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**Hole-bottom freezing technique based on phase change heat transfer for
gas-hydrates sampling: Efficiency optimization of refrigeration change of
phase**

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gasification refrigeration.

Abstract: Coring is the key to the exploration and exploitation of natural gas hydrate. Less than 60% of gas-hydrate cores can be retrieved by the existing pressure preservation technique because of mechanical valve sealing failures. To solve this problem, a freezing sampling method was proposed. The cold-alcohol was formed by dry ice gasification refrigeration to reduce the temperature of the hydrate core in the drilling-hole and to prevent the decomposition of the gas-hydrates. However, gasification efficiency of dry ice in the narrow sampler's internal space is notably low, and the cryogenic alcohol cannot meet the requirements of the frozen hydrate core. In this paper, three different structures of the mixing chamber are proposed to improve the

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