

# *Requirements for Specialised Inhibitor Tests*

EFC WP 13 Presentation  
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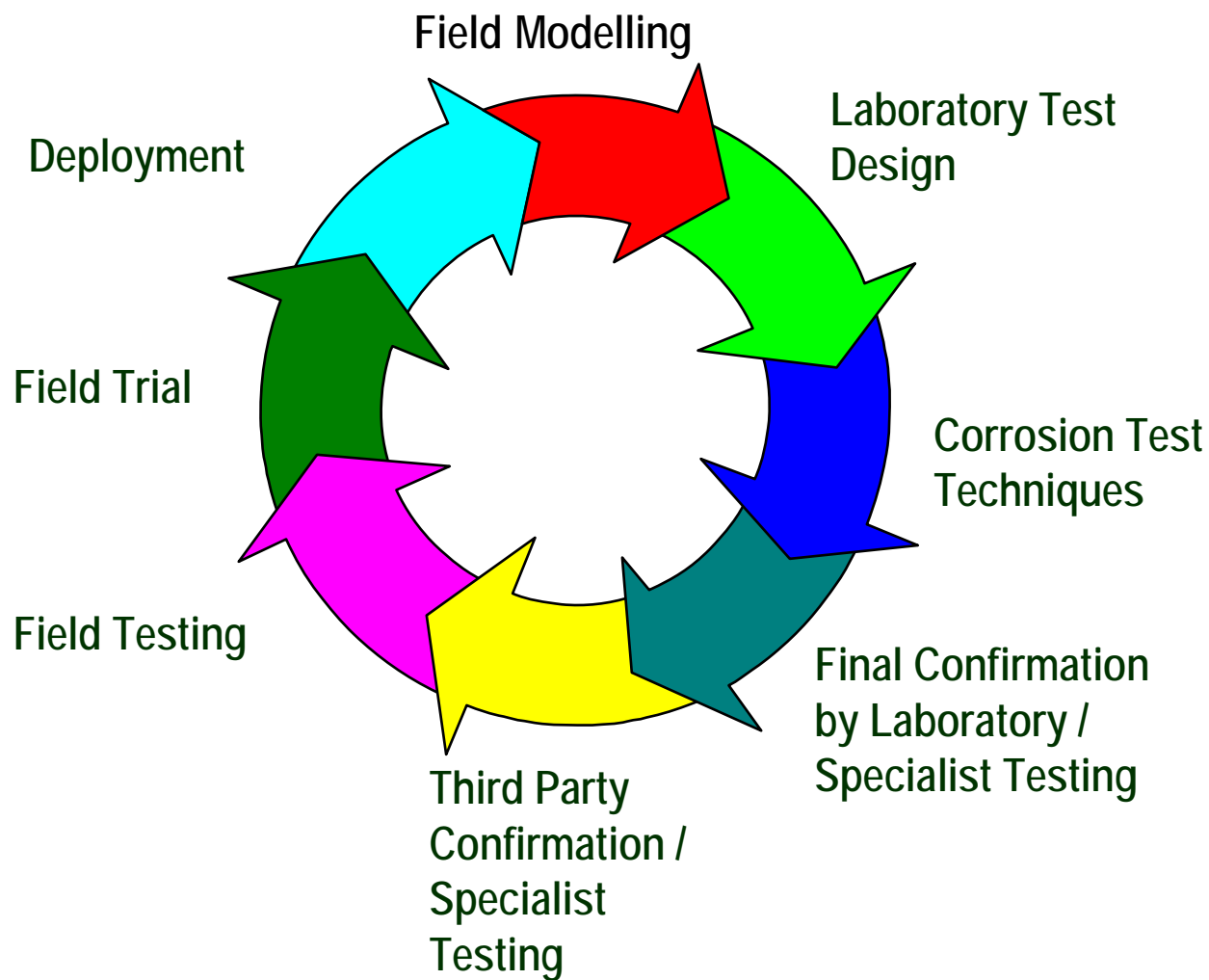


Exactly your chemistry.

# Content

- Philosophy
- 'Simple' Techniques
- Specialised Techniques
- Applicability
- Summary

# Philosophy



# 'Simple' Techniques – Low Shear

## ■ Wheel test

- Inhibitor screening
- Partitioning
- Batch treatment
- Persistency
- Weight loss (some electrochemical)



## ■ Bubble test

- Inhibitor screening
- Partitioning
- Persistency
- Weight loss and electrochemical



# *'Simple' Techniques - Dynamic*

## ■ Rotating Cylinder Electrode (RCE)

- Shear conditions (<80 Pa)
- Partitioning
- Persistency
- Low partial pressure



# 'Simple' Techniques – High Pressure/Temperature

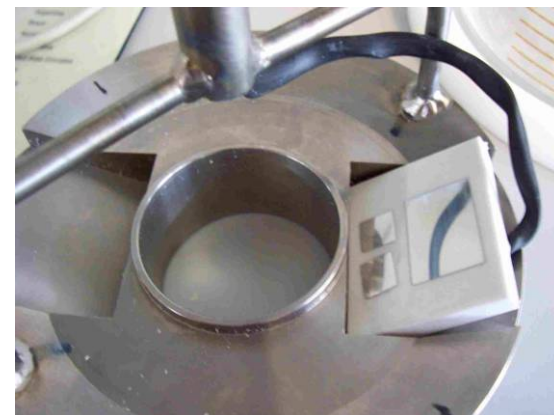
## ■ Autoclaves

- High partial pressure (CO<sub>2</sub>/H<sub>2</sub>S)
- Low shear
- Partitioned
- High temperature
- Long duration testing
- Coupons (Sour systems)



# Specialised Techniques

- High shear / high pressure
  - Flow loops
  - Autoclaves
  - Jet impingement
- Segmented weld testing
  - Partitioned
- Under deposit testing
  - Partitioned
  - High pressure
  - Initiation
  - Propagation
- Galvanic testing
  - Clad risers, metallurgical considerations



# Applicability

## ■ Water Injection

- Bubble tests
- Aqueous
- Pressure (high use autoclaves)
- Shear dependent upon system (RCE, RCA, Jet, Loops)
- Solids (Under deposit)
- Weld (Segmented weld testing)
- Compatibility (PWRI)



# Applicability

## ■ Wet Oil Production

- Bubble tests
- Partitioned
- Shear dependent upon system
- Pressure Some High Partial pressures
- Solids (Under deposit)
- Weld (Segmented weld test)
- Subsea (SCR Galvanic test on cladding)
- Compatibility Testing
  - Foaming
  - Emulsification

# Applicability

## ■ Dry Oil Production

- Bubble tests
- Coupons (sour systems)
- Partitioned
- Shear dependent upon system
- Pressure low partial pressures (Degassed oil)
- Solids (Under deposit)
- Weld (Segmented weld test)
- Compatibility Testing
  - Foaming
  - Emulsification
  - Other chemicals

# Applicability

## ■ Wet Gas Production

- Continuous Treatment
- Bubble tests
- Partitioned
- Shear dependent upon system
- Pressure high partial pressures (Autoclaves)
- Coupons (sour systems)
- Solids (Under deposit)
- Weld (Segmented weld test)
- Compatibility Testing
  - Foaming
  - Emulsification
  - Other chemicals (hydrate Inhibitors)

# *Applicability*

## ■ Wet Gas Production

- Batch Treatment
- Bubble tests persistency
- Wheel tests persistency
- Partitioned
- Shear dependent upon system
- Pressure high partial pressures (Autoclaves if possible)
- Weld (Segmented weld test)
- Compatibility Testing
  - Foaming
  - Emulsification

# Applicability

- Dry Gas Production
  - Continuous Treatment
  - Bubble tests
  - Partitioned
  - Shear dependent upon system
  - Pressure high partial pressures (Autoclaves)
  - Coupons (sour systems)
  - Solids (Under deposit)
  - Weld (Segmented weld test)
  - Compatibility Testing
    - Foaming
    - Emulsification
    - Other chemicals (hydrate Inhibitors)

# Applicability

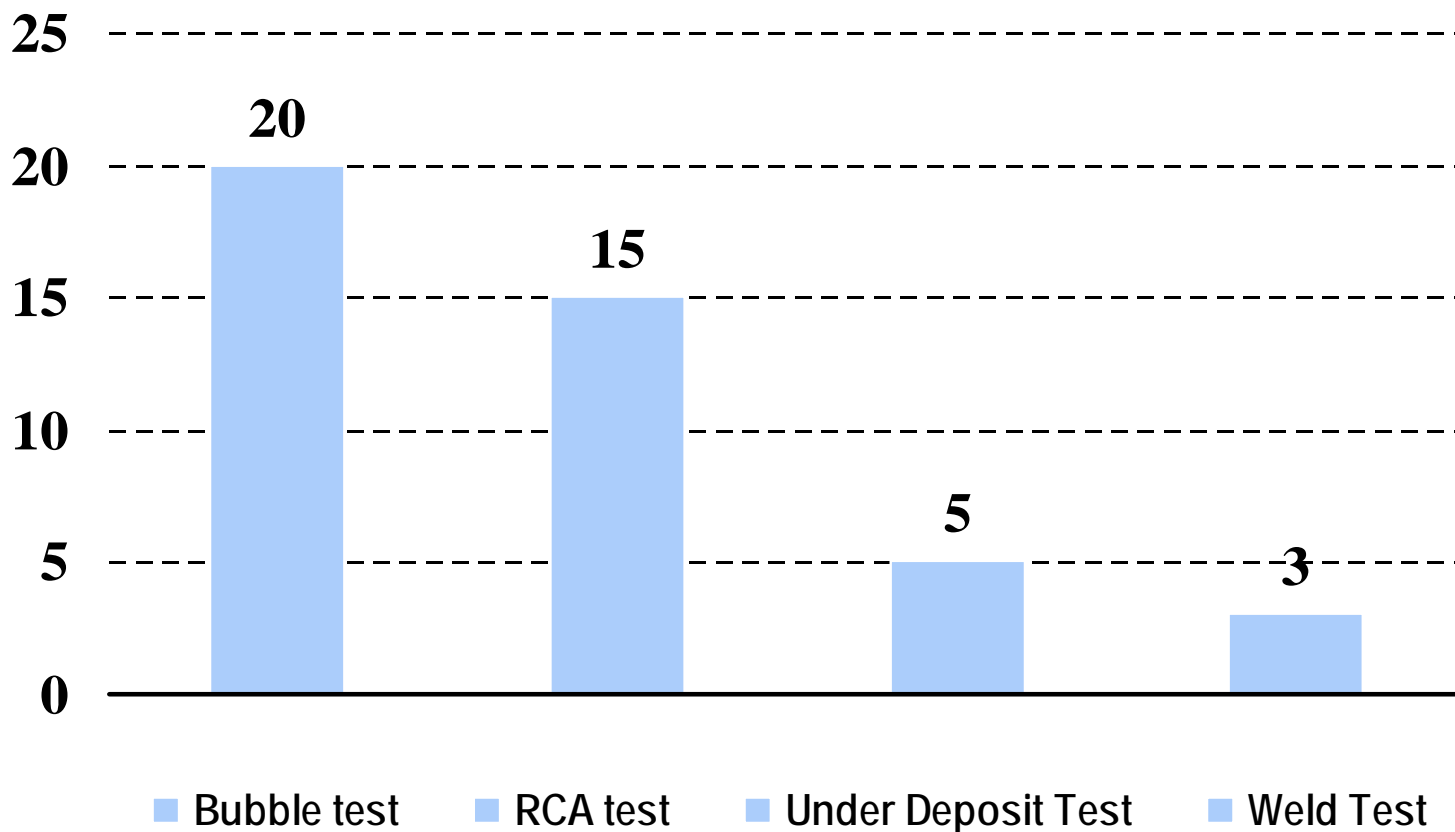
- **Dry Gas Production**
  - Batch Treatment
  - Bubble tests persistency
  - Wheel tests persistency
  - Partitioned
  - Shear dependent upon system
  - Pressure high partial pressures (Autoclaves if possible)
  - Weld (Segmented weld test)
  - Compatibility Testing
    - Foaming
    - Emulsification

# Applicability

- Closed cooling/heating systems
  - Pressure high partial pressures (Autoclaves)
  - High temperature (Autoclaves)
  - Oxygenated systems
  - Weld (Segmented weld test)
  - Metallurgical compatibility
  - Microbial
  - Deposits
  - Compatibility Testing
    - Foaming

# Importance of Correct Test Matrix

## Products Passing Routine and Specialist Tests





# Test Matrix

	Bubble Test	RCA Test	Under Deposit Test	Weld Test	Sour weld Test	Methanol compatibility	Viscosity
Product 1	Green	Green	Red	Red	Green	Green	Green
Product 2	One Suitable Product from 10						
Product 3	Green	Green	Green	Green	Red	Green	Red
Product 4	Green	Red	Yellow	Yellow	Red	Green	Green
Product 5	Green	Green	Yellow	Red	Yellow	Yellow	Red
Product 6	Green	Green	Red	Green	Red	Green	Red
Product 7	Green	Yellow	Green	Red	Red	Green	Red
Product 8	Green	Green	Red	Red	Red	Green	Green
Product 9	Green	Green	Red	Red	Green	Green	Green

# Summary

- Modeling essential
- Information on system essential
- Simulate the best we can
- Many tests available
- Specialised tests
- Choice dependent upon system
- Correct choice of methodology