DISSOLUTION RATE AS A FACTOR SHAPING OF UNDERGROUND RESERVOIRS IN THE ROCK SALT DEPOSITS

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The solution mining as applied to the construction of underground reservoirs in rock salt is based on the salt dissolution from boreholes. The dissolution rate coefficient K_D is an important parameter of the dissolution process. It depends on flow regime, velocity, temperature and physical properties of solvent. In previous works [1—3] was determined that initially smooth surfaces of salt samples dissolved by natural convection become rough during dissolution process and the salt dissolution rate will to increase. The evolution of surface roughness was explained by salt granular structure, presence of insoluble inclusions and solvent flow in a boundary layer, and increase of the dissolution rate because of flow regime variations.

In the present work, the influence of porosity and insoluble material content on rock salt dissolution is investigated.

INVESTIGATION PROCEDURE

The rock salt dissolution in water has been studied on horizontally oriented flat samples with the downward plane under the natural convection of solution. Samples were prepared from a core. The dissolution surfaces were bared and polished.

The dissolution rate coefficient was determined from the follow equation:

$$K_D = \frac{\Delta G}{F \cdot (C_W - C) \cdot \tau},$$

where ΔG is loss of salt mass due to dissolution, F is dissolution surface, τ is dissolution time, C_W is solution concentration at the wall being dissolved, C is volume - average concentration of solution.

The sample was dissolved during 10 minutes that confined the roughness evolution on a dissolution surface. The small dissolution surface, about 5 cm^2, allowed to study the influence of pores and caverns on the K_D magnitude.

The surface profile forming by dissolution has been studied on vertical flat samples with 60-70 mm in width and 100 mm high. The samples were dissolved during 12 hours in a large-volume container with an initial concentration of brine about 260 kg/m^3.