Modifying of Eugster & Hardie Brine Evolution Flow Diagram in The Base of Brine of Maharlou Lake

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Abstract

Maharlou lake located in southwest of Iran is an intra-continental sedimentary basin. Its area is about 280 km² extended with an average water depth of 1.5 m during wet seasons. The water level in the lake is controlled by several factors such as runoff volume from Maharlou catchment, underground water seepage, and direct rainfall over the lake and also evaporation. Generally, hydrochemical analysis of water resources showed that the water types are mainly bicarbonates and sulfates due to geology of the surrounding areas. Hydrochemical investigation has been carried out for a time period between 1975 and 2002 using previously published analyses together with new collected water samples. 230 samples were collected during summer 2001, summer 2002 and spring 2005. Results show a change in the brine type through time; with an Mg-SO₄ type in 1970 to an Mg-CI-SO₄ type in 2001 and currently Na-Mg-CI brine type, in recent time, which is comparable with Great Salt Lake in USA. Due to changes in diluted water compositions from HCO₃⁻ to HCO₃⁻, the path of brine on the Eugster and Hardie flow diagram changes from row III to the path II, indicating that the bicarbonate water comes into the lake from a fault occurring in the lake floor.

Key words: Brine evolution flow diagram, Brine, Maharlou Lake, Geochemistry of brine

1. Introduction

In a brine lake, a brine lake may be formed by direct interaction of water and salt crystals (ephemeral saline lake). In the case of Maharlou lake, the brine lake is brine, a brine lake is a brine lake, and the brine lake is a brine lake.
بنیه‌های تغییرات جنی در تمدن دریایی ایران، آزادی ریشه توسط آوست و هارسی (۲۰۰۶)
تنها نیترات جوی از نهاد نمودن تکامل شوراها، بهار شده توسط اکوسی و هاردی...
1. To assess the role of SO₄²⁻ in the formation of Na, Mg, Cl, (SO₄²⁻) + Cd(II) in soils, Domagalski et al., 1989; and Hardie & Eugster, 1987, found that the proportion of Cd(II) adsorbed to soils is dependent on the concentration of SO₄²⁻.

2. The presence of Na, Mg, Cl, (SO₄²⁻) in soils can significantly affect the mobility of Cd(II) in the soil system. This is because Cd(II) has a strong affinity for the anions present in the soil solution, which can lead to the formation of Cd(II) complexes that are less mobile and less available for plant uptake.

3. The study by Domagalski et al., 1989; and Hardie & Eugster, 1987, suggests that the concentration of SO₄²⁻ in soils can influence the availability of Cd(II) for plant uptake, which can have implications for the ecological and human health impacts of Cd(II) contamination.

4. The study also highlights the importance of considering the interactions between soil inorganic ions and trace metals in soil systems, which can significantly affect the mobility and availability of trace metals for plant uptake.

5. Furthermore, the study suggests that the management of soil inorganic ions and trace metal contamination is crucial for the sustainable use of soil resources and human health.
نسبه نیترات جلی در نمونه تکامل نورهای؛ اثر شدید کوست و هاری...
شکل 1- نقشه آبی‌گاری حوضه آبریز دریاچه مهارلو/وزارت آب و برق، ۱۳۵۰ (با تذکری نگی نیاز است)

شکل 2- نمودار پاییر کاتیون‌ها و آنیون‌های اصلی موجود در شوتاب و کلیه آب‌های وارده به دریاچه مهارلو
شکل ۳ - نمودار استیف کاتیون‌ها و آنیون‌های اصلی شوراها در دوره وضعیت برابر و کم آبین

شکل ۴ - تیپ‌های مختلف آب‌هایی که در اثر هوای گی شیمیایی سنگ‌های مختلف با آب‌های طبیعی یا ایجاد می‌گردد (Jones & Deocampo، 2004).

(نبهار، سال شانزدهم، شماره ۲۳)
شکل 5- نمودار جریانی پیشنهادی نکات شورایه (برگرفته از نمودار جریانی Eugster & Hardie، 1978)

جدول 1- مقایسه غلظت یونهای مختلف شورایه در یکه مهارلو در چهار زمان مختلف.

<table>
<thead>
<tr>
<th>SO₄</th>
<th>Na</th>
<th>Cl</th>
<th>Mg</th>
<th>Ions</th>
<th>Year</th>
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<tr>
<td>473</td>
<td>313</td>
<td>56506</td>
<td></td>
<td></td>
<td>1970</td>
</tr>
<tr>
<td>5801</td>
<td>9983</td>
<td></td>
<td>8283</td>
<td></td>
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<tr>
<td>10409</td>
<td>11502</td>
<td></td>
<td>1313</td>
<td></td>
<td>2002 (Semi dry)</td>
</tr>
<tr>
<td>3474</td>
<td>3671</td>
<td></td>
<td>396</td>
<td></td>
<td>2005 (Wet)</td>
</tr>
</tbody>
</table>
References


