# COURSE OVERVIEW PE0310
# Gas Sweetening & Sulphur Recovery

**Course Title**
Gas Sweetening & Sulphur Recovery




**Course Date/Venue**
Session 1: July 11-15, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar
Session 2: September 19-23, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar

**Course Reference**
PE0310

**Course Duration/Credits**
Five days/3.0 CEUs/30 PDHs

**Course Description**



***This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.***



Hydrogen sulfide, carbon dioxide, mercaptans and other contaminants are often found in natural gas streams. $H_2S$ is a highly toxic gas that is corrosive to carbon steels. $CO_2$ is also corrosive to equipment and reduces the Btu value of gas. Gas sweetening processes remove these contaminants so the gas is suitable for transportation and use.



This course presents a complete and up-to-date overview of the Gas Sweetening, Liquid Hydrocarbon Sweetening and Sulphur Recovery with emphasis on gas plant process operations. The process flow sheets of several Sweetening and Sulphur Recovery Processes will be used to illustrate how the various operations differ. The advantages, limitations, and range of applicability of each process will be discussed so that its selection and integration into the overall plant is fully understood and appreciated.

Upon completing this course, you will have a good understanding of Gas Sweetening, Liquid Hydrocarbon Sweetening and Sulphur Recovery. There are many methods that may be employed to remove acidic components (primarily $H_2S$ and $CO_2$) from hydrocarbon streams. The available methods may be broadly categorized as those depending on chemical reaction, absorption, or adsorption. Processes employing each of these techniques are described. Many of the processes result in acid gas streams that contain $H_2S$ that may be flared, incinerated, injected or fed to a Sulphur Recovery Unit. Various Sulphur Recovery Processes (primarily The Modified Claus Process) are discussed. You will also learn the basic vocabulary unique to the industry.

## Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge knowledge on gas sweetening and sulphur recovery and identify the safety precautions and the types of contaminants including their effects
- Discuss the concept of process selection as well as the chemical reaction processes used in gas sweetening and sulphur recovery
- Employ systematic methodology of inlet separation and filtration and distinguish their features and importance
- Identify the concept of flash tank and corrosion as applied in gas sweetening and sulphur recovery and acquire knowledge on foaming and materials
- Describe the principles of batch processes, SWS, amines and reclaimer and introduce the topic of liquid redox as applied in gas sweetening and sulphur recovery
- Explain the various physical and combination processes and gain an in-depth knowledge on caustic wash, alkaline process and liquid HC sweetening
- Discuss the amine plant process and modified claus plant as well as their practical application on gas sweetening and sulphur recovery
- Determine the mechanical consideration and process consideration of gas sweetening and sulphur recovery
- Carryout the procedure on re-heating operation as well as instrumentation and degasification and discover their features and functions

## Exclusive Smart Training Kit - H-STK®




*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

## Who Should Attend

This course provides an overview of all significant aspects and considerations of gas sweetening and sulfur recovery for managers, engineers and other technical staff who are directly involved in gas processing operations.

## Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

## Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

**Course Instructor(s)**

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



**Mr. Andrew Ladwig** is a **Senior Process & Mechanical Maintenance Engineer** with over **25 years** of extensive experience within the **Oil & Gas**, **Refinery**, **Petrochemical & Power** industries. His expertise widely covers in the areas of **Ammonia Manufacturing & Process Troubleshooting**, **Distillation Towers**, **Crude Oil Distillation**, **Ammonia Storage & Loading** Systems, **Operational Excellence** in **Ammonia Plants**, **Fertilizer Storage** Management (Ammonia & Urea), **Fertilizer Manufacturing** Process Technology, **Sulphur Recovery**, Phenol Recovery & Extraction, **Refining Process & Petroleum Products**, **Refinery Planning & Economics**, **Hydrotreating & Hydro-processing**, **Separators** in **Oil & Gas** Industry, **Gas Testing & Energy** Isolations, **Industrial Liquid Mixing**, **Extractors**, **Fractionation**, **Water Purification**, **Water Transport** & Distribution, **Environmental Emission Control**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant Performance**, **Plant Startup & Shutdown**, **Process Troubleshooting** Techniques and Oil & Gas Operation/Surface Facilities. Further, he is also well-versed in **Rotating Machinery** (**BRM**), **Rotating Equipment** Operation & Troubleshooting, Root Cause Analysis (**RCA**), **Process Plant** Shutdown, Turnaround & Troubleshooting, Planning & Scheduling **Shutdowns & Turnarounds**, Optimizing **Equipment Maintenance** & Replacement Decisions, **Maintenance Planning & Scheduling**, **Material Cataloguing**, Maintenance, Reliability & Asset Management Best Practices, **Storage Tanks Operations** & Measurements, **Tank** Inspection & Maintenance, **Pressure Vessel** Operation, **Flare & Relief** System, **Flaring System** Operation, **PSV** Inspection & Maintenance, **Centrifugal & Reciprocating Compressor**, **Screw Compressor** Troubleshooting, **Heat Exchanger** Overhaul & Testing, **Pipe Stress** Analysis, **Control Valves & Actuators**, **Vent & Relief System**, **Centrifugal & Reciprocating Pump** Installation & Repair, **Heat Exchanger** Troubleshooting & Maintenance, **Steam Trapping & Control**, **Control & ESD** System and Detailed Engineering Drawings, Codes & Standards.

During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer**, **Project Engineer**, **Reliability & Maintenance Engineer**, **Maintenance Support Engineer**, **Process Engineer**, **HSE Supervisor**, **Warehouse Manager**, **Quality Manager**, **Business Analyst**, **Senior Process Controller**, **Process Controller**, **Safety Officer**, **Mechanical Technician**, **Senior Lecturer** and **Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few.

Mr. Ladwig has a **Bachelor's** degree in **Chemical Engineering** and a **Diploma** in **Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and has delivered various trainings, workshops, seminars, courses and conferences internationally.

## Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

## Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

## Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

## Course Fees

**US$ 6,000** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

## Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

***Day 1***

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|---|---|
| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0900* | ***Terminology*** |
| *0900 – 0930* | ***Safety Precautions*** |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Types of Contaminants*** |
| *1030 – 1115* | ***Process Selection*** |
| *1115 – 1200* | ***Chemical Reaction Processes*** |
| *1200 – 1215* | *Break* |
| *1215 – 1300* | ***General Considerations*** |
| *1300 – 1345* | ***Inlet Separation*** |

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| *1345 – 1420* | ***Filtration*** |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day One* |

***Day 2***

| | |
|---|---|
| *0730 – 0930* | ***Flash Tank*** |
| *0930 – 0945* | *Break* |
| *0945 – 1045* | ***Corrosion*** |
| *1045 – 1200* | ***Foaming, Material*** |
| *1200 – 1215* | *Break* |
| *1215 – 1330* | ***Batch Processes, SWS, Amines & Reclaimer*** |
| *1330 – 1420* | ***Liquid Redox*** |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day Two* |

***Day 3***

| | |
|---|---|
| *0730 – 0830* | ***Physical Process*** |
| *0830 – 0930* | ***Combination Process*** |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Caustic Wash*** |
| *1030 – 1115* | ***Alkaline Process*** |
| *1115 – 1200* | ***Case Study*** |
| *1200 – 1215* | *Break* |
| *1215 – 1330* | ***Liquid HC Sweetening*** |
| *1330 – 1420* | ***Case Study – Amine Plant Process*** |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day Three* |

***Day 4***

| | |
|---|---|
| *0730 – 0930* | ***Amine Plant Process*** |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Modified Claus Plant*** |
| *1100 – 1200* | ***Mechanical Consideration*** |
| *1200 – 1215* | *Break* |
| *1215 – 1420* | ***Process Configuration*** |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day Four* |

***Day 5***

| | |
|---|---|
| *0730 – 0930* | ***Re-Heating Operation*** |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Instrumentation, Degassification*** |
| *1100 – 1200* | ***Instrumentation, Degassification (cont'd)*** |
| *1200 – 1215* | *Break* |
| *1215 – 1345* | ***Case Study – Tail Gas Clean-up*** |
| *1345 – 1400* | ***Course Conclusion*** |
| *1400 – 1415* | ***POST-TEST*** |
| *1415 – 1430* | *Presentation of Course Certificates* |
| *1430* | *Lunch & End of Course* |

**Practical Sessions**

This practical and highly-interactive course includes real-life case studies and exercises:-



**Course Coordinator**

Jaryl Castillo, Tel: +974 6652 9196, Email: jaryl@haward.org