
Sour Gas Treating Plant Operations: Solvent Systems, Claus Units and Tail Gas Training Course

27 June – 1 July 2027
Muscat





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Programme Summary

Sour gas treating plant operations is the subject of this one-week training course for operations managers, process engineers and asset leaders, and each participant ends with a plant performance review of one treating and sulphur recovery train. Gas plants and refineries depend on solvent units and Claus units that fail quietly through foaming, corrosion and poor air control. The programme moves from acid gas chemistry to fault diagnosis, sulphur handling and tail gas options, then applies each tool to one train. Mars Training Centre UK delivers this programme on sour gas treating and sulphur recovery to mixed-organisation cohorts.

The Business Case

Sour gas treating units run continuously, and small drifts in solvent quality, temperature or air supply turn into lost throughput, off-specification gas and unplanned shutdowns. Leaders who can read unit data and question operating decisions spot these drifts earlier, protect people from hydrogen sulphide exposure and keep sulphur production stable between turnarounds.

- Unplanned Downtime: Falls as foaming, fouling and corrosion causes are traced before they stop a unit.
- Emissions Exposure: Reduces as sulphur recovery efficiency and tail gas performance are tracked against design.
- Solvent and Energy Cost: Improves as regeneration duty and solvent losses are checked against targets.

Principles and Evidence Base

- Gas-liquid absorption equilibrium: It explains how acid gases load and strip from solvent, and anchors Sessions 1 and 2.
- API RP 945 on environmental cracking in amine units: It guides the corrosion review in Session 2.
- Modified Claus process thermodynamics: It frames the furnace and converter analysis in Session 3.
- ISO 45001 occupational health and safety management: It structures the hydrogen sulphide hazard review in Sessions 1 and 4.



Intended Participants

- Operations managers who are responsible for the daily performance of gas treating and sulphur units.
- Process and plant engineers who diagnose solvent and Claus unit faults.
- Health, safety and environment leads who manage hydrogen sulphide risk and emissions.
- Asset and reliability managers who plan turnarounds and approve improvement spending.
- Technical supervisors who review operating data with shift teams and contractors.

Typical sectors include gas processing, refining, petrochemicals and sulphur marketing.

Learning Outcomes

1. Participants will be able to evaluate acid gas loading and solvent selection for a given sour gas feed.
2. Participants will be able to diagnose foaming, heat stable salt build-up and corrosion in an amine unit from operating data.
3. Participants will be able to analyse a Claus unit heat and material balance and the air-to-acid gas ratio.
4. Participants will be able to calculate sulphur recovery efficiency and compare tail gas treating options.
5. Participants will be able to prioritise reliability risks in a treating plant using a ranked register.
6. Participants will be able to present a plant performance review for one treating and sulphur recovery train.

Programme Structure

Day 1: Sour Gas Treating Fundamentals and Acid Gas Chemistry

How do hydrogen sulphide and carbon dioxide behave across a sour gas treating plant?

- Acid Gas Absorption Equilibrium Curves
- Solvent Selection Matrix for MEA, DEA, MDEA and Activated MDEA
- Process Flow Diagram Reading Guide
- Hydrogen Sulphide Hazard Zoning under ISO 45001
- Plant Material Balance Template

Day 2: Diagnosing Amine Unit Faults

What causes foaming, corrosion and solvent loss, and how are they confirmed from data?

- Foaming Test and Antifoam Dosing Log
- Heat Stable Salt Tracking Chart
- Corrosion Location Map Based on API RP 945
- Absorber and Regenerator Temperature Profiles
- Solvent Sampling and Quality Plan



Day 3: Claus Unit Operation and Sulphur Handling

How does the Claus process convert hydrogen sulphide into liquid sulphur, and what disturbs it?

- Reaction Furnace Heat Balance
- Catalytic Converter Bed Temperature Table
- Air-to-Acid Gas Ratio Control Chart
- Sulphur Condenser and Degassing Overview
- Liquid Sulphur Storage and Loading Checklist

Day 4: Tail Gas, Emissions and Reliability

How are tail gas options compared and plant reliability risks ranked?

- Tail Gas Clean-Up Option Comparison
- Sulphur Recovery Efficiency Calculation Sheet
- Flaring and Emissions Review
- Shutdown and Start-Up Sequence Plan
- Treating Plant Reliability Risk Register

Day 5: Applying the Tools to One Treating Train

Do the tools hold together when applied to one sour gas treating train?

- Applying the Session 1 Material Balance to the Train
- Testing the Session 2 Fault Chart on Solvent Data
- Checking the Session 3 Ratio Chart Against Converter Readings
- Screening the Session 4 Tail Gas Options
- Completing the Plant Performance Review

Methodology

The programme uses a data exercise method built on anonymised solvent analyses, converter temperature logs, alarm histories and short written cases from gas processing and refining. Participants work in small groups on one treating train, explain their diagnosis to peers from other functions, and receive facilitator feedback on each calculation, chart and ranking.

- Suggested activity: Reading a solvent analysis and listing three likely causes of foaming.
- Suggested activity: Adjusting an air-to-acid gas ratio on sample data and judging the effect on conversion.
- Suggested activity: Ranking four reliability risks by consequence and likelihood.



Capstone Output

Each participant completes a plant performance review for one treating and sulphur recovery train. It holds a material balance, a solvent fault diagnosis, a Claus ratio check, a recovery efficiency calculation, a tail gas option screen and a ranked risk register. The review is used at work to brief plant management, plan turnaround scope and support improvement requests.

Frequently Asked Questions

Is training in sour gas treating suitable for engineers who have not run a Claus unit?

Yes. The programme assumes familiarity with gas plant operations and basic process engineering, and builds sour gas treating and Claus knowledge from acid gas chemistry.

Which standards does sour gas treating rest on in this programme?

It rests on gas-liquid absorption equilibrium, modified Claus process thermodynamics, API RP 945 for amine unit cracking and ISO 45001 for hydrogen sulphide hazard management.

How is the sour gas treating plant performance review used at work?

You use it to brief plant management, set turnaround scope and support improvement requests for your own treating and sulphur recovery train.

How does learning sour gas treating differ from a programme on general gas processing?

It centres on solvent units, Claus units and tail gas, while general gas processing centres on dehydration, fractionation and compression.