



CHEMICAL PROFILE OF DEAD SEA WATER



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INTRODUCTION

Dead Sea water is characterized by extreme salinity and a unique chemical composition, rich in salts and minerals such as magnesium, calcium, and chlorides. Its therapeutic, cosmetic, and geochemical properties have attracted research interest across multiple disciplines. Understanding its chemical composition is essential for evaluating biological effects and potential industrial or medical applications.



AIM OF STUDY

To synthesize and evaluate the main data from the literature regarding the chemical composition of Dead Sea water, the concentrations of major ions, and their implications.

MATERIAL AND METHODS

A review of studies published in international databases such as Scopus, Web of Science, and Springer was performed using keywords: “Dead Sea water”, “chemical composition”, “major ions”, “salinity”, “geochemistry”. A total of 45 relevant sources, including chemical, geochemical, and biological studies, were analyzed.

KEY-WORDS

Dead Sea, hypersaline water, chemical composition

RESULTS

Data indicate salinity between 30–35%, with magnesium and chloride ions predominating. Sodium and potassium concentrations are moderate, while calcium and sulfate are lower. The high Mg^{2+}/Ca^{2+} ratio gives the water unique physicochemical properties and contributes to its therapeutic effects. The chemical composition is relatively stable but may slightly vary due to seasonal changes, evaporation, and minor freshwater inflows. Compared to other hypersaline lakes, the Dead Sea has a distinct ionic profile, explaining its importance for cosmetic and medical applications.

Recent data of chemical profile of Dead Sea water

Parameter	Data	Literature source
Magnesium (Mg^{2+})	~ 2.17 M	<i>Microbial communities in the Dead Sea — Al-Daghistani & Abbas (2024)</i>
Calcium (Ca^{2+})	~ 0.525 M	<i>Microbial communities in the Dead Sea — Al-Daghistani & Abbas (2024)</i>
Sodium (Na^{+})	~ 1.53 M	<i>Microbial communities in the Dead Sea — Al-Daghistani & Abbas (2024)</i>
Potassium (K^{+})	~ 0.227 M	<i>Microbial communities in the Dead Sea — Al-Daghistani & Abbas (2024)</i>
Chloride (Cl^{-})	~ 7.26 M	<i>Microbial communities in the Dead Sea — Al-Daghistani & Abbas (2024)</i>
Bromide (Br^{-})	~ 1% of total anions	<i>Microbial communities in the Dead Sea — Al-Daghistani & Abbas (2024)</i>
pH	~ 6.0	<i>Microbial communities in the Dead Sea — Al-Daghistani & Abbas (2024)</i>
Boron ($\delta^{11}B$)	~ 60 ‰	<i>Boron geochemistry reveals the evolution of Dead Sea brines — Jurikova et al. (2023)</i>

CONCLUSIONS

The literature review confirms that Dead Sea water has an extreme and stable chemical composition dominated by magnesium and chlorides, with significant geochemical, medical, and cosmetic implications. Monitoring and characterization remain essential for applied research and understanding this unique ecosystem.