

Investigation of Effective Parameters on Water Quality of Iranian Rivers Using Hydrochemical and Statistical Methods

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Abstract : In this study, in order to evaluate water quality of Gamasiab and Gharehsoo rivers located in Kermanshah province, the information of a 5-year statistical period during the years 2014-2018 was used. To evaluate the hydrochemistry of water, first the type and hydrogeochemical facies of river water were determined using Stiff and Piper diagrams. Then, based on Gibbs diagram and combination diagrams, the factors controlling the chemical parameters of the two rivers were identified. Saturation indices were used to predict the possibility of dissolution and deposition of some minerals. Then, in order to classify water in different sections, fourteen water quality indicators for different uses along with WHO standard were used. Finally, factor analysis was used to determine the processes affecting the hydrochemistry of the two rivers. The results of this study showed that in both rivers, the predominant type and facies are bicarbonate of calcite. Also, the main factor in changing the chemical quality of water in both Gamasiab and Gharehsoo rivers is the water-rock reaction. According to the results of factor analysis in both rivers, two factors have the greatest impact on water quality in the region. Among the parameters of Gamasiab river in the first factor, HCO_3^- , Na^+ and Cl^- , respectively, had the highest factor loads, and in the second factor, SO_4^{2-} and Mg^{2+} were selected as the main parameters. The parameters Ca^{2+} , Cl^- and Na have the highest factor loads in the first factor and in the second factor Mg^{2+} and SO_4^{2-} have the highest factor loads in Gharehsoo river. The dissolution of carbonate formations due to their abundance and expansion in the two basins has a more significant effect on changing water chemistry. It has saturated the water of rivers with aragonite, calcite and dolomite. Due to the low contribution of the second factor in changing the chemical parameters, the water of both rivers is saturated with respect to evaporative minerals such as gypsum, halite and anhydrite in all stations. Based on Schoeller diagrams, Wilcox and other quality indicators in these two sections, the amount of main physicochemical parameters are in the desired range for drinking and agriculture. The results of Langelier, Ryznar, Larson-Skold and Puckorius indices showed that water is corrosive in industry.

Keywords : factor analysis, hydrochemical, saturation index, surface water quality

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