Abstract

Experience is considered in experimental simulating the formation of underground cavities in rock salt. Similarity parameters have been defined for the simulation of that process. Experimental simulation has been found to produce both qualitative and quantitative information on the factors determining the formation of underground cavities at various mining and geological conditions.

The formation of underground cavities in rock salt strata by the solving through wells method depends on a great number of parameters. Both natural factors and the selected construction technology determine those parameters. The process of forming an underground cavity in rock salt is of multifactor nature. Besides, control over the shaping of a reservoir for industrial purposes is very complicated. Therefore, the development is required of reliable methods, both theoretic and experimental, for investigations of the rock salt dissolving process and time history of the growth of underground reservoirs. Such investigations are particularly important for developing new techniques and devices.

The present study deals with a review and analysis of methods for laboratory simulation of the formation of underground cavities. The experiments carried out when constructing large industrial cavities produce very valuable information but they are very expensive. Besides, the obtained information content is limited because of the complexity of visual monitoring. The method of experimental investigation on models, which can be implemented both in a laboratory and in a testing area, is free from those shortcomings.

Experimental simulation is based on the similarity theory, which allows extending experimental results to real facilities. Valuable data derived from the use of the similarity theory are given in /1 - 3/.

There are the following conditions for the simulation of an underground cavity in rock salt:

1) geometric similarity;
2) kinematic similarity;
3) time similarity (homochronism)

4) similarity of fluid injection and withdrawal conditions;
5) similarity of the solvent concentration fields in the cavity.

Using the main theorem makes it possible to establish the similarity criteria. Thus, the simulation of the formation process of an underground cavity including withdrawal of the brine through the central casing with the cavern roof protected against dissolution will be carried out at the following conditions: