



CSI – Corrosion ‘Schmoo’ Investigation

The importance of proper inhibitor selection

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VEEGEO
Geothermal Energy

Introduction

Veegeo is a team of geothermal specialists

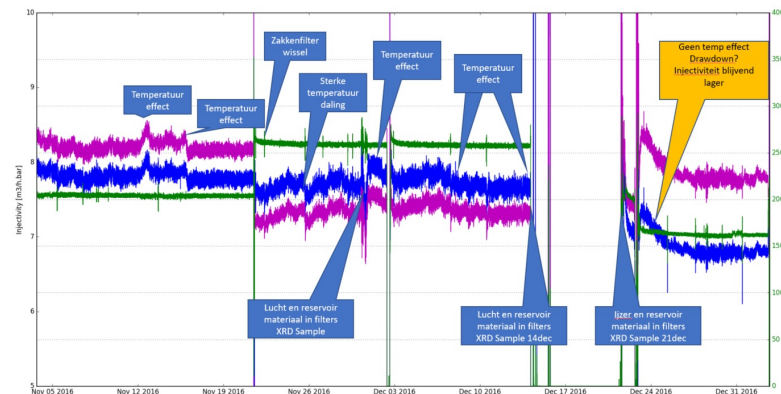
Involved in many of the running geothermal operations in the Netherlands since 2012:

- Various engineering & project management roles
- Currently responsible for production of 5 doublets (10 wells)

Completion and well interventions



Production Engineering & Monitoring

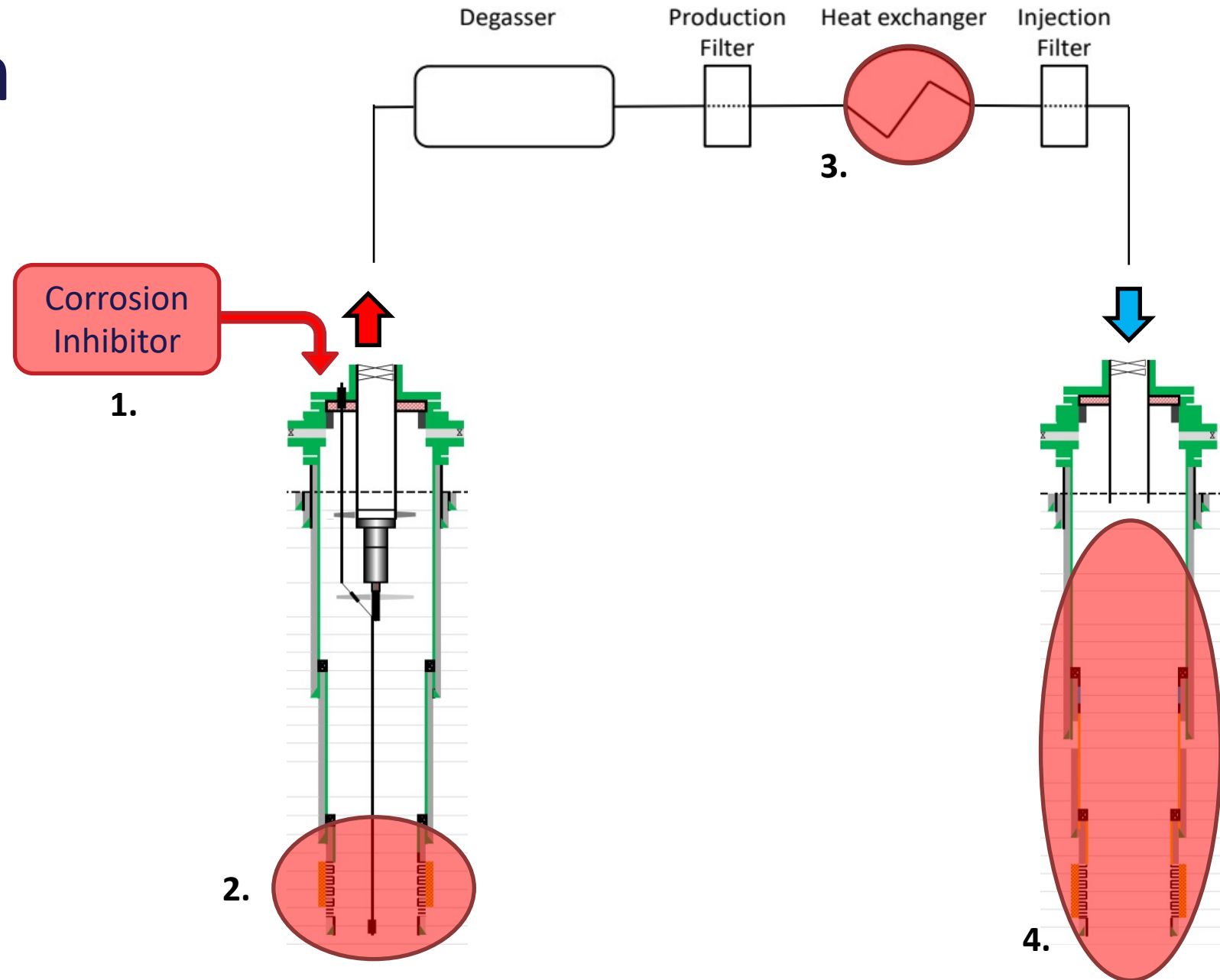


Well Integrity Management



Scene description

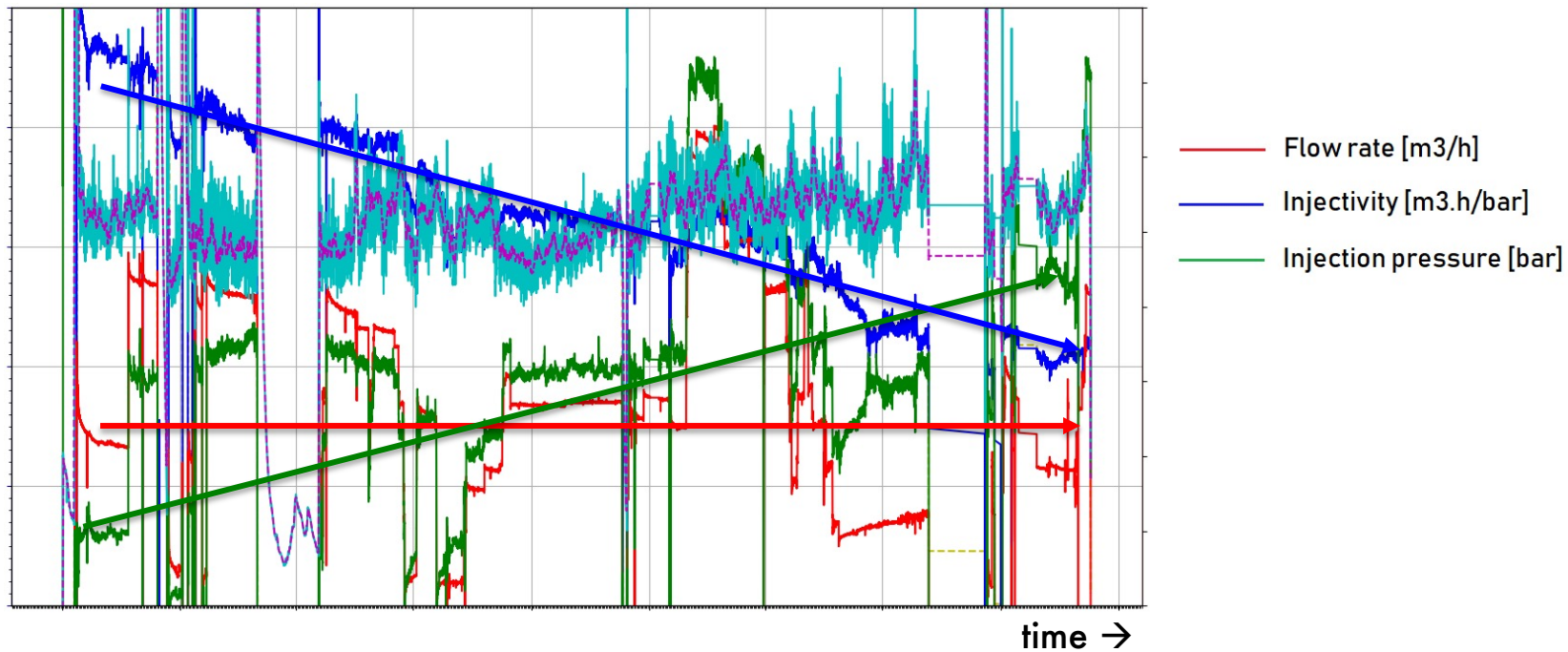
Film forming corrosion inhibitor required to protect the casing against corrosion



Problem identification

- ❑ Rapid injectivity decline
40 % within 2 years
- ❑ Filter fouling

Injection profile

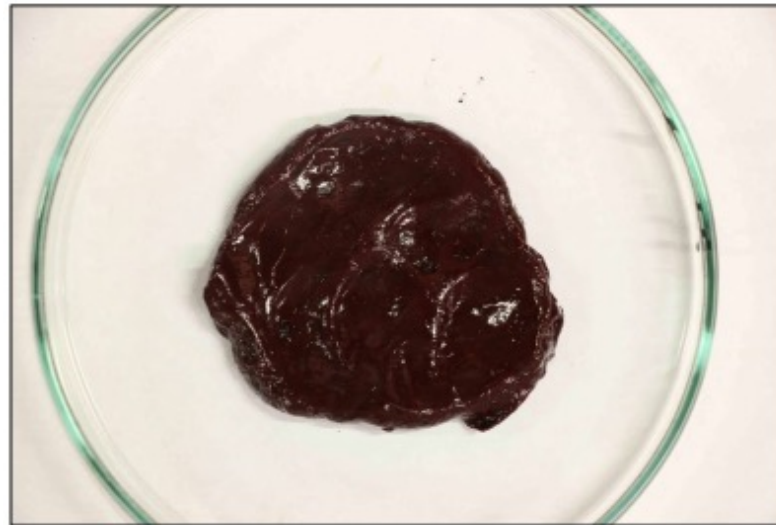


Evidence



Definition of Schmoo:

‘A paste, solid, or oily substance which adheres to surfaces with which it comes into contact, and is difficult to remove’

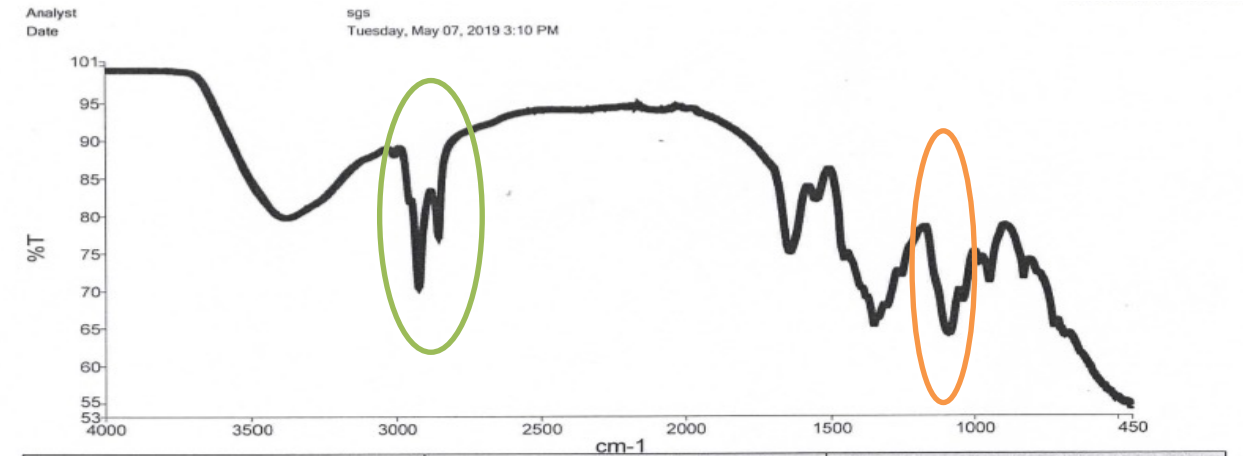


Autopsy Analysis

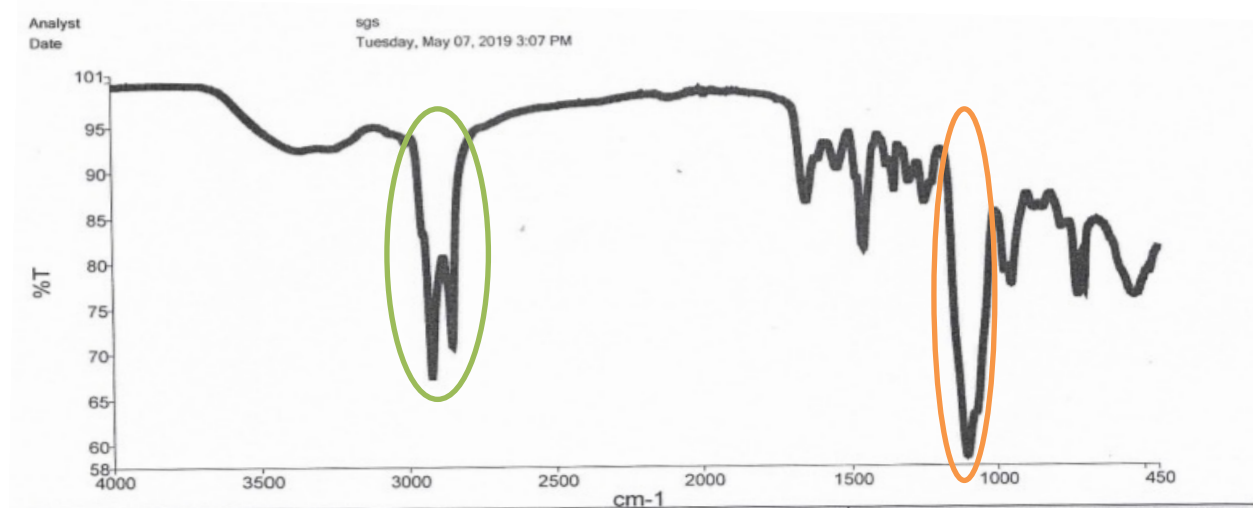
Deposit primarily consistent of corrosion inhibitor

Further analysis revealed that the inhibitor stability during temperature changes:

- Injection from surface to downhole producer causes the inhibitor to lose its volatile components before being injected with the flow
- Cooling this water to 35°C changes the viscosity making the inhibitor gunk



Schmoo



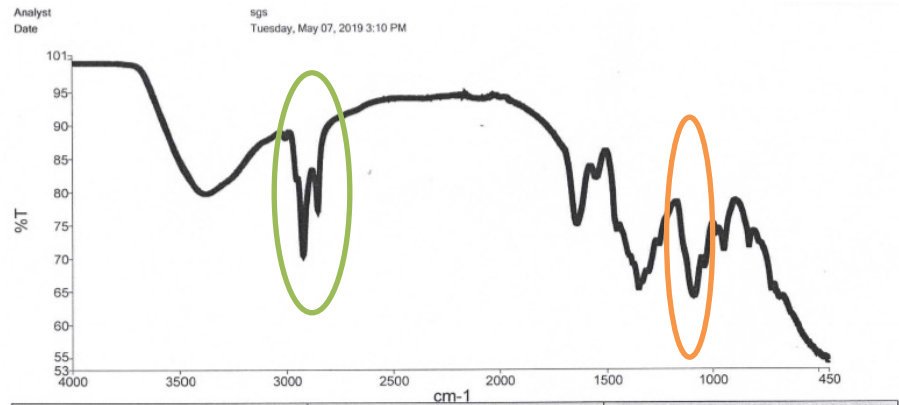
Evaporated inhibitor

Permanent solution

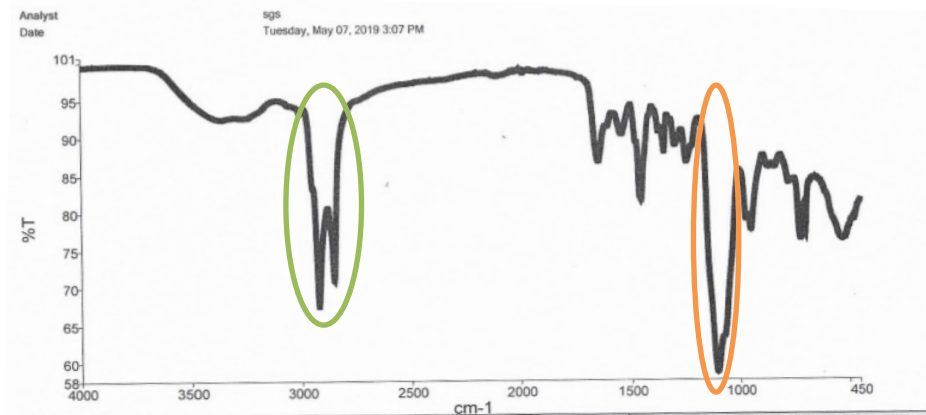
- Analyse other available geothermal-safe inhibitors
- Design a lab experiment that would mimic the exposure in the well:
 - Cyclic temperature testing
 - Compatibility with reservoir water
 - Compatibility with schmoo
 - Infrared spectroscopy
 - Dissolvability



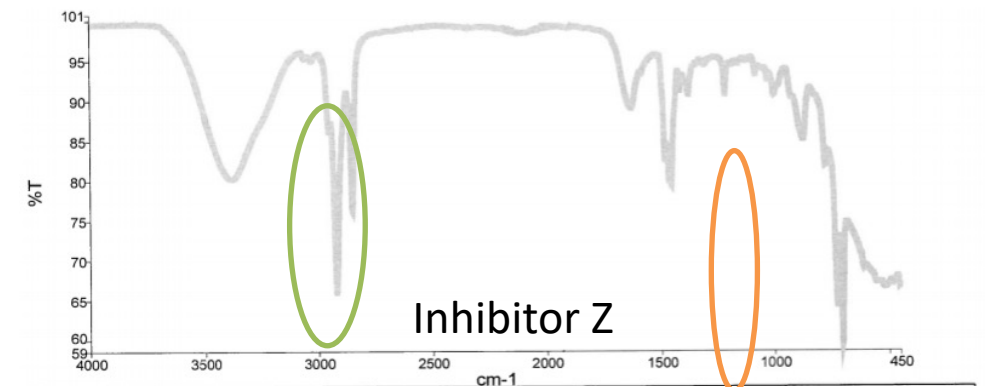
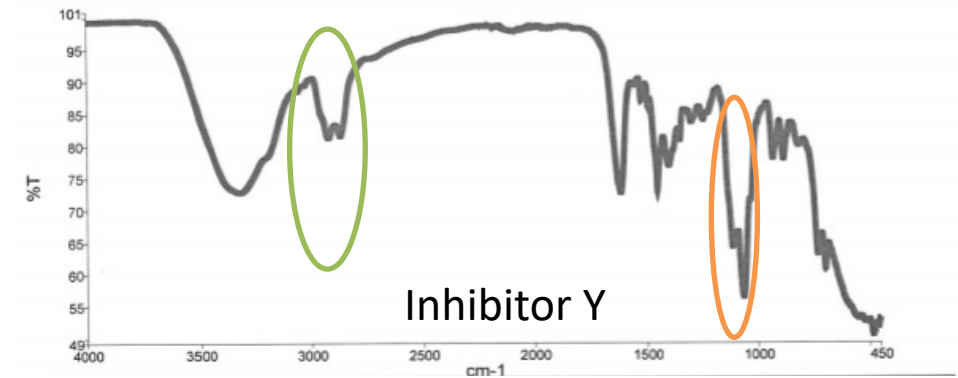
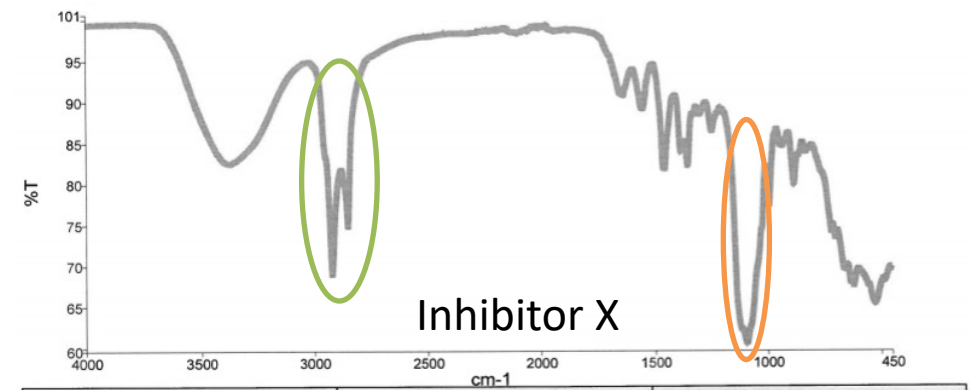
Permanent solution



Schmoo

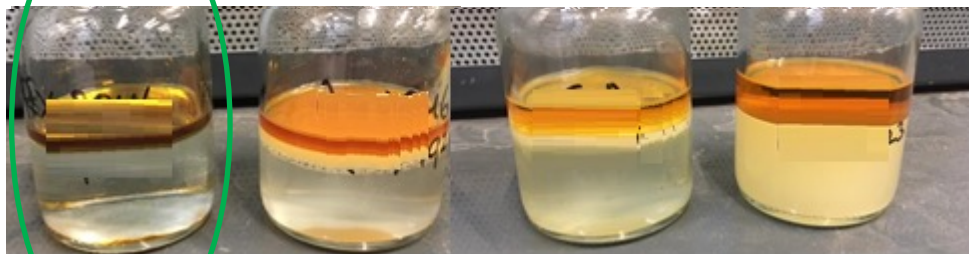
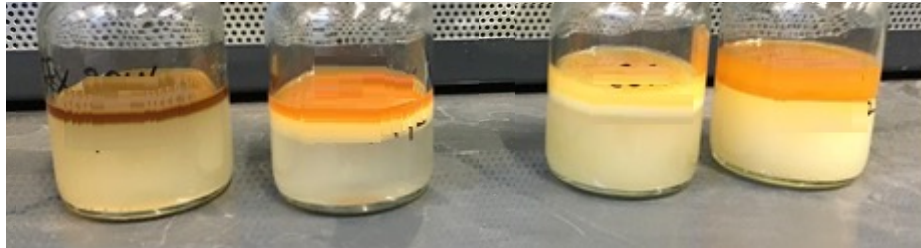


Evaporated inhibitor



Injectivity recovery

Step 1: Finding the correct solvent



>12h soaking

Step 2: Field implementation

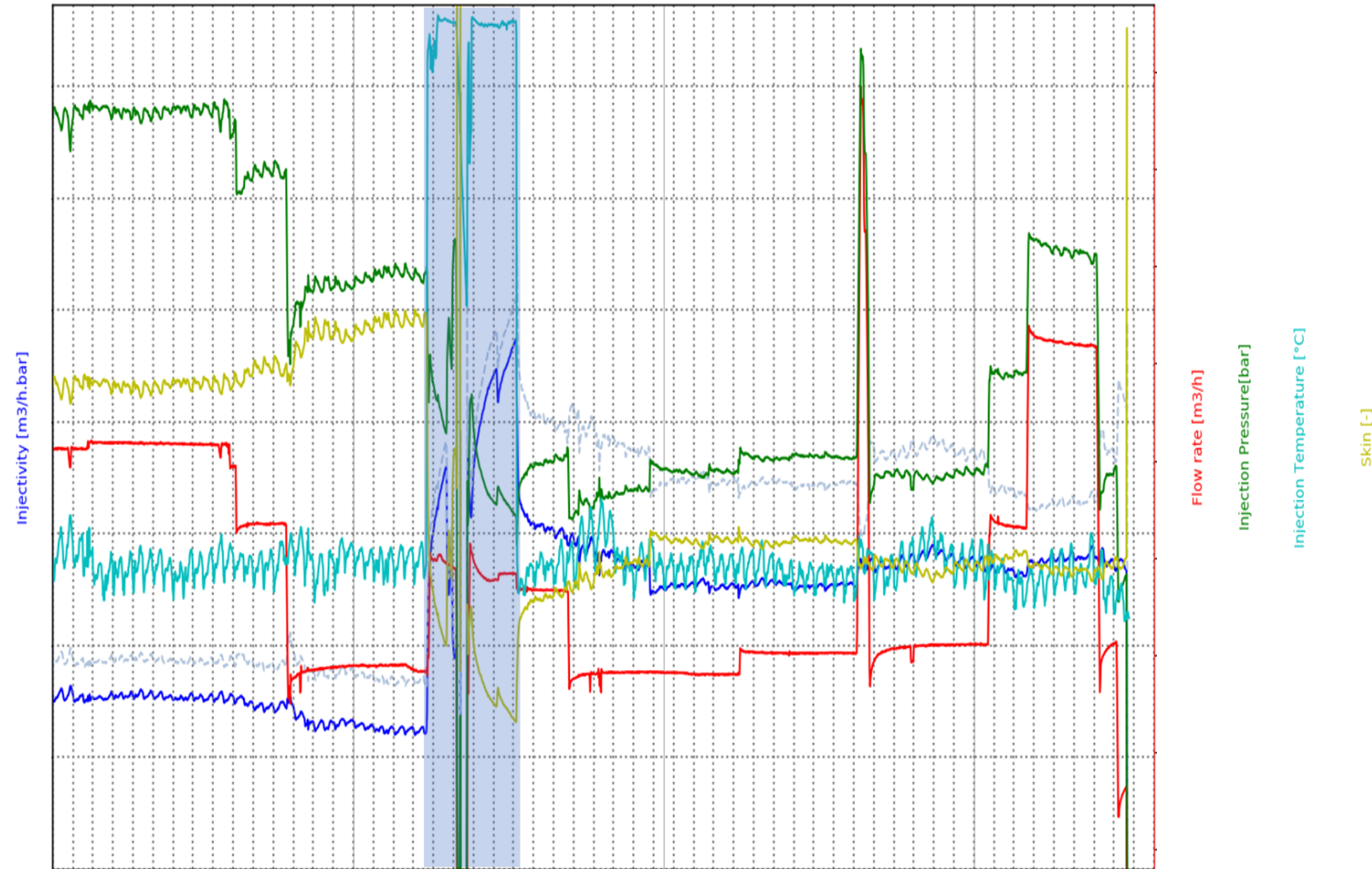


Case Closed

- ✓ Integrity of well unaffected
- ✓ Schmoo treatment effective
- ✓ Inhibitor change-out without issues
- ✓ Good performance new inhibitor

Main improvements:

- ❑ Injectivity improved by 50%
- ❑ Corrosion rate decreased

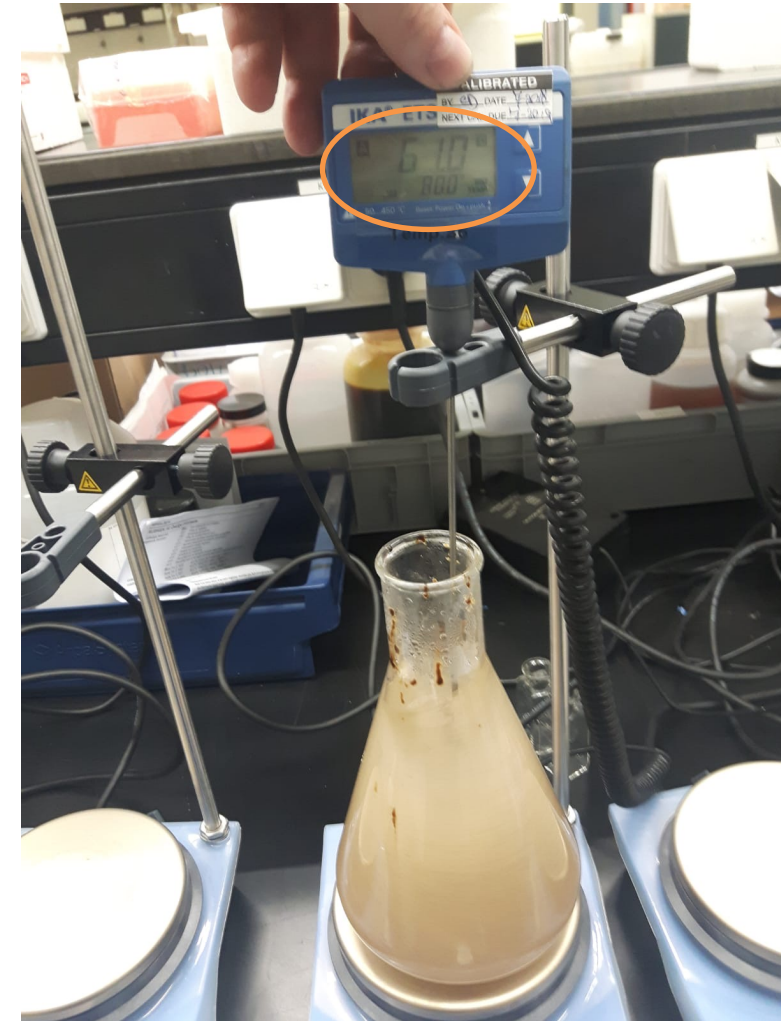
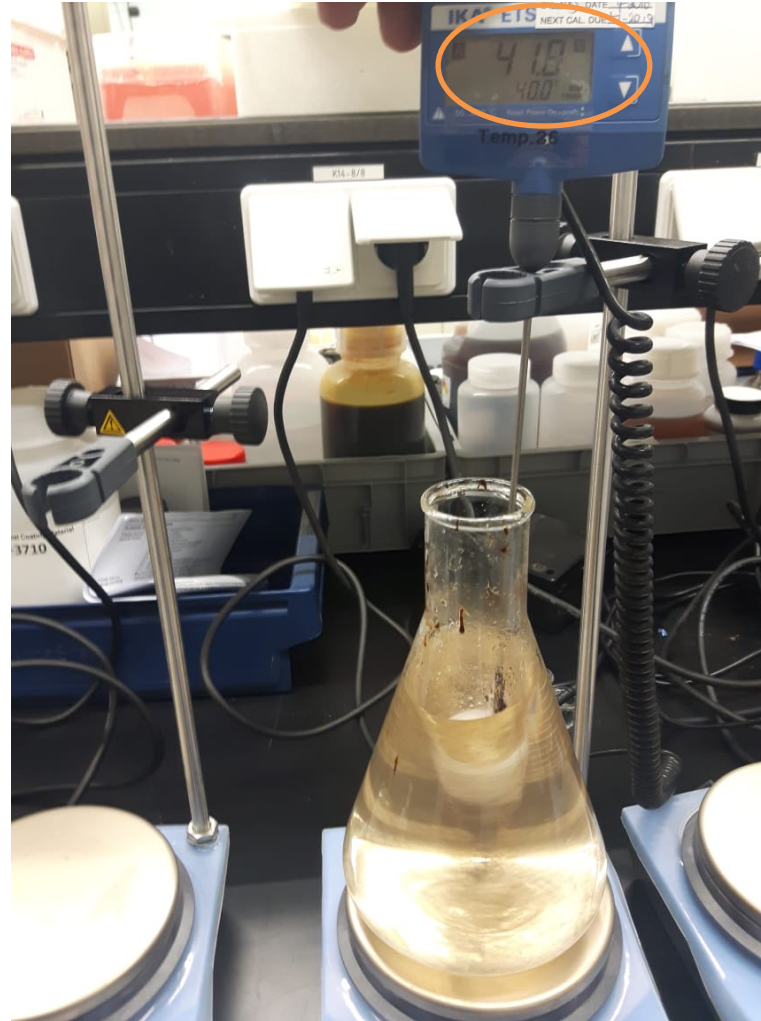
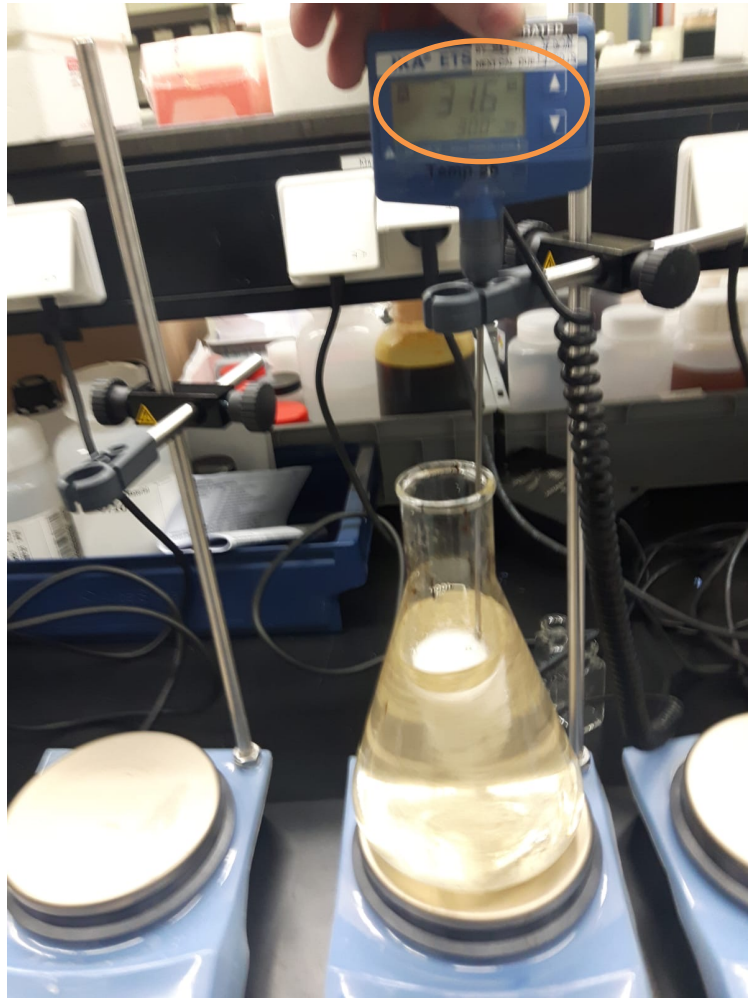




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Performed tests



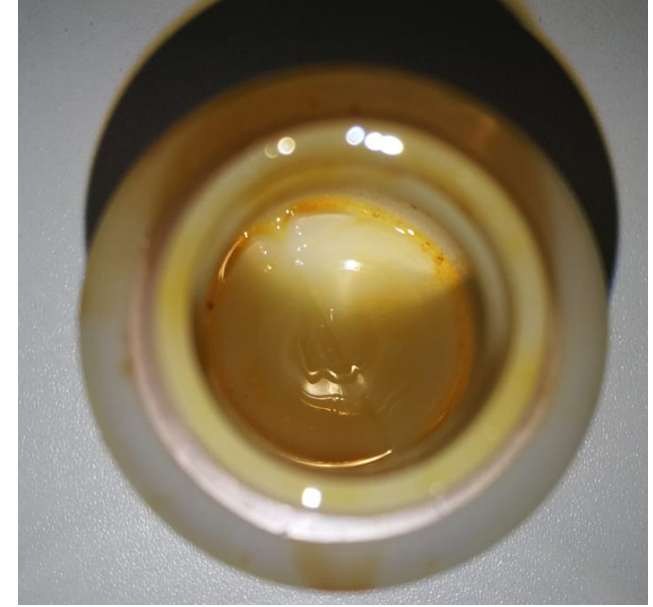
Injectivity recovery



Pure schmoo



Pure schmoo + solvent > 24h



Residue after treatment

Corrosion improvement

