



Elemental Sulphur Induced Formation Damage Management in Gas Reservoir

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Abstract

Sulphur compounds are considered as the most hazardous non-hydrocarbons in reservoir fluids, because of their corrosive nature, deleterious effects of petroleum products and tendency to plug porous medium which may impair formation productivity. Precipitation and deposition of elemental sulphur within reservoirs, near well bore region may significantly reduce the inflow performance of sour-gas wells and thus affect economic feasibility negatively.

Studies have sought that almost all deep sour reservoirs precipitate elemental sulphur either occurring as a result of decomposition of H₂S to give elemental sulphur or occurring as indigenous usually referred to as native sulphur as a dissolved species. Uncontrollable elemental sulphur induced formation damage has been one of the profit hurting syndromes that occurs in deep water sour gas reservoir.

Meanwhile many correlations have been formulated thermodynamically to predict the occurrences of elemental sulphur but little information related to effect of its saturation on gas production and its corresponding formation damage.

This paper presents an improved model for predicting elemental sulphur saturation and corresponding formation damage around the well bore. Results show that the minimum pore spaces blockage time was over-estimated by previous formulation.

Introduction

Sour gas reservoirs with high content of hydrogen sulfide are distributed widely around the world. Solid elemental sulfur which dissolves in the gas phase originally in the reservoir in form of sulphur compound may precipitate when the thermodynamic conditions of the temperature, pressure or composition change in the process of production. The phenomenon may lead to deposition of solid elemental sulfur near the wellbore hence block the pores in the formation and significantly affect the gas productivity (Roberts, 1997; Kuo, (1966 & 1972); Shedid et al. 2002; Al-Awadhy et al. 1998; Fadairo and Falode, 2009; Fadairo and Ako, 2010; Abou-Kassem, 2000).

Formation damage which is the inevitable end effect of the precipitation of elemental sulphur is defined as obstructions occurring in the near-wellbore region of the rock matrix primarily as a result of permeability reduction. Many of the operational and reservoir parameters influence sulphur deposition around wellbore have been identified by several literatures (Abou-Kassem, 2000; Hyne, 1968 and Civan et al. 1989).

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