STEM-Corrosion™

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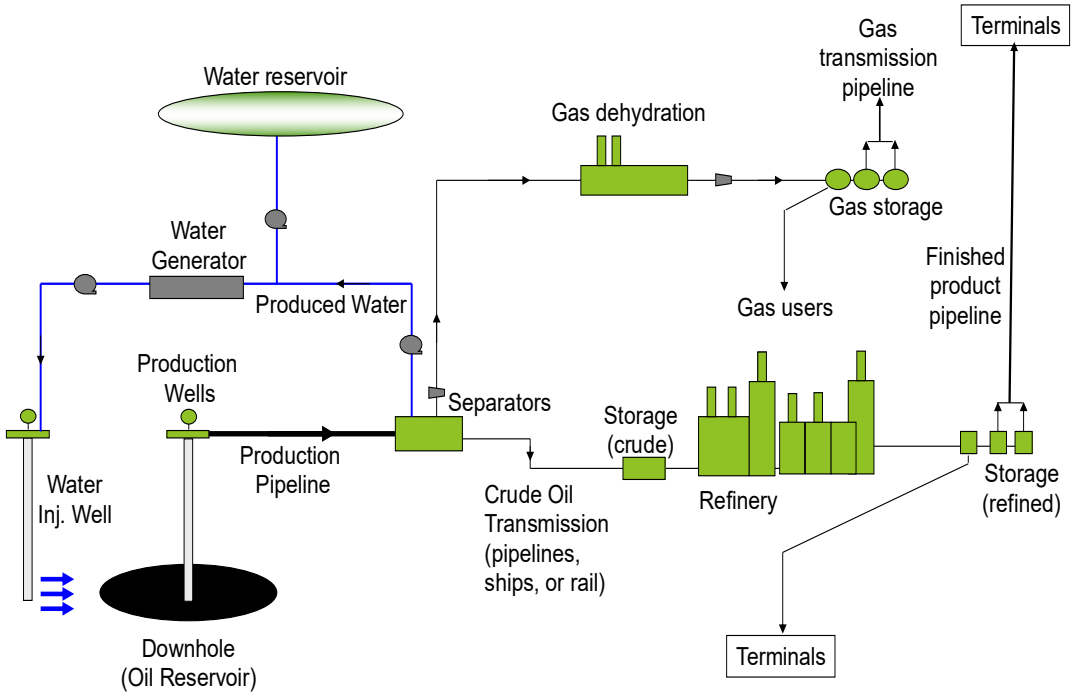
Industry Best Practices for Corrosion Inhibitor Testing

Addition of corrosion inhibitors is time-tested and effective method to control internal corrosion of oil and gas industry infrastructures. In terms of corrosion inhibitor usage, the oil and gas industry can be divided into 23 applications.



1. Downhole; 2. Production; 3. Untreated water; 4. Treated water; 5. Water injection wells; 6. Crude oil transmission; 7. Refinery; 8. Finished product pipeline; 9. Wet gas (water/acid gas); 10. Wet gas (containing water); 11. Gas transmission; 12. Gas distribution; 13. Storage/ mothballed/ preserved pipeline; 14. Sour and sweet gas treatment; 15. Water for steam generation; 16. CO_2 injection; 17. Hydrotesting; 18. Oil separator; 19. Hydrogen/HC pipeline; 20. Biofuel (bioethanol/biodiesel); 21. Storage tanks (Internal); 22. Storage Tanks (external) and 23. Strong acids]

To establish corrosion inhibitor test methods, and the utility of these tests for the 23 applications, a Joint Industry Project (JIP) was established. In Phase 2 of the JIP (carried out in 2024), to facilitate corrosion inhibitor testing and selection, the following characteristics of all 23 applications were described:

1. Operating boundaries
2. Corrosion types and control strategies
3. Establishment for the need for corrosion inhibitors
4. Laboratory methodologies for evaluation of efficiency of corrosion inhibitors
5. Laboratory methodologies for evaluation of secondary inhibitor properties
6. Standard test conditions in which corrosion inhibitors should be evaluated
7. Factors operators should consider evaluating corrosion inhibitors for their operating conditions
8. Decision making flowcharts (for inhibitor efficiency and secondary inhibitor properties evaluation)
9. Quality control and quality assurance in the laboratories during inhibitor evaluation
10. Field monitoring of corrosion inhibitor performance
11. Field logistic issues to be considered while applying corrosion inhibitors
12. Special observations/considerations specific to the application
13. Efficacy of corrosion inhibitor evaluation (TEAS)
14. Abbreviations and definitions
15. References.

Appendices

A. Salient Features of Phase 1 interviews
B. Wall Shear Stress Discussion
C. Considerations for the Selection of Screening Tests
D. Quality Control and Quality Assurance
E. Field Monitoring
F. Field Logistic Issues
G. Precautions in Using Electrochemical Techniques in Corrosion Rate Measurement and Corrosion Inhibitor Evaluation

To facilitate efficient and economical evaluation, the laboratory methodologies are broadly classified into three groups:

- Screening tests
- Selection tests.
- Special tests to investigate the ability of corrosion inhibitors to control special corrosion threats, e.g., underdeposit corrosion (UDC) and top of the line corrosion (TOL).

The principle behind categorization of efficiency tests is as follows:

1. Screening tests (are carried out for shorter duration under standard conditions) may be used by chemical suppliers or owners/operators, as an economic means of developing a shortlist of chemicals from several chemical suppliers.

2. Selection tests (carried out for longer duration simulating as close as possible the field conditions in the laboratory) may be used by owners/operators to select a chemical (or a few chemicals) for field testing or field use.
3. The screening may also be used by owners/operators to ensure quality of chemicals (selected based on selection tests) at various frequencies during operation.
    - Some operators may prefer to use selection tests (rather than screening tests) to ensure quality of chemicals.

Details of inhibitor usage in each application are described in individual reports (23 individual reports (1 report per application) and 1 index report[1].

[1]Industry Best Practices for Corrosion Inhibitor Testing for use in **Oil and Gas Industry**, Report 2019-10-02-00.