Study on Performance and Preparation of Pre-anticorrosion Liquid for CO_2 displacement

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Abstract: Under the guidance of the "dual carbon" strategy, CCUS technology has been widely applied in the field of oil and gas development. CO_2 displacement technology, as one of the main CCUS technologies, has also been widely applied in the field of Oil and gas stimulation. However, in CO_2 environment, there are serious corrosion problems with downhole tubing strings. In this article, pre-anticorrosion working fluid system for oil displacing by CO_2 is introduced to suppress the corrosion of downhole tubing during oil displacing.Through designing the molecular structure and optimizing the synthesis conditions, imidazoline groups and n-SiO_2 were simultaneously introduced into the PSI ring opening reaction. Then the composite of inorganic nanoparticles and organic polymer segments is made as the main agent. The main agent is finally compounded with selected small molecule corrosion inhibitor to produce pre-anticorrosion working fluid. Indoor simulated field experiments show that the system has excellent anti-corrosion performance in environment with large temperature differences and high CO_2 flow rates.The effective period is over 30 days.Under the continuous working conditions of inflation-sealing-depressurization, the average corrosion inhibition rate is 91.17%, and the pitting corrosion inhibition rate is 86.96%.

Keywords： CO_2 displacement,corrosion,Pre-anticorrosion,Working fluid system