Syntheses of thermosensitive poly(N-substituted-N-vinylamide) derivatives bearing ethylene glycol chain for kinetic hydrate inhibitor

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Abstract: Gas hydrate is expected as a new energy material, however, problems could be occurred in a pipe line. For example, when gas hydrate is formed in the gas pipeline, the pipeline gets clogged up with gas hydrate, possibly causing explosion accidents. For this reason, the kinetic hydrate inhibitor (KHI), which could be absolutely imperative material in order to prevent the generation of gas hydrate in pipeline. In the previous research, we revealed the possible application of poly(N-vinylamide) derivatives as KHI, which possessed thermosensitive properties, such as lower critical solution temperature (LCST) behaviour. In this study, we synthesized thermosensitive poly(N-vinylamide) derivatives (Figure), bearing oligo ethylene glycol chain and thermosensitive behaviors of their polymers were investigated. Thermosensitive poly(N-vinylamide) derivatives were synthesized by free radical polymerization with azobisisobutyronitrile (AIBN) as a radical initiator in toluene. Copolymers were purified by reprecipitation. LCST behaviors were observed by UV transmittance (500 nm).

Chemical structures and compositions were determined by ¹H NMR. (400MHz D₂O)

Keywords: Kinetic hydrate inhibitor; Poly(N-vinylamide) derivatives; Thermosensitive behavior; Amphiphilic polymers