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Abstract

The leaching rate is a very important factor in the leaching process. It affects the brine concentration obtained at a given moment of cavern development, for a given injection rate and location of the tubing shoes. Laboratory tests of this rate have been conducted on salt samples for decades. It would seem that everything that can be tested has been tested, and that everything that can be learned from laboratory testing is already known. But this is not so.

It is known that boundary layer turbulence occurs during leaching. It is known that the leaching rate depends on the type of salt, the concentration of the leaching solution, the angle of inclination of the leached surface, and the temperature. However, there is no agreement on the form of these dependencies. There are considerable discrepancies between the results reported by different researchers.

From time to time, attempts are made to analyze the flow in a cavern based on the Navier-Stokes equation. Typically, these analyses ignore the most important factor - turbulent diffusion - but without it, the concentration of the produced brine should be close to zero. It is a dead end, that will lead to nowhere.

No one has yet proposed a description of turbulence in a cavern. But is such a description necessary for practical applications?

It seems that there is still no good alternative to the approach used in the UBRO model (the author is a co-author of its algorithm), where the concentration in the cavern is determined on the basis of a simplified flow equation and the gravitational equilibrium condition.

A precise and comprehensive mathematical and physical description of the leaching process is still missing.

Key words

Leaching rate, flow through the cavern, brine concentration in the cavern, cavern development modeling