

Experimental Investigation of Abnormal Chlorinity Observed in Natural Gas Hydrate Layer

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Abnormal chlorinity has been observed in natural gas hydrate layer comprising methane hydrates (MHs). In this study, we designed an electric circuit system linked to the high-pressure reactor in which the chloride ion concentration can be directly measured within reasonable accuracy under in situ conditions of the deep-sea floor pressure and temperature. Chloride concentration increased under a fast MH formation rate, but no noticeable concentration change was detected under a relatively low-rate. Furthermore, we suggested that the MH formation rate must be maintained at least $\sim 10^2 \text{ mol m}^{-2} \text{ yr}^{-1}$ so as to efficiently enrich chlorides and retain the acquired chlorinity. The present experimental system does not fully reflect the relatively minor effective variables such as vertical advectons in real system, but the results seem to be sufficient for revealing chloride enrichment phenomena induced by fast MH formation rate with free methane gas.