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降温过程对粗砂土中甲烷水合物形成的影响

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The effect of cooling process on the formation of methane hydrate within the coarse sand

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摘要

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摘要 多孔介质中甲烷水合物的形成和分解研究对于了解自然界多年冻土中的天然气水合物具有重要意义. 本文通过3组10次甲烷水合物形成实验, 研究了降温过程对粗砂土中甲烷水合物形成的影响. 实验结果表明, 降温过程对粗砂土中甲烷水合物的形成过程有较大的影响, 在反应釜内温度降到0℃之前约90%的甲烷水合物已经形成, 且降温速率越慢, 水转化为甲烷水合物的转化率越高. 0℃以下冻结过程对甲烷水合物的形成基本没有影响, 但在冻结土体开始融化时发现有水合物二次生成的现象.

关键词 甲烷水合物, 降温过程, 粗砂土, 降温速率, 转化率

Abstract: The research on the formation and dissociation of methane hydrate in porous media is very important for understanding the natural gas hydrate in permafrost regions. 10 times of the experiments were conducted to research the effect of the cooling process on the formation of methane hydrate within the coarse sand. And the results showed that the cooling process affected the formation of methane hydrate within the coarse sand very much; about 90% of the methane hydrate had been formed before the temperature inside the pressure vessel decreased to 0℃ which meant that little methane hydrate was formed during the frozen process; and the slower the temperature decreased, the greater the converting rate from the water to the hydrate was. When the frozen sand began to melt, the formation of methane hydrate was observed.

Keywords Methane hydrate, Cooling process, Coarse sand, Cooling rate, Conversion rate

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