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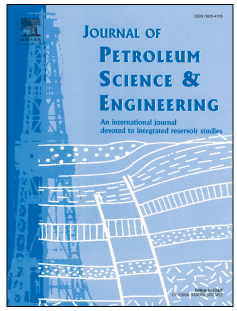

The influence of electromagnetic waves on the gas condensate characterisation: Experimental evaluation

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The influence of electromagnetic waves on the gas condensate characterization: Experimental evaluation

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Abstract

In this study, we investigated and analyzed the effects of microwaves on the properties of gas condensate. The results of gas chromatography show that under microwave radiation, the carbon composition of the gas condensate sample changes with different durations of the irradiation, and these changes in certain compounds do not have a clear trend. Due to the appearance of cracked compounds during the microwave heating process to the super-heated state, these materials cannot be removed completely from the gas condensate sample. The analysis of cracked gases also suggests that with an increase in the duration of the irradiation, the amount of light compounds increases and C_{7+} compounds decrease. Except for the oxygenates and paraffin compounds that are produced in the liquid, increasing the duration of irradiation reduces the presence of other compounds. The sulfur content of the gas condensate decreases during the irradiation by increasing the heating time. Sulfur leaves the gas condensate sample in the form of H_2S in gas and partly in produced liquid. The results of the Fourier transform infrared (FTIR) spectra also show that, due to microwave radiation, looser and more polar bonds crack and create a wider range of compounds. With an increase in the time of microwave irradiation, the length of existing bonds increases in normal methylene paraffin. With microwave radiation, the polar and lighter components are cracked at all times and separated from the liquid system and consequently reduce the amount of polarity fraction (length of absorption CH_3/CH_2). The results of this paper show that microwaves can be used in gas condensate reservoirs for upgrading by desulfurization and also increasing the gas flow by reducing the polar compounds that play an important role in the fluid flow in porous media.

Keywords: Gas Condensate; Microwave; Cracking; desulfurization; Upgrading.

1. Introduction

Microwave technology as an energy source provides access to dielectric and ionic heating mechanisms and enables accelerated temperature rises while providing cost, time, and material homogeneity benefits that are significantly improved over conventional heating approaches. The