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Underground Coal Gasification as the Alternative Method of Coal Deposits Development

Nowadays research concerning deep coal conversion is being carried out both to have products for electric power generation and to obtain valuable chemicals. The second tendency of coal use is of special importance today. It means obtaining synthetic gas, methanol, liquid fuel, and other scarce products.

Coal use to produce liquid fuel is a commercially developed process; here reactions of coal incomplete oxidation are performed in ground gas generators. However, high cost of gas generators and considerable expenditures for coal mining and transportation is the main disadvantage of this process.

Underground coal gasification (UCG) is the most advanced innovative technology in the sphere of economy. Calculations based on the research carried out at current UCG plants have shown that it is possible to use air blasting for obtaining stoichiometric gas mixture for synthesis of ammonia, methanol, carbamide, and even artificial oil. Gas obtained by blowing and enriched with oxygen up to 45% was considered as the source of raw material.

Underground coal gasification is the alternative method of coal deposits development giving new possibilities in coal seams mining with complex mining and geological modes of occurrence. It combines coal mining, dressing, and conversion. The essence of underground coal gasification is in the following: special different-purpose holes are drilled from the surface to the coal seam; some holes are used to perform coal seam ignition, some other holes are used to blow through them, and the others are used to carry off the produced combustion gas. Thus, all technological operations for underground coal gasification are carried out from the earth's surface. In this case development is environmentally safe.

Main advantages of UCG technology are as follows:

- economic benefit — UCG gas cost value is considerably lower than the one of natural gas extraction;
- high degree of environmental safety – especially comparing to traditional methods of coal mining;
- “gas saving” effect when natural gas is replaced by UCG one at thermal power stations and in boiler houses.

It is necessary to pay attention to possibilities of conversion processes of UCG gas as it has unique composition. UCG conversion can be the basis for the development of various chemical productions including artificial liquid fuel. Moreover, complex extraction and use of chemical elements allow preserving deposits without processing expenditures for effluent gases, wastes, and dust.