Course title:

Corrosion (-erosion) and Stress Corrosion Cracking (SCC) Degradation Mechanisms in CO2 removal systems of ammonia plants

Root cause, preventive measures, monitoring, inspection and repair

Introduction:

This course will contribute to a better understanding in the root cause and mechanism of corrosion (-erosion) and stress corrosion cracking degradation mechanisms in CO2 removal systems of ammonia plants. Information is presented regarding preventive measures, monitoring and inspection technologies on these failure modes. The target group of this course comprises process, mechanical and inspection engineers of ammonia plants.

Duration 4 hours

Course outline

Module 1

1. Introduction:
    - NH3 process
    - CO2 removal processes
2. Corrosion degradation mechanisms in Hot Potassium Carbonate (HPC) CO2 removal systems.

   Mechanisms and measures to mitigate:

    - Corrosion.
    - Corrosion-erosion.
    - Carbonate/ bicarbonate Stress Corrosion Cracking.
3. Experience review in Hot Potassium Carbonate (HPC) CO2 removal processes:
    - GV Giammarco Vetrocoke.

Author(s) / Trainer(s):

Giel Notten

Materials & Corrosion Engineer,

Giel Notten is a materials and corrosion expert who, spent thirty-eight years working with DSM in The Netherlands. After gaining his Chemical Engineering degree he joined DSM's Materials and Corrosion Department and was heading this Department as Managing Senior Corrosion Engineer. In this job he was involved in a broad range of consultancy activities for numerous (petro-)chemical plants. For Stamicarbon, a previous subsidiary company of DSM, and licensing DSM's know-how, he set up programs for lifetime assessment studies, based on RBI philosophy, in numerous urea and ammonia plants and supervised these studies. Giel was also involved in the development of Safurex®, the super-duplex stainless steel grade (developed by Sandvik in cooperation with Stamicarbon) for application in Stamicarbon urea plants.
He was a board member of NACE Benelux and a member of the Contact Group Corrosion of the Dutch Chemical Process Industry.

Since his retirement from DSM, Giel started his own company NTT Consultancy in 2006 and has remained active as a materials and corrosion engineering consultant for many companies all over the world. He has devoted much of his time to passing on his knowledge and experience on the topic of corrosion engineering to a new generation of engineers in corrosion courses and trainings; numerous trainings have been presented. In cooperation with UreaKnowHow (in-house) training sessions have been organized and presented to more than 1000 urea engineers, managers, (shift-) supervisors and operators from all over the world. Several workshops have been presented in cooperation with UreaKnowHow for CRU in Nitrogen & Syngas Conferences.

Giel published many technical papers in reputable industry magazines and collected his knowledge and experience, illustrated with numerous cases of corrosion, in a book entitled Corrosion Engineering Guide.

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- Catacarb.
- Benfield.

4. Conclusions and recommendations regarding HPC CO2 removal processes.

Module 2

1. Amine-based CO2 removal systems: MEA, TEA, DIPA, aMDEA.
2. Corrosion degradation mechanisms in amine-based CO2 removal systems and formation of protective layers.
3. Experience review in Amine based CO2 removal systems; MEA, TEA, DIPA.
4. Conclusions / recommendations regarding Amine based CO2 removal systems (MEA, TEA, DIPA).
5. Experience review in Amine based CO2 removal systems:
    - aMDEA.
    - Morphology of corrosion in aMDEA.
    - SCC investigations in aMDEA.
6. Conclusions / recommendations regarding aMDEA CO2 removal systems.
7. Physical solvent processes:
    - Fluor Solvent Process (Fluor Corporation).
    - Selexol process (KBR, TKIS).
8. Experience review in physical solvent process:
    - Selexol process.
9. Pressure Swing Adsorption (PSA) process (Linde).
10. Conclusions / recommendations regarding physical solvent and PSA processes.

Module 3

1. Corrosion inspections and corrosion monitoring in CO2 removal systems.
2. Fitness-for-Service judgement, Repair and Stress Relieving (SR) / Post Weld Heat Treatment (PWHT).
3. Summary: Measures to prevent degradation mechanisms in CO2 removal systems.

Learning outcomes:

By the end of this training course you will understand:

- The risks of degradation mechanisms in CO2 removal systems.
- The mechanism of these failure modes and parameters influencing these failure modes.
- How to monitor and to mitigate the risks of these failure modes.
- How to perform inspections based on a RBI philosophy.

Who will benefit:

Employees who are responsible or share responsibility with respect to the mechanical integrity of equipment in CO2 removal systems of ammonia plants; process, mechanical and inspection engineers.

Course materials:

- Hand-out presentation slides in PDF format
- Technical paper: Corrosion(-erosion) and SCC phenomena in CO2 removal systems of ammonia plants. pdf of word file

Price:

€ 450.00

Discounts:

- 2 places – 10% discount
- 3 places – 15% discount
- 4 or more places – 20% discount.

In-company training:

This course is also available as an in-company course (face-to-face or online) where content can be customised to meet your organisation's specific needs and delivered on a date/location that suits your requirements.

Contact us for more information.

Training code: MAT03

On request the electronic (recently revised) version of the Corrosion Engineering Guide (> 800 pages) is available for additional costs of **€95.00**