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Solubility variations of Tirgan limestone in Northeast of Iran with change of PH and temperature

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Abstract

Climate and geological conditions are among main the factors that can affect the erosion and natural dissolution of rocks. In the present study, we investigate the solubility variation of 144 rock samples taken from different depths of Tirgan limestone formation (Kopet-Dagh Mountains) under various pH (CO_2 injection) and temperature conditions during 2880 h of testing. For all of samples microscopic sections were prepared and studied. Furthermore, the porosity and dry unit weight of all samples were measured and some of them were analyzed by scanning electron microscope (SEM) and X-ray diffraction (XRD and XRF). The results show that the effect of temperature variations on the dissolution of the calcite limestone samples is higher than dolomite samples. Moreover, the dry unit weight of micrite samples shows a smaller drop after the dissolution test. The variation of dissolution level in grain-stone type samples was wider, due to a decrease in pH of water. According to this study, the effect of temperature is much less than the increase in the percentage of atmospheric carbon dioxide on the amount of limestone dissolution. Moreover, a sudden increase is noticed in the dissolution of samples with a porosity higher than 3.45%. Considering the geological characteristics of the limestone formation of Tirgan and the results of the experiments, it can be concluded that at the depth ranges of 40–55 m and 145–175 m provide more suitable conditions for the formation of advanced karst systems.

Keywords

Atmospheric carbon dioxide Dissolution of carbonate rocks Tirgan formation
Simulation experiment

Notes

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