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Biotechnology for Coal Desulphuration

Both lignite and black coal often contain substantial amounts of sulphur. Общее содержание серы в углях может достигать 10 - 12 %. While coal combusting, sulphur containing in them turns into sulfur dioxide gas forming sulphuric acid in atmosphere.

The first experiments concerning sulphur removal from coal with the help of microorganisms took place in 1959. They were performed by such scientists and researches as Z.M. Zarubina, N.N. Lialikova, and E.I. Shmuk. During 30 days 23 to 30% of sulphur was removed from coal using *Th. ferrooxidans* bacteria. Later several American researches published results concerning coal desulphuration. With the help of thionic bacteria the researches during four days managed to reduce pyrites sulphur content by almost 50%. Moreover, laboratory tests and industrial tests were performed to reduce coal sulphur content with the help of *Th. Ferrooxidans* microorganisms.

The tests took place in “Horniak” mine (“Selidovuhol” Association). Desulphurization process with the help of microorganisms is to transform insoluble in water and fixed sulphur-containing minerals into water-soluble ones which then are removed from coal by means of water or biosuspension. Thus, content of sulphur in the treated black coal has reduced by 38-42%.

In addition, the technique may be followed by parallel leaching of various metals. It is known that coal contains germanium, nickel, beryllium, vanadium, gold, copper, cadmium, plumbum, zinc, manganese. Parallel obtaining of metals of value in the process of desulphuration will have extra economic effect.

Many countries of the world are engaged in the process of sulphur removal from coal using microbiological technique. According to the up-to-date information, application of the microbiological leaching makes it possible to reduce content of sulphur in coal almost by 100% during 5 days. Microbiological coal desulphuration technique is considered as promising.

Currently, more than 570 mining seams are under mining in Ukraine. The seams differ in their qualitative parameters. Content of total sulphur being the most harmful impurity is one of the most important quality indices. Thus, both the development and implementation of desulphuration techniques will help improve efficiency of coal mining and reduce environmental pressure on environment.