UDC 631.4:546:002.18

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The impact of the process of producing chrysotile-asbestos on environment

The process of coming fibres into organisms' of people and animals it appears to be very interesting to investigate biological, especially carcinogenic features of chrysotile-asbestos. A wide specter was found on dusty remnants of snow samples. On samples that were taken after energy dispersal analysis there were identified 11 heavy metals. Congestion rate of snow cover and heavy metals were discovered. It became known that the compound of water changes during the chemical compound analysis of melted snow and the dusty basis of snow. During winter time a wide specter of heavy metals gather in an enough amount, but basic contaminating metals are elements Si, Fe, In, Al.

Key words: chrysotile-asbestos, environment, snow sample, soil sample, heavy metals, atomic-absorbing spectrometry, inversional voltampere method.

Urbanization and growth of industrialization by means of revival of natural and technological processes lead to changes in environment. It is mostly seen in places like producing minerals in mining places, near recycling complexes, particularly at places where digging, recycling and placing of a reasonable amount of rock take place and not mining but raw materials appear.

Asbestos is a mineral that is being investigated widely according to issues covering the impact of it on human organism and environment [1, 2].

Chrysotile-asbestos as other solid parts makes up a dispersal system together with surrounding liquids being in close relations with environment. Therefore, near a fiber two electrical layers formulate that are the result of contacting phase relations [3, 4]. Thus, it is an environment where there dispersal phases formulating fiber particles and atmospheric depositions where fibers gather or as water of natural resources animals and human organisms can participate. Including chrysotile-asbestos mineral together with earth's soil undergo erosion, change and become a part of water, precipitation and soil. Existence of chrysotile-asbestos and its concentration are identified in water, air and other parts of Earth's soil [5, 6].

Like other serpentine minerals chrysotile-asbestos experience chemical degradation on the ground. This soil leads to deep changes of Ph and introduces a range of metals to environment. In its turn this plant affects negatively on growth of fish and invertebrates. In some sources when grazers (sheep and cattle) eat grass grown up with serpentine things, in cattle's blood compound there are noticeable some biochemical changes [7, 8].

The process of coming fibres into organisms' of people and animals it appears to be very interesting to investigate ecological, especially carcinogenic features of chrysotile-asbestos.

Thus, all the types of asbestos have not only fibrogenic but also carcinogenic peculiarities. Oncological deceases in organism appearing because of asbestos are known, particularly there are some dangerous ones like lung tumor, pneumonia and stomach Mesothelioma.

It is vitally important to estimate ecological danger of chrysotile-asbestos and prohibit usage of it or to decide to continue using it [9, 10].

The aim of the work is to investigate the ecological impact of chrysotile-asbestos on environment.

Investigation objectives:

1. To investigate the impact of chrysotile-asbestos production process on ecological issues.
2. To evaluate the dust remnants through snow and soil samples near industry enterprises.

Investigation materials

With an intention to assess the texnogenny pollution level there were taken some samples in order to identify the micro-elemental compounds of snow. In the middle of November before melting of the snow samples are taken in order to find out the amount of gathered polluted things. In order to prevent texnogennical impact, especially from vehicles, the snow is taken 100 meters away from the road, far from trees, hills, roofs, buildings, electrical wires, local atmosphere contaminating sources, flat lands.

Snow samples are cut using the plastic tubules that volumes are 55 cm². Samples are cut from rents as rocks with 40 cm longitude. Taken snow samples are put in covered glass dishes and melted in room temperature.

With the help of prairie emission MIRA 3LMU (Tescan, Check Republic) СЭМ microstructure of samples were investigated. Accelerated tension of electronic instrument comprised 10–30 kV. Measuring of volumes of constructed constructions was made by using analyzer of ZetasizerNano ZS (Malvern-InstrumentsLtd, Great Britain) submicronic particles.

Investigation Results

During investigation of chemical permanence, physical-chemical features, construction of fibres, that are influenced by chemical factors, also environment factors, showed that they experience changes.It influenced to some extend on the ecological change of it. According to the results of chemical permanence of chrysotile-asbestos in Zhitikara there are some changes in two synthetic types of it, acid permanence of taken samples is equal to 43,05; 44,34; 45,13 mass percent, alkali permanence is 95,37; 98,27; 96,35 mass percent. Taken materials are not stable for acid, but are endurable for high acid permanence. Due to atomic-absorbing spectrometry method chrysotile-asbestos from soil and water composing element magnesium was found out.

Soil samples were taken from the land 500 metersaway from manufacture, 1 kilometer away from sanitary zone chrysotile-asbestos in soil got from 500 meter far is equal to 1,3 g/кg, 1 km far land is 1,7 g/kg and from sanitary zone — 0,47 g/кg. At these distances the decrease of structure composing element magnesium is noticeable (Fig. 1).

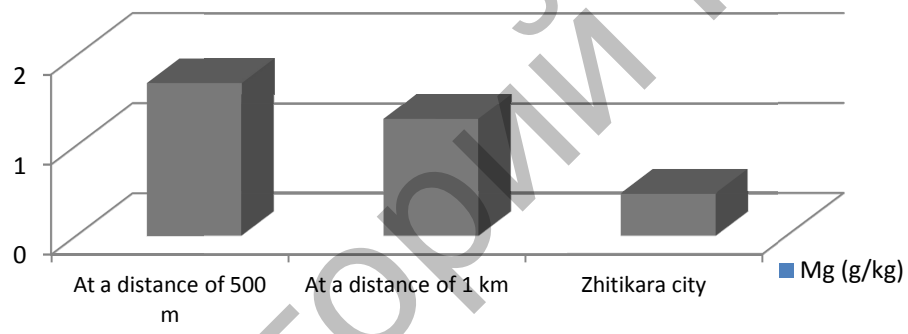

Figure 1. Amount of magnesium in soil by atomic-absorbing spectrometry method

Water samples were taken from the river Shortandi, rain (dweilling-house) and snow (dweilling-house). In water chrysotile-asbestos composing element magnesium — in Shortandi was 45,5 mg/l, rain water — 4,2 mg/l, snow water — 0,45 mg/l. At these zone starting from production till the sanitary zone the decrease of structure composing element magnesium is noticeable (Fig. 2).

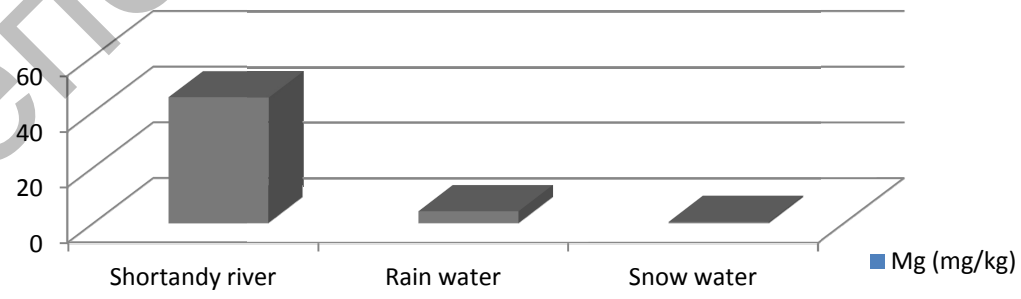

Figure 2. Amount of magnesium in water by atomic-absorbing spectrometry method

By the inversional ampere-voltmeter method the amount of heavy metals (Pb, Cd, Cu and Zn) in soil samples in given area were identified (Fig. 3).

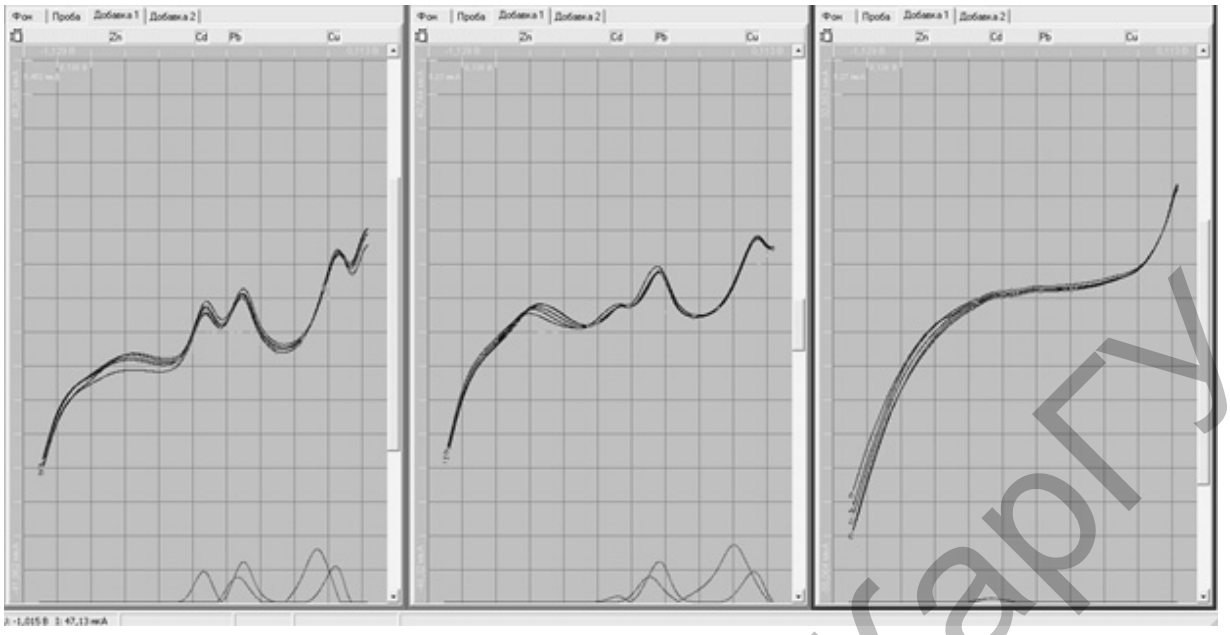

Figure 3. The amount of heavy metals (Pb, Cd, Cu and Zn) in soil samples
by the inversional ampere-voltmeter method (The view of mixture)

In compounds of soil samples taken from Zhitikara city territory amount of plumbum (Pb) 6,5±2,3 (mg/кg) and zinc (Zn) 10,0±4,6 (mg/кg) were the highest among all heavy metals.

Accumulation of heavy metals in dusty and melted snow water
nearby manufacture enterprises and their danger

The volume of particles in melted water is discovered by laser dynamic shining method.Volume measuring process of the particles was done by molecular order. For every sample three-time measurement was completed during 30 seconds. According to the shown experimental materials average volume of measured particles in snow water comprised 342 nm. Final results showed that dispersion of measured particles can range from200 nm till 400 nm. The volume of measured particles in taken melted water is shown on Figure 4.

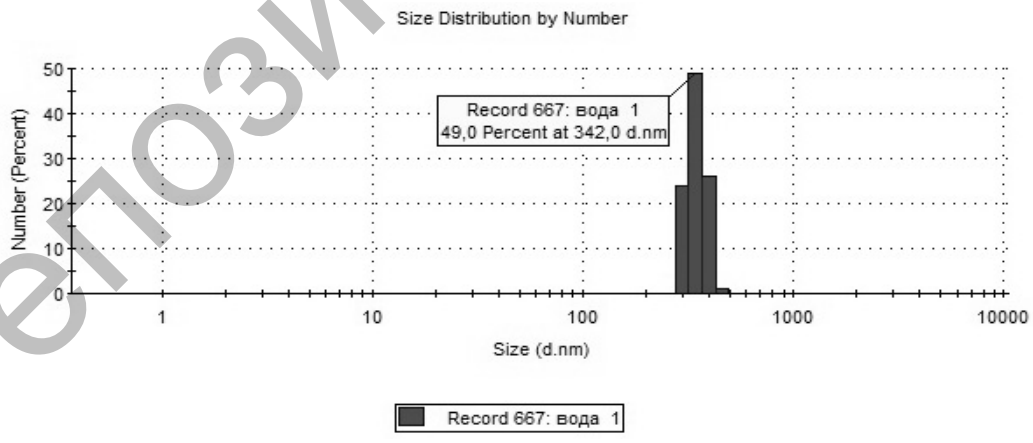

Figure 4. The volume of measured particles in taken melted water

Element compound of measured particles is illustrated in Figure 5. Wide specter of heavy metals in dust remnants of snow samples was found. 11 heavy metals were identified in investigated forms taken from energy dispersal analysis.

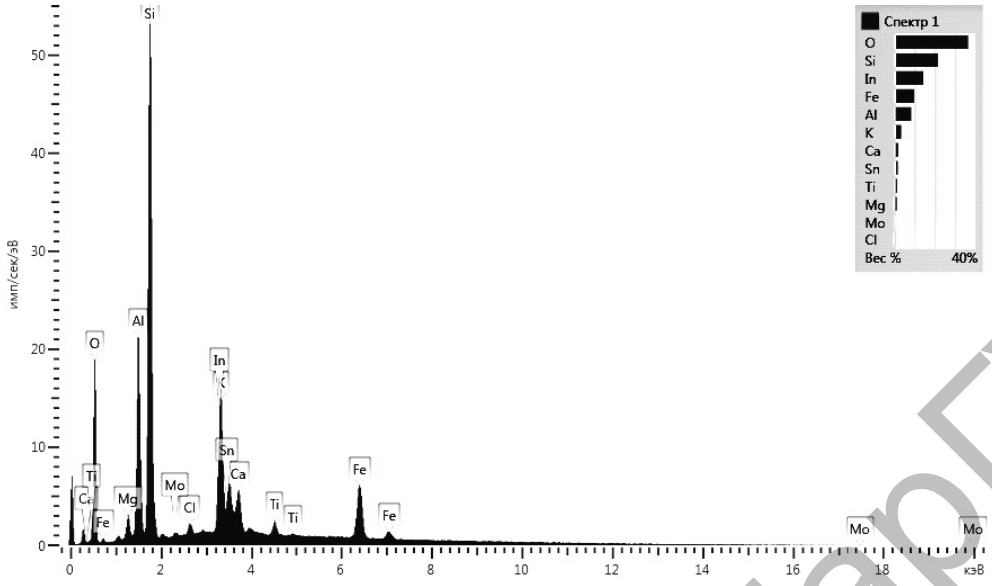

Figure 5. Results of measuring chemical elements' compounds and percent of atom on the weight of measured particles

Analysing chemical compounds of melted snow water and dusty snow influences on renewal of water compounds in spoilt anthropogenic conditions. In winter a wide specter of heavy metals is accumulated enough, but main polluting metals are Si, Fe, In, Al elements. In such regions if chemical elements in most cases go into the organism of people the danger of prolonged intoxicationheightens.

Conclusion

1. There is a negative impact of cultivating manufacture of chrysotile-asbestos on ecological objects.

2. While analysing chemical compounds of melted snow water and dusty snow changes were noticeable in water compounds because of spoilt anthropogenic factors.. In winter a wide specter of heavy metals is accumulated enough, but main polluting metals are Si, Fe, In, Al elements.

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Хризотил-асбестті өңдеу өндірісінің қоршаған ортаға әсері

Мақалада талшықтардың адам және жануарлар ағзасына түсу барысында хризотил-асбесттің биологиялық, оның ішінде канцерогендік ерекшеліктерін анықтайтын қасиеттерін зерттеу үлкен қызығушылық тудырады. Қар сынамаларының шаңды қалдықтарында ауыр металдардың кең спектрі табылды. Энергия дисперсиялы талдаудан алынған үлгілерінде 11 ауыр металдар идентификацияланды. Қар жамылғысындағы ауыр металдардың және шаңның жинақталу қарқыны анықталды. Еріген қарлы судың және оның шаңды негізінің химиялық құрамын талдауы кезінде бұзылған антропогендік әсерден судың құрамы өзгеретіні байқалды. Авторлар қыс кезінде қарда ауыр металдардың кең спектрі жеткілікті жинақталды, бірақ негізгі ластағыш металдар Si, Fe, In және Al элементтері болып табылды деген қорытындыға келді.

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Влияние производства хризотил-асбеста на окружающую среду

В статье показано, что влияние хризотил-асбеста на организм человека и животных, а также определение его биологических и канцерогенных свойств представляет большой интерес. Выявлено, что воздействие определенных факторов окружающей среды и промышленного производства на волокна хризотил-асбеста приводит к изменению их химического состава. Авторы отмечают, что в образцах пыли были найдены в широком диапазоне тяжелые металлы, в составе снега был определен суммарный состав тяжелых металлов и пыли. Во время анализа химического состава основания снега, талой воды и пыли были обнаружены изменения под воздействием антропогенных факторов. Сделан вывод, что в зимний период в снеге накапливается широкий спектр тяжелых металлов, но основными металлами-загрязнителями являются Si, Fe, In, Al.

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