VIETNAM NATIONAL UNIVERSITY – HCMC
HCMC UNIVERSITY OF TECHNOLOGY

SOCIALIST REPUBLIC OF VIETNAM
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DISSERTATION'S INFORMATION

Dissertation's title: **ALKALI - SURFACTANT - POLYMER FLOODING FOR ENHANCED OIL RECOVERY: FROM OPTIMAL CHEMICAL FORMULATION EXPERIMENTS TO FIELD SCALE SIMULATION**

Major: **PETROLEUM ENGINEERING** Major code: **62520604**

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Summary of new academic and theoretical contributions of the dissertation:

Alkaline–Surfactant–Polymer (ASP) is a combination of chemical agents applied in the flooding stage of Enhanced Oil Recovery (EOR). However, selecting a suitable ASP formulation for a specific oil field is highly complex and time-consuming. The study "**Alkali–Surfactant–Polymer Flooding for Enhanced Oil Recovery: From Optimal Chemical Formulation Experiments to Field Scale Simulation**" aims to optimize the experimental process of determining the chemical formulation in order to minimize the number of experiments while still ensuring comprehensive coverage and high accuracy of results.

The type II emulsion state (microemulsion) formed between the ASP (Alkali/Surfactant/Polymer) solution and oil plays a crucial role in the success of the ASP flooding process. A high-quality microemulsion phase has ultralow interfacial tension, thereby increasing oil recovery. In this study, optimal experimental design and response surface methodology were employed to predict the optimal chemical concentrations in the ASP solution that would produce the best microemulsion. The optimized ASP formulation was then prepared and injected into specially prepared core samples to assess its effectiveness. According to the results, the total optimal

surfactant concentration in the ASP solution is 0.57 wt%, and the highest effective injection volume is 19.33% of the pore volume.

Furthermore, the study conducted reservoir-scale simulations using the optimized ASP formulation. These simulations predicted the cumulative oil recovery from ASP flooding and compared it with the cumulative oil recovery over the same period using waterflooding. The results were used to evaluate the field applicability of the process.