ABSTRACT

Storing and transporting natural gas as hydrate medium from remote gas fields is one of the most promising applications of gas hydrates. This is supported by the fact that natural gas hydrate (NGH) is not decomposed at atmosphere and freezing point (-15~--20°C), so-called self preservation effect. From the previous studies, the NGH process was found to be about 18-24% lower in capital cost than the LNG process and safer than compressed natural gas process. In this study, new designed continuous hydrate production and dehydration system having a volume of 80L was proposed for more effective hydrate formation and dehydration, which is based on the principle of centrifugal force. A major aspect in this process is that hydrate formation and dehydration can be performed in the same space of hydrate reactor. In order to evaluate the new system, we have installed the optical Raman probe at the reactor to analyze real-time Raman spectra and occupancy of small cage (5\textsubscript{12}) and large cage (5\textsubscript{12}6\textsubscript{2}) during methane hydrate formation stage. In addition, the water conversion to methane hydrate was measured after dehydration stage by centrifugal separation.

Keywords: natural gas hydrate (NGH), methane hydrate, NGH chain, dehydration, centrifugal separation

INTRODUCTION

In recent years, a demand for the natural gas industry has been increased because of global warming and stable supply of the clean energy. However, the production of natural gas is limited. Gudmundsson et al.[1, 2] suggested that natural gas hydrates are expected to become a new medium for energy storage and transport because of their high stability below 273 K at atmospheric pressure. They also published a feasibility study showing a substantial cost saving (24%) for the transport of natural gas in hydrated form compared to liquefied natural gas (LNG).