

ADSORPTION OF Zn, Cd, Pb, Cu IN SOILS AFFECTED BY ANTHROPOGENIC ACTIVITY, CASE STUDY OF THE KRASNOURALSKIY INDUSTRIAL HUB

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Abstract. *Background.* An important component in assessing the anthropogenic load on the environment is the content of heavy metals in the test object. The metallurgical industry apparatus involves a number of heavy metals in the geochemical cycle, thereby loading the subordinate and conjugate areas, among which the soil cover is one of the first to be most affected. The adsorption processes occurring in the soil influence the migration ability of the elements. The paper is aimed at determining the mechanisms of adsorption of Zn, Cd, Pb, Cu in the soil cover in the area of high anthropogenic activity using the Dubinin-Radushkevich model. *Materials and methods.* The studies were carried out in the area of high anthropogenic activity located within the Krasnouralskiy industrial hub in the Sverdlovsk Region. The basic mechanisms of fixing the chalcophilic series of heavy metals in the soil section, such as Zn, Cd, Pb, Cu, are examined. Adsorption energy is calculated using the Dubinin-Radushkevich model, which determines the nature of interaction between adsorbed ion forces and active potential centers. Calculations are made according to the results of analyses to determine the gross and mobile forms of the studied metals in the soil and calculation of the equilibrium concentration in the soil solution. *Results.* During the construction of the adsorption model, the obtained isotherms are predominantly of the C-type according to the Sposito classification. Obtaining linear approximations indicates a high degree of compliance and enables comparing the thermodynamics of binding energy with maximum adsorption and comparison in a series on the distribution of interaction forces among the studied metals. *Summary.* The obtained values of adsorption energy characterize the presence of various geochemical barriers for heavy metals involved in the construction model. Numerical data suggest the presence of physical or chemisorption. Depending on the intensity of man-made load on the soil cover, the adsorption procedure is caused by a number of physical and chemical processes in the soil and the ionic strength of the metal, which have different selectivity and competitive sorption on the surface of solid particles.

Keywords: heavy metals, adsorption, Dubinin-Radushkevich model, soil cover, technogenesis.