CONCLUSIONS

A review of the various methods preventing the silting of a bed by finely dispersed clay particles makes it possible to select the method that best fits specific conditions. Examples of practical implementation of certain methods are given. The principles of the choice of agents and determination of optimal concentrations for technological processes to prevent solid-phase silting are illustrated by examples.

LITERATURE CITED


STRUCTURE OF FUNCTIONS DEFINING CONTRAST AND CONCENTRATION

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UDC 622.276

The sorting of extracted ore matter according to geophysical rapid analysis has been increasingly practiced by mine operation managers in recent years. In several studies [3-6] it has been shown that sorting as a preconcentration method removes noncommercial material from subsequent processing quite effectively and at a low cost and helps extract additional valuable material from substandard blocks and ore bodies.

The efficacy of geophysical sorting is usually estimated by standard methods of concentration practice. All the necessary estimates are established using an integral distribution function of concentrations

\[ \gamma(\lambda) = -\int_{-\infty}^{\lambda} f(c) \, dc, \]  

where \( f(c) \) is the distribution density of concentration \( c \), and \( \lambda \) is the final concentration at which the ore is divided into two classes. The function \( \gamma(\lambda) \) characterizes the relative yield of ore into the concentrated fraction depending on \( \lambda \). The reverse order of integration

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Fig. 1. Concentration distribution densities (1 - true (initial ore) \( f(c) = 2ce^{-c^2} \), 2 - "apparent" \( f'(c') \) (based on geophysical measurements); 3 - true resultant concentration \( f''(c'') \) (based on exact verification testing); 4 - density of normal distribution of errors (\( \sigma = 0.34d \)).

Fig. 2. Contrast function (1 - \( \gamma_k(\lambda) \), 2 - \( \varepsilon_k(\lambda) \)) concentration function (3 - \( \gamma_{\text{con}}(\lambda) \) and \( d - \varepsilon_{\text{con}}(\lambda) \)). The distribution patterns of concentrations and errors are the same as in calculated functions in Fig. 1.

in (1) represents the specifics of methods of experimental evaluation of \( \gamma(\lambda) \) [4, 5]. The relative yield of the metal in the concentration fraction or its extraction \( \varepsilon(\lambda) \) is defined by

\[
\varepsilon(\lambda) = -\frac{1}{\lambda} \int_{-\infty}^{\lambda} cf(c) dc, \tag{2}
\]

where \( \lambda \) is the average concentration. The metal concentration in the enriched fraction \( \beta(\lambda) \) and in the tailings \( \Theta(\lambda) \) is found from the expressions

\[
\beta(\lambda) = \alpha \varepsilon(\lambda) / \gamma(\lambda), \tag{3}
\]

\[
\Theta(\lambda) = \alpha [1 - \varepsilon(\lambda)] / [1 - \gamma(\lambda)]. \tag{4}
\]

According to [1, 4] a distinction is made between contrast functions \( \gamma_k(\lambda) \) and \( \varepsilon_k(\lambda) \), used to estimate the maximum possible efficiency of ore sorting, and the concentration functions \( \gamma_{\text{con}}(\lambda) \) and \( \varepsilon_{\text{con}}(\lambda) \), which are used to find the actual values that can be achieved by a particular sorting technique.

An empirical evaluation of contrast and concentration functions is performed on a representative sample of specimens (portions). Each specimen (portion) is first subjected to geophysical measurements. Based on the results (e.g., emission intensity \( J \)), one employs a distribution formula

\[
e' = \eta(J) \tag{5}
\]

to determine the metal concentration in specimens \( c' \). Each specimen is then ground and a chemical analysis is conducted to determine the exact concentration \( c \). In order to construct contrast functions, each specimen of weight \( P \) is assigned a serial number \( i \) according to decreasing concentrations \( c \). The contrast function for various \( \lambda \) is found from the expressions

\[
\gamma_n(\lambda) = \frac{\sum_{i=1}^{\lambda} P_i}{\sum_{i=1}^{n} P_i}, \quad c_i > c_{i+1}, \tag{6}
\]

\[
\varepsilon_n(\lambda) = \frac{\sum_{i=1}^{\lambda} c_i P_i}{\sum_{i=1}^{n} c_i P_i}, \quad c_i > c_{i+1}, \tag{7}
\]