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## **Development and verification of the technology of waste disposal of chemical processing of germanium concentrates**

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### **Abstract**

The object of research is agglomerated waste from chemical processing of germanium concentrates. The aim of the research was to determine the feasibility of waste disposal with additional extraction of germanium by the method of reduction-sulphiding smelting. In laboratory and pilot-industrial conditions, a variant of electric melting of pellets prepared from crushed mixtures of heat-treated waste, silicate flux (in the form of slag) and carbon (in the form of lignite) was tested. The studies were carried out on a resistance furnace setup equipped with a laboratory bag filter with periodic processing of a sample of pellets. The technological line of the pilot plant consisted of a chamber furnace for drying and calcining, a mixer for introducing lignite into the pellets, a drum pelletizer and an electric furnace with molten slag as a working medium for melting the pellets. The smelting process was carried out with a continuous mode of trapping fumes and periodic discharge of molten slag and metal. As a result of research and testing, the yields and compositions of smelting products were determined: germanium-containing fumes, silicate slag and an alloy based on iron and sulfur. The operating parameters of the electric smelting process have been established: productivity, total amount of exhaust gases and their dustiness, consumption of electricity and electrodes. As a result of experimental data processing, the possibility of extracting 70% of germanium into poor germanium concentrate and transferring the bulk of the waste into ordinary waste products has been shown. The loss of germanium with waste products is 18%, which proves the suitability of the developed and tested recycling technology. The efficiency of using the equipment in the apparatus scheme of drying, pelletizing, reducing and sulphiding electric melting for industrial use is shown.

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