COURSE OVERVIEW PE0285
Treating and Sulphur Recovering Operation

Course Title
Treating and Sulphur Recovering Operation

Course Date/Venue
Session 1: January 12-16, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: July 14-18, 2025/ Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

3.0 CEUs (30 PDHs) AWARD

Course Reference
PE0285

Course Duration/Credits
Five days/3.0 CEUs/30.0PDHs

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.

This is an introductory course. Upon the successful completion of this course, you will have a complete and up-to-date overview of the natural gas processing, gas sweetening and sulphur recovery, including product specifications and the processes available to condition the gas to meet these requirements. You will understand the nature and purpose of key gas processing operations, and how the individual operations are integrated into plants to process diverse feed streams received from gas fields around the world. You will gain a working knowledge of the major processes for Dehydration, Acid Gas Removal (Gas Sweetening), Hydrocarbon Dewpoint Control (HCDP Control), LPG Production, NGL Recovery and Separation (Fractionation), Sulphur Recovery and Tail Gas Clean-up. You will also learn the basic vocabulary unique to the industry and the key physical and chemical properties of natural gas constituents. You will also learn the important considerations of the design and selection of key process equipment including Separators, Heat Exchangers, Pumps, Compressors, Valves and Towers.

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. 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. You will also learn the basic vocabulary unique to the industry.

During this interactive course, participants will learn:

- Basic properties of hydrocarbon gases and the behaviour of water-hydrocarbon systems.
- How to calculate system energy changes.
- Fundamentals of fluid flow and heat transfer.
- Design and operational aspects of process control systems, separation equipment, pumping and compression facilities, and absorption and fractionation facilities.
- Methods used for dehydrating natural gas.
- Methods used for Acid Gas Removal (Gas Sweetening)
- Methods used for Sulphur Recovery with a concentration on Amine processes

Course Objectives

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

- Apply and gain a good knowledge on gas treatment and sulphur recovery
- Discuss the introduction to natural gas processing & contract terms and enumerate the various types of separators as well as its sizing
- Identify the parts and functions of slug catcher and twister super sonic separator and recognize the importance in natural gas processing
- Describe the concept of water content & dew point applied in gas processing & sulphur recovery and list the examples & scenarios on hydrates and liquid desiccant dehydration
- Distinguish the operating variables of natural gas processing & sulphur recovery as well as the concept of enhanced glycol concentration & solid desiccant
- Use and gain knowledge on hydrocarbon recovery (NGL) and explain mechanical refrigeration & thermodynamics of gas
- Employ the process of removal of acid gases including the use of batch process, amines and physical solvents

- Identify the pH diagram of propane used in natural gas processing as well as employ the process of liquid ethane recovery
- Distinguish the gas sweetening & amine processes and identify their features and importance
- Explain what is corrosion as applied in natural gas processing, gas sweetening & sulphur recovery and identify other processes involved such as the physical, combined and sulfinol processes
- Discuss the operation & control of natural gas processing, gas sweetening and sulphur recovery and identify the process of getting chemical reaction
- Carryout the principles of claus process variation, claus combustion operation & modified claus plant and identify their features & importance
- List the other natural gas processing, gas sweetening & sulphur recovery operation such as re-heating, catalyst converter operation and tail gas clean up option and understand the concept of mechanical considerations & process configuration
- Identify the various batch processes, SWS, amines & reclaimer used in gas sweetening & sulphur recovery
- Explain the usage of liquid redox and liquid HC sweetening applied in gas sweetening process
- Employ the principles of amine plant process, instrumentation & degassification

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 is intended for those directly involved in supervising gas processing operations; managers involved in the planning and development of new gas processing facilities or modifying existing facilities; individuals involved in the negotiation of contracts for the sale of Natural Gas, LPG and NGL Products; and newly employed engineers and technicians in the oil and gas processing industry will find the course particularly relevant. The course is specifically designed to be of substantial benefit to both technical and non-technical personnel. Those employed in the activities that support the gas processing industry will also receive considerable benefit from the broad overview.

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

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**. 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 Fee

US$ 5,500 per Delegate + VAT. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

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

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. Mohammad Hamami, is a **Senior Process Engineer** with an extensive practical experience within the **Oil**, **Gas**, **Refinery**, **Petrochemical** and **Power** industries. His experience covers **Clean Fuel** Technology & Standards, **Clean Fuel** Specification, Emission Regulation, **Crude Oil** Production, **Desulphurization**, Synthesis **Gas Production**, **Naphtha** Isomerization, **Diesel Fuel Additives**, **Storage Tanks** Filtration, **Fuel Quality** Inspection, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Equipment** Operation, **Process Plant** Operation, **Process Plant** Start-up & Commissing, **Process Plant** Optimization, **Oil & Gas Field** Operation, **Oil Movement**, Storage & Troubleshooting, **Petroleum Refinery** Process, **Process Reactor** Operation & Troubleshooting, **LPG Oil & Gas** Operation & Troubleshooting, **Crude Oil & LNG** Storage, **LNG & LPG** Plants Gas Processing, **Refinery Process** Operations Technology, **Liquid Bulk Cargo Handling**, **Gas Conditioning** & Processing Technology, **Distillation Column** Design & Operation and **Gasoline & Diesel Fuel** Technology. Further he is also well-versed in **Refinery** Operational Economics & Profitablity, Aromatics Manufacturing Process, **Hydrogen Production** Operation, **Steam Reforming** Technology, **Gas Treating**, **Hydro-treating & Hydro-Cracking**, **Catalyst** Material Handling, Gas Sweetening & Sulfur Recovery, Hydro Carbon Dew Point (HCDP) Control, **Heat Exchangers** & Fired Heaters, **Amine** Gas Sweetening, **Plastic Additives** Selection & Application, **Crude & Vaccum** Process Technology, **Flare & Pressure Relief Systems**, Stock Management & **Tank Dipping** Calculation, **NGL Recovery & Fractionation**, **Refrigerant & NGL Extraction** and **Catalytic Craking & Reforming.**

During his long professional carreer, Mr. Mohammad worked as a **Refinery Manager**, **Operations Manager**, **Section Head/Superintendent** and **Process Engineer** for **Process Units**, **Utilities & Oil Movement** in various companies. He has been responsible for a number of **technological-driven world-scale hydrocarbon processing projects** from **beginning to successful start-up**.

Mr. Mohammad has a **Bachelor's** degree in **Chemical Engineering**. He is an **active member** of the **American Institute of Chemical Engineers** (**AIChE**) and has presented **technical papers** at its **several national meetings**. He has largely participated in the **start-up of seven world-scale process plants** which made him an **International Expert** in **Process Plant Start-Up** and **Oil Movement** and a **Certified Instructor/Trainer**.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0845	***Introduction to Natural Gas Processing***
0845 – 0900	***Contract Terms*** *Gas Contracts ● Liquid Contracts*
0900 – 0930	***Separators*** *Types of Separators*
0930 – 0945	*Break*
0945 – 1000	***Separator Sizing***
1000 – 1015	***Slug Catcher***
1015 – 1030	***Twister Super Sonic Separator***
1030 – 1045	***Case Study***
1045 – 1100	***Water Content & Dew Point*** *Sweet/Sour Gas ● Calculation Charts*
1100 - 1115	*Break*
1115 – 1130	***Hydrates*** *Formation, Prediction and Inhibition ● Examples*
1130 – 1200	***Liquid Desiccant Dehydration*** *TEG Process*
1200 – 1215	***Operating Variables***
1215 – 1300	***Enhanced Glycol Concentration***
1300 – 1315	***Solid Desiccant***
1315 – 1420	***Case Study***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Hydrocarbon Recovery (NGL)*** *Solid Desiccant Short Cycle Units (HRU's) ● Joule-Thompson (JT) Plants ● Mechanical Refrigeration Plants*
0830 – 0930	***Mechanical Refrigeration***
0930 – 0945	*Break*
0945 – 1030	***Thermodynamics of Gas***
1030 – 1100	***Removal of Acid Gases (H_2S, CO_2, CS_2, COS & RSH)*** *Batch Processes ● Amines ● Physical Solvents*
1100 - 1115	*Break*
1115 – 1130	***PH Diagram of Propane***
1130 – 1200	***Case Study***
1200 – 1300	***Liquid Ethane Recovery***
1300 – 1315	***Gas Sweetening*** *Introduction ● Batch Process ● Mercury Removal*
1315 – 1420	***Amine Process***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0800	***Corrosion***
0800 – 0815	***Process Control***
0815 – 0830	***Physical Process***
0830 – 0845	***Combined Process***
0845 – 0900	***Sulfinol Process***
0900 – 0930	***Operation & Control***
0930 – 0945	*Break*
0945 – 1000	***Case Study***
1000 – 1015	***Sulphur Recovery*** *Modified Claus Plants & Tail Gas Clean-up*
1015 – 1030	***Chemical Reaction***
1030 – 1045	***Straight through Operation***
1045 – 1100	***Claus Process Variations***
1100 - 1115	*Break*
1115 – 1130	***Claus Combustion Operation***
1130 – 1200	***Re-heating Options***
1200 – 1300	***Mechanical Considerations***
1300 – 1315	***Catalyst Converter Operation***
1315 – 1420	***Tail Gas Clean up Options***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 4

0730 – 0830	***Batch Processes, SWS, Amines & Reclaimer***
0830 – 0930	***Liquid Redox***
0930 – 0945	*Break*
0945 – 1030	***Physical Process***

1030 – 1100	***Combination Process***
1100 - 1115	*Break*
1115 – 1130	***Caustic Wash***
1130 – 1300	***Alkaline Process***
1300 – 1315	***Case Study***
1315 – 1420	***Liquid HC Sweetening***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730– 0800	***Case Study***
0800– 0930	***Amine Plant Process***
0930 – 0945	*Break*
0945– 1030	***Modified Claus Plant***
1030– 1100	***Mechanical Consideration***
1100 - 1115	*Break*
1115 – 1130	***Process Configuration***
1130 – 1145	***Re-heating Operation***
1145 – 1215	***Instrumentation, Degassification***
1215 – 1345	***Case Study – Tail Gas Clean-up***
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
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

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