ARC'18
مؤتمر مؤسسة قطر السنوي للبحوث
QATAR FOUNDATION ANNUAL RESEARCH CONFERENCE
البحث والتطوير: التركيز على الأولويات، وإحداث الأثر
R&D: FOCUSING ON PRIORITIES, DELIVERING IMPACT
19-20 مـــارس
19-20 MARCH

مـؤسـسـة قـطـر
Qatar Foundation
لإطـلاق قـدرات الإنـسـان.
Unlocking human potential.

Energy and Environment - Paper Presentation

http://doi.org/10.5339/qfarc.2018.EEPP605

Effect of Trace 100 vppm H2S on the Corrosion Behaviour of Plain Carbon and Microalloyed Steels in a Predominant Sweet Environment in High Flow Regime

Mobbassar hassan Sk*, Aboubakr Moustafa Abdullah, Noora Hamad S Al-Qahtani, Nick Laycock, Mary P Ryan, David E Williams

Center for Advanced Materials, Qatar University
* skmobba@qu.edu.qa

We investigate the effects of the presence of trace (100 vppm) H2S on the corrosion behaviour of plain carbon steel and its various micro-alloyed counterparts in a CO2 saturated (sweet) brine (0.5 M NaCl) environment, in a high flow regime (1000 RPM), at 80oC in a slightly acidic environment (pH 6.6). Potentiostatic current transients indicate that the presence of trace amount of trace H2S in a predominantly sweet regime, where the partial pressure ratio of CO2 and H2S (pCO2:pH2S) is ~10000:1, shows a very different corrosion behaviour for both plain carbon steels and as well as micro-alloyed steels. In presence of trace H2S, current density starts dropping much earlier compared to H2S free standalone CO2 environment. Trace amount of H2S also induces faster passivation of the corrosion scale, especially for alloys with relatively high Mo (0.7 wt.%) and Ni (1.4 wt.%) content, suggesting that Mo and Ni have a strong effect in presence of trace H2S. On the basis of available literature, we speculate that the effects observed in presence of trace H2S is due to the formation of Mackinawite which forms on the steel surface immediately via solid state reaction and micro-alloying with some specific elements catalyzes the formation of mackinawite and/or assists formation of more stable sulfide phase(s), causing a faster current drop and passivation. Modeling of the hypothesis is currently in progress.Keywords: Micro-alloying, CO2 corrosion, Flow effect, RDE, Plain carbon steel, Cr-Mo-Ni steel. Figure: Potentiostatic current transient

دار جامعة حمد بن خليفة للنشر
HAMAD BIN KHALIFA UNIVERSITY PRESS

Cite this article as: Sk M et al. (2018). Effect of Trace 100 vppm H2S on the Corrosion Behaviour of Plain Carbon and Microalloyed Steels in a Predominant Sweet Environment in High Flow Regime. Qatar Foundation Annual Research Conference Proceedings 2018: EEPP605 http://doi.org/10.5339/qfarc.2018.EEPP605.

for various plain carbon and micro-alloyed steels. Condition - pH: 6.6, Temp: 80oC, Flow: 1000 RPM, @ anodic over potential: Open Circuit Potentials (OCP) + 150 mV