



ID 07

## Nevarnosti uporabe umetnih agregatov iz mineralnih odpadkov

### Threats coming from applying of artificial aggregates produced from mineral wastes

DR. Jacek NOWAK<sup>1</sup>, MAGDALENA KOKOWSKA-PAWLOWSKA<sup>1</sup>

<sup>1</sup> *Silesian University of Technology, Faculty of Mining and Geology, Department of Applied Geology, Gliwice, POLAND*

[jacek.nowak@polsl.pl](mailto:jacek.nowak@polsl.pl), [magdalena.kokowska-pawlowska@polsl.pl](mailto:magdalena.kokowska-pawlowska@polsl.pl)

#### POVZETEK

Mineralni odpadki predstavljajo največji delež odpadkov na Poljskem. Nastajajo predvsem v rudarstvu, energetiki in metalurgiji. Glede na zahteve varovanja okolja se ti odpadki in ostali odpadki, ki se odlagajo na jalovišča in odlagališča, minimizirajo. Danes se mineralni odpadki vse pogosteje uporabljajo za proizvodnjo umetnih agregatov za uporabo npr. pri gradnji cest. Povzročajo ga nizki stroški takega materiala v primerjavi z agregati na osnovi surovin in dobrimi tehničnimi parametri proizvedenih umetnih agregatov.

Zaradi izboljšanja tehničnih parametrov umetnih agregatov se mešajo z različnimi mineralnimi odpadki (pepeli iz termoelektrarn in rudarskimi odpadki iz premogovništva), namen pa je predvsem pridobiti ustrezne granulacijske krivulje. Na žalost lahko v takšnih sestavljenih agregatih pride do interakcije med posameznimi komponentami odpadkov, kemičnimi in fizikalnimi transformacijami. Uporaba umetnih agregatov na osnovi različnih mineralnih odpadkov lahko zato kljub pozitivnim ekonomskim vidikom (zniževanju stroškov) in okolju (zmanjševanje odloženih količin odpadkov v okolje) povzroči tudi nevarnosti.

Ena od teh nevarnosti je tudi možnost izpiranja in transporta kemijskih elementov v odpadnih voda (npr. elementi v sledovih, vključno s kovinami). Opažene so tudi nevarnosti, povezane s faznimi spremembami, ki se pojavljajo v umetnih agregatih po gradnji v gradbenih slojih cest. Spremembe parametrov okolja (pH, Eh, ioni, ki selijo v padavinskih vodah) vodijo do raztapljanja mineralov v agregatih, njihovega transporta in kristalizacije novih mineralnih faz. To je pogosto povezano s spremembo volumna, kar vodi do deformacij površine novozgrajenih cest. Pred uporabo umetnih agregatov na osnovi različnih mineralnih odpadkov je potrebno analizirati možne spremembe, priporočljiva pa je uporaba odpadkov, katerih reaktivnost v hipergenih pogojih je že predhodno zmanjšana.

**Ključne besede:** odpadki industrije za izkoriščanje mineralnih surovin, jalovišča, zakonodaja, gospodarjenje z odpadki.

#### ABSTRACT

Mineral wastes constitute the largest part of wastes originating in Poland. They come mainly from mining, power industry and metallurgy. Considering necessity of environmental protection the produced wastes and wastes disposed on tips and disposal sites are being minimized. Therefore more and more often mineral wastes are applied to produce artificial aggregates used e.g. in road construction. It is caused by low cost of such material, comparing to aggregates on the basis of rock raw materials and good technical parameters of produced artificial aggregates.

Sometimes in order to improve technical parameters of artificial aggregates they are produced by mixing different mineral wastes (power plant ashes and coal mining wastes), what purpose is obtaining of proper granulation curve. Unfortunately in such composed aggregates may come to interaction between components of particular wastes, chemical and physical transformations. That is why applying of artificial aggregates on the basis of mineral wastes in spite of positive economical aspects (limiting of costs) and environmental (diminishing of amount of wastes disposed in the environment) may also cause dangers.

One of these dangers is possibility of leaching and migrations to water-ground milieu components of wastes (e.g. trace elements including metals). There are also observed threats connected with phase changes occurring in artificial aggregates after building it in construction layers of roads. The changes of parameters of the milieu (pH, Eh, ions migrating within precipitation waters) lead to dissolving of minerals included in the aggregates, their transport and crystallization of new mineral phases. It is often linked with the change of volume, what leads to deformations of pavement of new built roads. Applying of artificial aggregates on the basis of mineral wastes should be preceded by profound analysis of possible changes and it is advisable to use for the production seasoned wastes which reactivity in hypergenic conditions has already been diminished.

**Key words:** extractive industry wastes, dumps, legislation, waste management.