Bohai Oilfield Heavy Oil Processing and Transportation Technology Research

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ABSTRACT

The development of offshore heavy oil field need to reduce investment, energy consumption for oil and gas processing and transportation, we should improve the process, in order to simplify the process by using advanced technology, reduce processing facilities, improve equipment utilization, reduce energy consumption. This paper analyzes the current new technology of heavy oil processing in domestic and foreign oil field being used and in the test phase. The heavy oil in Bohai oilfield with viscosity reduction and experimental research, applied to Bohai heavy oil dehydration conveying process, as well as the feasibility and foreground of application in offshore heavy oil processing.

KEY WORDS: Heavy oil; Heavy oil dehydration technology; Technology of heavy oil pipeline; Diluting with light oil

INTRODUCTION

There is large and increasing proportion of heavy oil in oil and gas reserves in China and how to reduce the cost to maximize the heavy oil and super heavy oil production is the biggest problem facing China's petroleum industry. Onshore oil field has been using steam drive as the main development technology. The viscosity of degassed heavy oil at reservoir temperature is 10000 ~ 50,000 mPa. s, and super heavy oil (natural asphalt) more than 50,000 mPa.s. In recent years, China's offshore heavy oil development has been increasing. There have been new heavy oil field/block put into production. How to reduce investment and increase economic benefits of heavy oil field is the focus of consideration. However, due to high density, high viscosity and poor fluidity it is difficult to achieve economic, safe and stable transportation.

Compared with the onshore oil field heavy oil reserve, the offshore heavy oil field well depth is relatively deeper, and there are more constrains on offshore platform space, equipment deploying, and Capex/Opex. Bohai heavy oil reserve is very large, well is deep, and characteristic viscosity range is wide. The oilfield is located in the Bohai Bay area, oil containing layers are mainly Qianshan, Guantao and Minghuazhen group, and crude oil viscosity range under reservoir conditions is 50 ~ 10,000 mPa - S.

The heavy oil is categorized as naphthenic base crude oil: density @20 C is 0.96 ~ 1.07, viscosity @50C is 488mPa.s ~ 12800 mPa.s, oil/gas ratio is low (< 305m³/m³), wax content is low, resin and asphaltene content is higher (more than 30%). Due to the high viscosity, easy emulsification and viscosity change sensitively to emulsification, the dehydration of crude oil is very difficult. It is critical issue to improve the heavy crude oil processing efficiency.

PRESENT OFFSHORE OILFIELD HEAVY OIL TREATMENT TECHNOLOGY

Typical Treatment Process

At present, the offshore heavy oil treatment process mostly adopts the traditional three-stage dewatering process: free water removal, thermochemical dehydration and electrochemical dehydration (Lu, 1999); shown as Figure 1.

![Figure 1. Typical Main Process Flow Diagram](image-url)