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GROUNDWATER PROTECTION AGAINST POLLUTION BY HEAVY METALS AT WASTE DISPOSAL SITES

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Ground water is an important ingredient of the environment. The process of ground water pollution reached impressive size, specifically in regions with mining and processing industries. Heavy metals are very common pollutants of ground waters in these areas.

This article presents an assessment of the subsoil layer as of a natural geochemical barrier on heavy metals migration pathways.

Investigations have been carried out with clay samples different in mineralogy and granulometry, with heavy metals Cu, Zn, Cd, Co, Ni, Mn, Pb salts solutions, as well as with the liquid phase of the feed pulp sampled at dressing mills. A sorption capacity determination performed under static and dynamic conditions.

Isotherms for 21 variants of clayey subsoils of different origin were obtained in static experiments for named metals. These data are shown for some subsoils and monomineral clays.

For evaluating the contribution of non-disturbed subsoil structure to the sorption capacity experiments have been carried out with undisturbed samples in dynamic regime. The resulting curves in coordinates of relative concentration C of the volume V of the solution percolated through the sample are obtained.

Resulting curves for samples with undisturbed structure serve to quantify not only the sorption capacity in dynamic conditions, but to determine the migration parameters as well; they enable to start forecasting changes of heavy metals concentration in subsoil in time.

Investigations shows the possibility to apply two models for natural subsoil or for artificial clay screen: block-heterogeneous and hydrodispersional in case of linear kinetics of sorption.

Using the solutions proposed, alongside with the data of experiments under dynamic conditions, it is possible to quantify the pollution pattern in the depth of subsoil changing with time.

The method suggested makes it possible to determine maximum permitted length of the service life ; of the tailing dump during which the pollution of ground water with any studied pollutant will not occur. The calculations are done taking into account the volumes of liquid wastes and toxic elements concentrations in it. It is possible also to calculate the necessary thickness of a man-made clay screen for ground water protection during designed time. The solutions are given.