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Acoustic emission induced by thermal heating of rocks

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In the connection with deposits of radioactive wastes arises new topical problem to evaluate the response of rock massive due to his thermal loading. This thermal loading can produce propagation and origin of new cracks in rock massive, what results in changes of earlier physical properties; mainly its changes of the massive strength and permeability. Such a problem was solved under laboratory conditions on rock samples, which were subjected to thermal heating under various time regimes. Cylindrical samples of calcite, diameter 30 mm and height 60 mm, were heated by heating unit (wire spiral). This unit was located in axially drilled hole, diameter of which was 3 mm. On the surface of the sample, there was located heat-sensitive elements and the sensors of acoustic emission. Maximum temperature of heating unit was up to 800oC and the duration of the experiment was limited to the value when surface temperature of the rock samples reaches 240oC. Thermal heating was carried out under different time regimes, it means that the maximum surface temperature (240oC) of the rock sample was reached within 1 hour (slow heating) and within 10 hours (fast heating), respectively. Due to the temperature gradient in the rock samples, there was observed and recorded acoustic emission by the set of 6AE transducers. Acoustic emission activity and ultrasonic energy transmition for different heating regimes is discussed in this contribution.