

RESEARCH OF THE APPLICATION OF COMBINED ANCHOR SYSTEMS FOR THE MAINTENANCE OF RE-USED MINING WORKINGS

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Purpose. Study the possibility of developing the technical and technological justification of combined anchor systems for the maintenance of re-used mining workings in economic effective level.

Methodology. The studies were carried out through the mine experiments and analysis of the geomechanical model of the elements of the preparatory working "massif – frame –combined anchor system".

Findings. Multivariate calculations proved the efficiency of using rope anchors in the supporting system of preparatory workings, which have a multifunctionality in the work of "deep" hardening of the roof rocks, increasing the stability of the frame support and intensifying the end operations in the area of joining the long wall with the working.

Recommendations are developed and calculation expressions are obtained for the selection of all the necessary parameters for the installation of a combined anchor system in preparatory workings.

The evidence base for cardinal limitation of the manifestations of rock pressure is substantiated due to the formation in the roof of a powerful reinforcing plate with the help of a combined anchor system that provides protection of the frame support against excessive loads and creates conditions for the reuse of preparatory workings.

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Key words: mine experiments, modelling, combined anchor systems

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EVOLUTION OF THE MICROSTRUCTURE OF MINERAL SYSTEMS IN ELECTRIC AND MAGNETIC FIELDS OF WEAK INTENSITY

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Purpose. Study of phase and structural effects in solid mineral systems caused by the development of spin-selective chemical reactions initiated by the action of a weak magnetic field.

Methodology. Experimental studies of the influence of weak electric and magnetic fields were carried out with the aim to establish regularities of microstructural and phase transformation in solids. Numerical modeling involving quantum mechanical regularities were adapted to estimation of energy changes of chemical bond. Raman spectroscopy, electron paramagnetic resonance, nuclear magnetic resonance, infrared spectroscopy, thermogravimetric analysis and differential scanning calorimetry, laser diffraction analysis of particle sizes, etc. were used for physiochemical studies.

Findings. The effect of an abrupt decrease in the electrical resistance of siderite upon heating and the simultaneous action of a weak current and the action of a weak magnetic field is established. The jump in resistance is due to spontaneous formation of a new carbon phase, mainly with an electronic type of conductivity. The action of a weak magnetic field on hard coal leads to an increase in the C:H ratio by 3-7%, a decrease in volatiles by 8-10%; increase the size of microparticles of crushed coal by 35-55%. These changes in composition can be interpreted as one of the possible chemical acts of coalification. The action of an electric field on coal leads to the contrary result, including the stimulated gasification of coal.