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THE STUDY ON THE ENVIRONMENTAL SIGNIFICANCE OF GLAUCONITE DEPOSITS OF THE SOUTH KAZAKHSTAN REGION WITH THEIR FURTHER APPLICATION IN AGRICULTURE

Abstract. In connection with market relations in the agricultural production, it is possible to abandon the use of high doses of expensive chemical fertilizers and introduce them in smaller amounts under different crops jointly with natural mineral glauconite, which is characterized by a whole set of chemical compounds and micro elements necessary for the mineral nutrition of plants. This work is aimed at identifying common geological and environmental characteristics of glauconite deposits in order to conduct a study on the use of glauconites in agriculture. In the course of the study, stimulatory effects of glauconites on the development of useful soil microflora determining their fertility and sides of glauconites possessing high adsorption and cation exchanging properties which can be used as the adsorbent of contaminants were studied. With the help of an areal application of glauconite in the cultivation of agricultural crops and the creation of geochemical barriers, rehabilitation of soil properties having a high technogenic load as a result of industrial enterprises activities were identified.

Keywords: glaukonit, minerals, technogenic loading, the soil, adsorption, montmorillonite, a forage, culture.

Introduction. In the modern seas, glauconite deposits are formed in the shelf fields and upper part of a continental slope. There are no glauconite deposits in the abyssal area. The average depth of the formation of modern glauconite is from 20 to 150 m, in average is about 70-80 m, but the formation of glauconite at shallower depths is likely to be from 10 to 20 m. The presence of glauconite at the depths of 200-400 m was also identified. Standing out as the finest sediment, sometimes it penetrates into the cavity of foraminifera and radiolarians, filling them and forming glauconite cores. Such cores are found in the modern bathyal silts.

A shallow-marine origin is widely expanded in sedimentary rocks and the modern marine sediments. Glauconite contains bathyal green silt, glauconite sandstone, light green glauconite cretaceous sands, green glauconite ordovician limestone and many other rocks. But it does not form large monomineral clusters in nature and occurs exclusively in a mixture with other minerals of clayey or sand strata; its content in the rock seldom exceeds 50%. Celadon in small quantities is common in the tonsils and cracks of effusive rocks. Among glauconite facies, sands and aleurites, which sometimes included in the composition of phosphorite conglomerate, dominate; glauconite clays are more rare, although they are quite common. Sometimes glauconite silts are enriched by calcite and represent glauconite limestone, usually more or less clayey, by themselves in the form of fossils. Glauconite is formed only in the sea basins, but its seeds are resistant to weathering and is therefore in the secondary occurrence they are found in freshwater and even terrestrial sediments. As a result, by the presence of only grains of glauconite in those or other deposits, their marine origin cannot be judged. In the form of large grains, it is contained in the coarse-grained sands and mall pebble conglomerates,often phosphorite.

In recent years, the study of geological systems of glauconite deposits in the developed countries has become increasingly deep since glauconites are significant mineral objects in the broad sense. Ongoing

researches in this field are conducted in many countries around the world, especially in European countries. Over the past century, the scope of glauconite use is more and more expanded. The reason is a valuable mineral composition and chemical properties of different glauconite. The study of glauconite rocks from the upper cretaceous sediments in the Southern Priaralie was carried out over a number of years by taking layered samples from outcrops and cores of drilled wells in the areas [1]. All selected samples were integrated to a complex modern laboratory investigation to determine the glauconite composition in them and study its application prospects in various areas of agriculture.

The studied areas of glauconite deposits of the Southern region require a detailed study of structural and crystal-chemical characteristics of minerals with a complex and changeable structure, which allows to identify new criteria for evaluating their quality and manufacturability to produce competitive products. The relevance is determined by the need to expand the mineral resource base of our country, including, by means of the development of new scientific and methodological foundations of mineralogy studies.

Owing to the comprehensive studies, the possibility of widespread use of glauconite in agriculture was revealed contemporaneously providing solutions to environmental problems. The estimated reserves and resources of deposits and occurrences of glauconite, identified through conducting the studies within the glauconite deposits of South Kazakhstan region will be able to provide business enterprises, commercial farms and other facilities with activities operating in a number of the mentioned spheres of our economy. In particular, as glauconites are easily enriched, they can be used in natural form as a fertilizer since their high agrochemical properties have been proved.

A high absorption capacity of glauconite can be used to solve problems of geo-ecology engineering to protect the environment from the effects of various eco toxicants that can rapidly migrate to the hydro and geosphere and thereby disrupt the normal course of biochemical processes.

The study purpose is to investigate the mineral composition of glauconite rocks of Southern Kazakhstan, investigate various properties in the agricultural sector, as well as carrying out experimental work with the help of modern technologies for the use of glauconites in the various fields of activity.

Research methods. In the study of the glauconite concentrate (hereinafter simply "glauconite"), the complex physical and chemical methods were used: photocolorimeters, differential thermal, X-ray structural, X-ray phase analyses. In the course of the study, the investigation was carried out on the technological properties and the quality assessment of glauconite deposits, expediency of application (in various fields of activities) of various forms of a glauconite material – a natural rock, concentrate, extract, mixture with other ingredients, etc. The workability of glauconite raw materials was determined primarily by the adsorption characteristics and the amount of glauconite granular in the rock. In this regard, recommendations on the limits of the content of critical components – glauconite, quartz, clay (<0.01 mm) and glauconite rocks oxides (K2O, P2O5), essential in the evaluation of their quality for specific areas of use, especially for the needs of agriculture and environment at the improvement of the environment from polluting toxic substances were developed.

Results and discussion. Glauconite relates to a class of clayey minerals, a family of phyllosilicates containing continuous tetrahedral layers of the structure TgS (T -81, A1, Fe, etc.). They are characterized by the same type of structure with aluminosilicate layers of 2: 1, separated by interlayers of different varieties consisting of K + cations, as in micas, water molecules and exchangeable cations as in montmorillonites. An important fact is that there are often significant quantities of minerals (Mn, Cu, Co, Ni, B et al.) in glauconite, and many reservoir of glauconite rocks contain high impurity of P2O5 and even include phosphate horizons. All this gives grounds to consider glauconites as natural fertilizers, which allow us not only to enrich the soil with potassium, but also to improve its structure, retain moisture, stimulate growth and reduce the incidence of plants. Glauconite of the southern region has the following average chemical composition.

Due to rather high content of potassium dioxide (7.6%) and phosphorus pentoxide (up to 3%), glauconite can be used to produce potash fertilizer or as a natural fertilizer without processing. In particular, the introduction of glauconite flour into soil increases the yield of a number of crops and potatoes by 10-20%, significantly increases the yield of fruit trees.

Taking into account the limited edition of industrial forms of fertilizers containing macro and micro elements in its composition, we attached particular importance to the glauconite, capable to fill their deficiency in soils and plants.