Research on the Corrosion Mechanism of Tubing in Deep Coal Seam Gas Wells in Linfen Area

ZHANG YUN[1], ZHANG KANG[1],YANGLIN[1],QI Wei[1],YAN JIN[1], WNAG ChaoMin[2]

1.PetroChina Coalbed Methane Company Limited，CHINA

2.State Key Laboratory for Performance and Structure Safetyof Petroleum Tubular Goods and Equipment Materials，CHINA

Abstract: The potential for Deep coalbed methane development in the Linfen area is substantial. During the development process, oil pipes are typically used for gas well production. However, prolonged corrosion resulting from the high mineralization of formation water renders these oil pipes susceptible to perforation issues, significantly hindering the advancement of deep coal-bed gas extraction. Both domestic and international academic communities have conducted extensive research on wellbore corrosion, there remains a paucity of studies specifically addressing corrosion in deep coal seam gas wells. In order to elucidate the corrosion mechanism of the oil pipeline in Linfen deep coalbed methane well, the formation water and gas producing components were analyzed by chromatography. The micromorphology and mineral composition of the products were studied by scanning electron microscopy and X-ray diffraction. By combining the experimental results with the inherent characteristics of underground conditions, the corrosion mechanism of deep coal seam and the main control factors affecting wellbore integrity are further discussed. The results indicate that: (1) The oil pipe corrosion of deep coalbed methane Wells in Linfen block is mainly electrochemical corrosion and scale corrosion. (2) The high salinity and high content of carbon dioxide in the water quality of the formation are the main factors causing corrosion. (3) The high intensity drainage and production of the rod pump further aggravate the corrosion rate of the tubing.

Keywords Deep coalbed methane; High mineralization; Corrosion mechanism; Control factors;

Reference

[1] Jiyin Cao , Tai Ma , et al. Unveiling the inhibition of high-pressure CO_2 flow accelerated corrosion at gradual contraction and gradual expansion tubings Corrosion Science[M] , Corrosion Science,2024,239, 112375.

[2] Baojun Dong , Dezhi Zeng, et al. Insight into polymer concentration, temperature, CO_2 content, and Cl^- content on corrosion of N80 steel tubing in polymer flooding[M], Materials and Corrosio.2023,73(6),943-961.

[3] Nan Ji , Mifeng Zhao et al. Collapse failure analysis of S13Cr-110 tubing in a high-pressure and high-temperature gas well[M]. Engineering Failure Analysis. 2023,148, 107187.