

Lithium isotope systematics of gas hydrate-bearing fluid off Naoetsu in Japan Sea

Yoshiro Nishio[1]; Hideaki Machiyama[1]; Hitoshi Tomaru[2]; Ryo Matsumoto[3]

[1] KOCHI/JAMSTEC; [2] New Energy Resources Research Center, Kitami Institute of Technology; [3] Earth and Planetary Sci., Univ. of Tokyo

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To provide new constraint on the origin gas hydrate off Naoetsu in Japan Sea, we analyzed concentration and isotope ratio of lithium (Li) of gas hydrate-bearing fluid. Li, the lightest alkali metal, is a fluid-mobile element having two stable isotopes, ^7Li and ^6Li , with abundances of 92.5% and 7.5%, respectively. Amount of Li leached from sediment to fluid drastically increases with the temperature, and once leached Li is kept in fluid while decreasing temperature (cooling). The analyzed samples were gas hydrate-bearing fluid off Naoetsu in Japan Sea. The results show that Cl/Li ratios of gas hydrate-bearing fluid are significantly lower than seawater value. From the linear correlation between Cl/Li and $d^7\text{Li}$ value, it is inferred that Li in gas hydrate-bearing fluid of studied area are results of two component mixing. One is seawater and the other should be fluid from deeper part. Assuming that the Cl/Li ratio of deep-fluid end-member is 0, the $d^7\text{Li}$ value of deep-fluid end-member is estimated as +7 per mil.