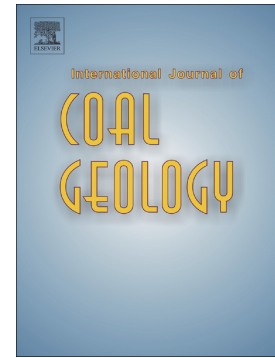


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# Biogenic Methane Generation using Solutions from Column Reactions of Lignite with Hydrogen Peroxide

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## ABSTRACT

A microbial consortium associated with coal from the coal-bearing Soya Formation in the Tempoku Coalfield (northern Hokkaido, Japan) was cultivated with reaction solutions of lignite and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) (i.e., chemically solubilized lignite) to evaluate *in situ* biogenic methane generation. Column experiments with H<sub>2</sub>O<sub>2</sub> flowing through pulverized lignite achieved maximum concentrations of dissolved organic carbon, acetic acid, and formic acid of 6,330, 612, and 1,810 mg/L, respectively. Cultivation experiments using the above reaction solution as a substrate for methanogens produced nearly 6 cm<sup>3</sup> CH<sub>4</sub> per g lignite with a maximum rate of 0.14 cm<sup>3</sup> per g per day. Pyrosequencing analysis of the microbial consortium after cultivation confirmed the presence of methanogens, such as *Methanoregulaceae* and *Methanosarcinaceae*, as the dominant archaea in the culture. The

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