Elmi Qaynaqlar XXVIII Respublika Elmi Konfransı / 15 İyul 2026 / 38-41
Scientific Resources XXVIII Republican Scientific Conference / 15 July 2026 / 38-41
DOI: https://doi.org/10.36719/2663-4619/2/38-41

TƏBİƏT ELMLƏRİ

NATURAL SCIENCES

Corrosion Problems in Gas Condensate Wells and the Necessity of Improved Drilling Fluid Systems in the Baku Archipelago

Sevda Aliyeva[1*], Gunay Khasmammadova[2], Shahla Zeynalova[3]

Keywords: *corrosion, gas-condensate wells, pitting corrosion, tubing, H_2S, drilling fluids, Baku Archipelago*
Açar sözlər: *korroziya, qaz-kondensat quyuları, çuxur korroziyası, borular, H_2S, qazma mayeləri, Bakı arxipelaqı*

Azerbaijan's oil and gas production industry is expanding rapidly, leading to increased operational pressure on drilling and production infrastructure. Alongside production growth, corrosion-related degradation of equipment has become a serious technical and environmental issue (Abasov, 2009; Gurbanov, 2023). Corrosive components such as hydrogen sulfide, carbon dioxide, and low-molecular organic acids significantly reduce the service life of tubing and well equipment.

[1]Nakhchivan State University, Nakhchivan, Azerbaijan
[2]Azerbaijan Technical University, Baku, Azerbaijan
[3]National Aviation Academy, Baku, Azerbaijan
[*]Corresponding author. E-mail: sevdaeliyeva@ndu.edu.az

Field Observations. Field studies conducted in wells of the Bulla-Deniz and KNGKM fields revealed the following:

- severe external pitting corrosion on tubing strings;
- through-wall corrosion in couplings and nipples;
- higher corrosion intensity on external surfaces compared to internal ones;
- degradation of the mechanical properties of the circulation valve.

For example, well No. 78 (depth 5,910 m) showed deep pits up to 3 mm and corrosion spots up to 40 mm in diameter (Hasanov, 2024; İbrahimov, 2024; Mehtiyev, 2025).

Severe downhole environments containing corrosive agents can significantly increase the rate of metal deterioration in well equipment and production systems. Traditional drilling and completion fluids often do not provide sufficient resistance to these conditions, leading to higher operational costs and a greater likelihood of equipment failure. The use of advanced fluid formulations incorporating multifunctional additives offers an effective way to improve corrosion control, extend equipment service life, and support more sustainable field operations (Safarova, 2022; Safarova, 2023).

Corrosion continues to be a major challenge in gas-condensate operations of the Baku Archipelago, where aggressive downhole conditions contribute to the deterioration of tubing and associated equipment. The use of enhanced drilling fluid formulations containing multifunctional additives offers an effective approach to minimizing corrosion damage while increasing the operational reliability and service life of production systems.

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