INTERACTION OF REDUCED FLUID WITH CARBONATE UNDER PRESSURE AND TEMPERATURE GRADIENT

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In order to study a transport of ore and petrogenic components in reduced gas fluids the reactors have been made. The specified composition of fluid formed as a result of the thermal breakdown of chemical compound or its interaction with metallic aluminum and magnesium at $T=500^0C$ and P=1000 bar. The fluid was supplied into the autoclave by "hot" pipelines. The phase composition of fluid was calculated with the "Selector" program complex.

Monitoring of fluid composition was realized with methods of chromatographic analysis. In systems with low C/H ratio, the experimental and calculated gas composition coincides completely. In a case of high C/H ratio (when carbon isolates as independent phase) the experimental and calculated gas composition coincide qualitatively.

The experiments were carried out with calcite marble and granodiorite under pressure- and temperature gradient. The experiments were preformed on our original device. The rates of fluid diffusion (near $10^{-6}cm^3/sec$) depend on the permeability of samples and crimping pressure. The fluid runs through the sample and collects in a sampler. The reactor permits to make calculation of samples' transmissivity before and after experiments.

Granitic glass enriched of ore elements was used as a source of ore and petrogenic components. The reduced fluid formed as a result of the thermal breakdown of ethyl alcohol. Calculation with the "Selector" program complex yields the following fluid composition at $500\text{-}600^0C$ and 1000-2000bar: graphite – 24% and gas phase – 76% (mainly consisting of methane and hydrogen with insignificant heavier hydrocarbons ranging from C_2H_6 to $C_{10}H_{22}O$). Chromatographic analysis of gases released in the runs shows a qualitative coincidence of calculated and experimental compositions for methane and hydrogen.

The calcite marble after the run under temperature gradient doesn't display essential modification of structure. Fine-dispersed carbonaceous matter precipitates on faces of the sample and precipitates into intergrain space (fig. 1, 2). Total change of primary structure of marble at the expense of

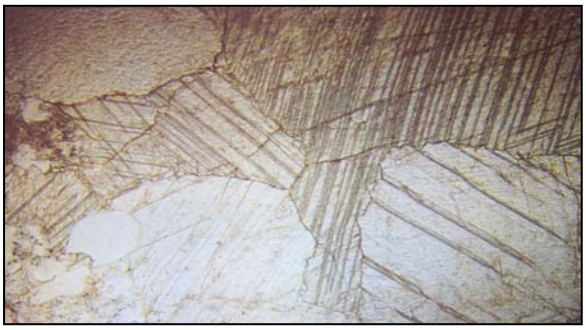

Fig. 1. The initial carbonate matrix

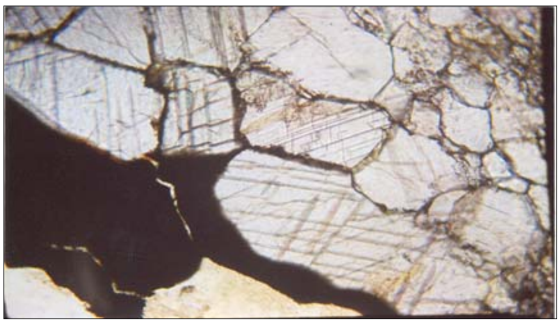

Fig. 2. The carbonate after the experiment

substitution of crystals for more small (0,08-0,10mm) grains proceeds under pressure gradient conditions (500bar). Recrystallized marble has a pronounced idiomorphic granular texture the internal space of witch is filled with fine-dispersed carbonaceous matter with microadmixture of plagioclase. The permeability of the carbonate with fine-dispersed carbonaceous matter precipitated in pore space brings down. The permeability of the carbonate changes nonlineary with time from 10^{-5} to 10^{-3} mD. We carried out a layer-by-layer analysis of experimental samples in order to study the migration of elements in the course of fluid percolation in carbonate rocks. Analysis of a sample following the run with reduced carbon-bearing fluid shows that the fluid flow promotes the transport and selective precipitation of some ore components (Cu, Pb and Sn), and leads to complete recrystallization and loss of Ba from the carbonate. Lead precipitates largely in the region of minimum pressure. The comparison of content of import ore components has shown significant difference in its distribution. Thus, there was no addition of Sn and Pb in carbonate. An addition of Cu in marble is noted at less quantity. Loss of Ba (uniformly distributed at primary carbonate) takes place in margin parts of sample only.

The granodiorite after the run under temperature gradient displays minor modification of structure the internal space of witch is filled with fine-dispersed carbonaceous matter. The sample of granodiorite after the experiment under pressure gradient is broken to pieces. Its internal space of witch is filled with fine-dispersed carbonaceous matter (3-5%). Insignificant mobility of Ba and addition of Be (from the glass) is noted.

Modification of carbonaceous matter and primary formation of intermediate type of dispersed carbonaceous matter and after that formation of graphite (sand buckle size is near 0,001-0,01mm) take place when temperature increases from 500 to 700^{0}C.

Thus, we have experimentally proven that Si, Al and ore components can be transferred with anhydrous reduced fluid and that, it the fluid pressure decreases; they can subsequently be deposited in the fine porous mineral media.

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