Behaviour of mineral phases during combustion of coal waste dumps – experimental study

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Coal waste dumps can be affected by self-heating and self-combustion processes and became an environmental problem. These processes are widely investigated, but as every coal waste dump is unique and the factors which influence and modify the processes are so numerous, it is hard to predict the behaviour of deposited wastes in any individual case. The aim of the experiment was to reduce the number of influencing factors by heating, in an oven, samples of known mineral composition under known conditions. Samples were heated at 960ºC under oxidizing conditions for 74 hours in a pipe furnace (PRC 65M, Czylok). One sample (20W) comprised 53% coal, 24% kaolinite, 21% illite/muscovite and 3% quartz. A second sample (20B) contained 11% coal, 29% kaolinite, 22% illite/muscovite, 28% quartz, 2% feldspars and 1% siderite. Each sample was mixed 1:1 with siderite (containing 76% of the mineral siderite) and pyrite (containing 79% of the mineral pyrite).

After the experiment, sample 20W was more intensely cracked than 20B, less compact but homogeneous. The presence of siderite or pyrite made 20W more compact while burning, limiting oxygen access. Besides layers of varying hematite- and magnesioferrite contents were formed.

After heating, 20B contained half of the quartz originally present and 20W one third. There was also less quartz in samples mixed with pyrite than with siderite.

Twice as much mullite was produced in sample 20W than in 20B, although both primary samples contained similar amounts of clay minerals. Additionally, euhedral mullite needles formed only in 20W.

A small amount of diopside was produced in 20B samples mixed with pyrite or siderite. Much more diopside was produced in 20W with pyrite or siderite. There was no diopside in the original 20B and 20W samples.

The presence of coal matter accelerates changes in coexisting mineral phases. As it burns during the first stage of fire, coal matter provides moisture and the space for newly-formed mineral phases.

Preliminary data on the trace elements concentration in Moldova Nouă porphyry copper deposit (Romania)

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Moldova Nouă porphyry Cu ore deposit is associated with the Suvorov quartz dioritic intrusion from Banat Mts (Romania). The copper mineralization esentially consists of chalcopyrite, pyrite ± magnetite, molybdenite, bornite and enargite as impregnations in intensely sericitized rocks. Trace elements (Au, Ag, Mo, Re, Te, In, Ge, PGE) from bulk rock samples in the porphyry type mineralization were analyzed using ICP-MS method. The results indicate mean values of 0.35 ppm Au, 0.29 ppm Ag, 52 ppm Mo, 0.26 ppm Re, 36.23 ppm Te, 0.11 ppm In, 1.43 ppm Ge, 4.18 ppm Se, 2.32 ppm Bi and ppm As 175. PGE shows very low values (~2 ppb in total). EMPA analyses show notable concentrations of Au in enargite, tennantite and pyrite (100-1300 ppm), Ag in covellite, enargite, tennantite, chalcopyrite (100-1300 ppm) and galena (1600-3000 ppm), Se in tennantite and enargite (300-2200 ppm), galena (800-4000 ppm) and in covellite, chalcopyrite and sphalerite (20-400 ppm), Bi in all sulfides (700-1000 ppm). Ge and In have been detected in some samples of chalcopyrite, galena and sphalerite.

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