

The selective sorption of K^+ from water solutions by Ca-zeolites

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The geochemistry of potassium during subduction-related processes does not seem to be a solved problem yet. The important role of subducted oceanic lithosphere as a potassium source for alkali-rich subduction magmatism was repeatedly discussed [1]. However, MORB basalts contain less than 0.16% of K_2O [2] and so cannot be considered as important source of this component. To avoid such discrepancy, some authors consider terrigenous sediments to enrich subducting lithosphere in K_2O [3]. We suggest the alternative mechanism of this enrichment consisting in cation exchange between seawater and zeolitized rocks of the ocean floor. To prove the probability of such process we carried out the experimental modeling of interaction between Na^+/K^+ water solutions and Ca-zeolites as common secondary minerals appearing during hydrothermal alteration of basalts.

The water solution with Na^+/K^+ molar ratio close to that of seawater (0.06) was used in our experiments. The obtained results for laumontite and stellerite are given in the Table 1.

%	Laumontite	Stellerite
CaO	7.34 → 5.51	8.03 → 2.27
Na ₂ O	1.56 → 2.67	0.14 → 4.71
K ₂ O	0.47 → 1.43	0.05 → 2.46

Table 1: The change in the cation composition of Ca-zeolites due to 30 days of hydrothermal treatment by Na^+/K^+ solution.

As one can see, a significant change in cation composition of Ca-zeolites occurs after interaction with Na^+/K^+ water solution. Moreover, the K^+/Na^+ molar ratio of alkali cations absorbed by laumontite (0.58) and stellerite (0.35) clearly demonstrates the selective sorption of K^+ from solution with low K^+/Na^+ ratio (0.06). Such phenomenon caused by features of zeolites crystalline frameworks probably plays an important role in interaction of zeolitized rocks of ocean floor with seawater and enriches the sedimentary part of oceanic lithosphere in potassium.

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[1] Schmidt (1996) *Science* **272**, 1927-1930. [2] Melson *et al.* (1976) *J. Am. Geophys Union Trans.* **4**, 351. [3] Konzett & Fei (2000) *J. of Petrology* **41**, 583-603.

Integrated geo-microbial and adsorbed soil gas studies with seismic data interpretation for successful evaluation of Hydrocarbon Resource Potential

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The hydrocarbon microseepage of light hydrocarbon gases (C1 – C4) can be identified using geochemical means, which provides evidence of charge traps and structures. These light hydrocarbon microseepage gases likewise directly influence shallow anaerobic soil and sediment environments, creating a spectrum of microbial activity. The indicator light hydrocarbon oxidizing bacteria are isolated and enumerated using microbial techniques. Therefore, an integrated and complementary microbial microseepage signature can identify gaseous hydrocarbon microseepage, which occurs directly above charged oil and gas reservoirs in on/offshore region. Present day exploration for oil and gas requires a coordinated effort based on the synergy of geophysics, geology, and geochemistry. The proposed study aims at integrated approach interpreting the geochemical and seismic data to understand the mechanism of hydrocarbon seepage and to evaluate the hydrocarbon potential as well. The main objective of the study is to integrate the seismic and the geochemical data. The seismic gives a clear picture of subsurface tectonics, structures, faults, fractures and reservoir distribution and extension (Attributes) Integrating the subsurface with the surface geochemical data, helps to know the seepage pattern and type of system. Such a study, will lead to the successful exploration. It will be more useful in the virgin areas, and also during Exploration and Development of the fields.

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