The chemical composition of groundwater is the result of continuous water–rock interaction between rain water (and hail or snow) that filters into the ground and the minerals in the lithology it flows through. The objective of this study is to determine the origin of the chemical composition of groundwater in the Loreto area, Baja California Sur. Hydrogeochemical mass balance and water mixture models as well as other hydrogeochemical tools were used. All related processes are marked by an increase in the concentrations of Cl-, Br-, I-, As(total), B-, Li and Sr. We identified seven groups of water corresponding to shallow springs, wells, thermal springs and submarine springs. The hydrogeochemical patterns of the underground water flows (defined numerically and by graphic expressions of water chemistry) are related to the prevailing lithology and are typical of albite, andesine and oligoclase dissolution. The remaining patterns result from the mixture of different groundwater flows, and show influence of ionic exchange processes. Thus, the chemical composition of groundwater circulating through the felsic volcanic rocks and their derived sediments has its origin in the weathering of those materials. Processes of water-rock interaction and water mixture take place among local flows and others of intermediate or regional hierarchy. Furthermore, the influences of the arid climate and intensive agriculture development also play an important role in how groundwater in the area acquires its chemical composition.

**Keywords**

Hydrogeochemical patterns, fluid chemistry, arid zones, Loreto.