almost every tenth landfill is subject to reclamation, one in five is certified, and every eighteenth is being rehabilitated. In 2018, there were found 26610 unauthorized landfills with an estimated landfill volume of 5.0 million m<sup>3</sup>. During the reporting year, 26050 unauthorized landfills with an estimated waste volume of 2.6 million m<sup>3</sup> were eliminated. Obviously, up to 54.0 million m<sup>3</sup> of officially collected HSW for completeness is worth adding volumes of unauthorized landfills, which also fall into the overall waste management

system. Then the total volume of waste will be about 59.0 million m<sup>3</sup>. At a dumping depth of 10 m, Ukraine is forced to allocate a plot of at least 2.0 × 3.0 km annually for waste. According to approximate estimates, by the end of 2018, 1380 million m<sup>3</sup> of HSW have already been accumulated in the territory of Ukraine. Today, due to the financial difficulties, the filtrate collection systems are installed only in 46 landfills. Only 33 of them have decontamination systems. Only 18 landfills are equipped with a biogas extraction system that is burned in a flare and fed to cogeneration units. Such figures are extremely small. According to the analysis of HSW accumulation in Ukraine, these problems will only be exacerbated. Since 2013, due to known events, it is difficult to track the dynamics of HSW accumulation in Ukraine. Even rough assumptions show that, while maintaining the pre-war trends, the mass of waste collected during the year may reach about 20 million tons, which is about 350 kg per inhabitant. According to the experience of developed countries, 522 - 760 kg per year is already formed per inhabitant. Therefore, the problem of HSW must be solved today and urgently. It must be coped with by environmentally friendly methods.

**Conclusions.** There is a catastrophic situation with the disposal of household solid waste in Ukraine. Huge volumes of accumulated HSW pollute the atmosphere, surface and groundwater, the soils of the surrounding areas, and have a negative impact on the environment. None of the current trends in Ukraine (landfill, incineration, separate collection) receive due attention from the state. Despite the severity of the problems, \$ 15.4 thousand / hectare was spent on landfill reconstruction from the state and local budgets in 2018. Separate collection in conjunction with the reconstruction and rehabilitation of existing landfills is the most realistic and rapid way to solve existing problems. At the same time, tax incentives for secondary products (such as “green tariff” in the energy sector) obtained from HSW fractions would be a powerful impetus, which can stimulate the creation and updating of the necessary production base for recycling of raw materials. In many countries of the world, the problems of HSW have long been resolved at a high level, and Ukraine has to follow their positive example.