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# Study on the Emulsification Characteristics of Heavy Oil during Chemical Flooding

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Chemical flooding is a very important method to the efficient development of heavy oil reservoir. A clear understanding of the relationship between emulsification characteristics of heavy oil during chemical flooding and test methods that current used to evaluate the properties of chemical flooding agent can be useful for oilfields development of the heavy oil. In this study, the oil-water interfacial tension (IFT) and oil in water (O/W) emulsion properties (emulsification state, droplet size, viscoelasticity and stability) formed by six chemical flooding agents at different concentration are tested. Then, combined with the heavy oil flooding dynamics, the emulsification characteristics of heavy oil during the chemical flooding process of are studied and the influence mechanisms of O/W emulsion on oil recovery are clarified. Finally, the emulsification effect of heavy oil on injection profile turnover is studied by parallel sand-packed tube experiments. Studies show that all six chemical flooding agents can greatly reduce the IFT of heavy oil-water (more than 90%). However, the stronger the emulsification ability, the smaller the droplet size, the better the viscoelasticity and the stronger the stability of O/W emulsion, the better heavy oil recovery of the chemical flooding agent. This is mainly because the most effective action stage is the time it takes from the chemical flooding agent injected to the O/W emulsion front reach the production outlet. During this period, the amount of emulsified heavy oil, the width of emulsification zone and the properties of formed O/W emulsion all affect the heavy oil flooding efficiency. Therefore, when screening chemical flooding agents, the emulsification speed, the droplet size and the viscoelasticity of formed O/W emulsion are the primary evaluation factors. In addition, through the parallel sand-packed tube experiment, it is found that the stronger the emulsification ability of chemical flooding agent, the better the performance of formed O/W emulsion, the stronger the profile turn over ability. For reservoirs that water flow channel has formed, using profile control agents to effectively block dominant flow channels can improve the emulsification ability of chemical flooding agents, thus achieving the purpose of improving the swept area. The research results can provide guidance for the screening of chemical flooding agent with emulsify character and construction process optimizing in heavy oil reservoirs development.

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