

# **GEOCHEMICAL EVOLUTION OF GROANDWATER SYSTEM OF WADI AL-MHAMMADI BAISIN, WESTERN DESERT, IRAQ.**

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## ***ABSTRACT***

Springs and 28 wells penetrate the upper unconfined and the lower confined aquifers in Wadi Al- Mhammadi basin Western Desert of Iraq were selected to study the geochemical evaluation of ground water system by a geochemical modeling techniques. There are many geochemical reactions which responsible for the spatial variations. Most of these ground water is undersaturated with Calcite, Dolomite, Gypsum Anhydrite, as well as cation exchange process but supersaturated with Calcite and Dolomite in certain places. Three groundwater flow paths were selected at 4,5,6 flow paths to calculate the mass transfer of selected mineral phasds which results mainly Calcite, Anhydrite, and cation exchange of Ca for Na precipitation, and dissolution of Gypsum, Ialite ,with dedolomitization in flow paths 5,6 and dissolution of Sylvite with cation exchange of Ca for Na and precipitation of Dolomite and Gypsum in flow path 4, beside the present study aims to calculate the mixing proportions of the two aquifers under study. The proportions were ranged from 1.857o- 64.01'A. There exist high mixing zones at the eastern parts of the study area reflecting the great hydraulic connection between the two aquifers under consider. This connection were because of the exist of Abu-Jir fault and other features that found in this parts of study area. According to this results future well drilling must be taking into the zones of lower mixing ratios to have more suitable groundwater quality and obtain more suitable water for irrigation.

## **INTRODUCTION**

The study area is a part of Western Desert and filling in the Euphrates River about (15 km)south of Hit with an area of (1731 km<sup>2</sup>)(fig. 1). The stratigraphic sequences extend from the Jurassic to the Recent. Many geomorphological features could be seen like Buttes, Messa and the plains covered mainly by a results of weathering and erosion of Carbonate, Gypsum and wadi deposits includes gravel, sands and silt (Al Dulaimi, 1996). Abu-Jir fault represents the main structural feature affecting on the general geological and hydrogeological setting that leads to the appearance of springs. From tectonic view point, the eastern part of the area is a part of Al-Salman subzone, where the western part of the Wadi is a part /of Al-Rutbah- Jazerah subzone which is more stable parts from stable shelf (Buday & Jassim, 1987).

The area under study is characterized by arid climate (Brown & Cocheme, 1973), the mean annual rainfall of (127.3 mm), rainy storms resulting in runoff fowling to the Euphrates River, the mean annual rates of evaporation from Epan class (A) (2494 mm) which exceed the rainfall in the studied area (Al Dulaimi, 1996). Several hydrogeological studies have been carried out around the study area Parson, 1957; Consortium Yugoslavia, 1977; Al-Kufrishipt, 1989; whereas Al-Dulaimi, 1996 study the hydrogeochemical aspects of the water aquifers and the components that effecting on it.