

Usefulness assessment and application principles of different wastes to reclamation of waste heaps and areas degraded by industrial activity

Summary

In Upper Silesia province (Katowice province) mining wastes outnumber total waste material produced there. There are less metallurgical and power industry wastes as well as mining or flotation wastes connected with lead, zinc and iron ores processing. An overwhelming part of wastes is located on heaps. However, it has not been considered possible to use waste material produced by one branch of industry for reclamation of wastes produced by some other one (e.g., use of power plant ashes for reclamation of mining wastes, or use of mining wastes to prevent the windy erosion of fly ashes). The same can be said about using mining wastes to reclaim metallurgical wastes and Zn – Pb flotation wastes.

It is not usually taken into consideration that many waste materials of industrial origin are ecologically hazardous, especially when they are accumulated in large quantities on a small area. However, many of them but in small quantities, could be used as a fertilizer or substance improving the physico-chemical properties of soils or reclaimed wastes.

The usefulness assessment of different wastes and principles of their application to reclamation are based on technological, petrographic, mineralogical, chemical and photochemical criteria. Waste transformations after dumping should be also taken into account. Very important for evaluation are the following factors: granulometric composition, susceptibility to weathering, pH value, buffer-properties, salinity, nutrient content including nitrogen forms, the water repellence, content of organic matter and different sulphur forms (especially sulphides), as well as contents and forms of heavy metals.

Three groups of wastes presented in this study have proved to be useful for reclamation of heaps composed of other wastes, especially in the central part of Upper Silesia province, where wastes from different branches of industry are located close to each other, often within the same works, e.g., mining wastes, ashes from power plants, and coal sludges. Some organizational changes and knowledge of mutual waste utilization possibilities can improve and accelerate reclamation processes.

Special investigations and technical projects should be done before applying wastes to reclamation, because reclamation and reclaimed wastes have different granulometric compositions, as well as mineralogical and chemical characteristics. Waste doses should be selected in such a way that they accelerate reclamation process, and at the same time they should not exceed the amount of some dangerous, from ecological point of view, substances (especially heavy metals in Upper Silesia).