

# **GAS CONDITIONING & PROCESSING**



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**TRAINING TITLE**

GAS CONDITIONING & PROCESSING

**VENUE**

Dubai, UAE

**DURATION**

5 Days

**DATES**

18 - 22 September 2022

**PRICE**

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet.

**TRAINING INTRODUCTION**

The rapidly increasing worldwide demand for natural gas as an energy source requires expertise in gas engineering technology, which involves several production operations such as dehydration, acid gas removal, recovery of natural gas liquids and the production of liquefied natural gas. In addition, one involved in such industry needs to be familiar with different gas sources, specifications, storage requirements, transportation and distribution

This course will start by defining what natural gas is, its properties, specifications and end uses. Then, typical gas processing operations will be discussed, including dehydration, acid gas removal, recovery of ethane, propane and NGL (natural gas liquids), and liquefied natural gas (LNG) operations. Sulfur recovery, tail gas conditioning and process control will also be discussed. Typical equipment and facilities that are found in typical natural gas processing operations will also be discussed including compressors, vessels, relief systems and safety systems. Finally, the fundamentals of gas transportation and distribution will be discussed.

**TRAINING OBJECTIVES**

This course is designed to give the attendants the fundamentals of natural gas conditioning and processing including some of the details of the process. Specifically, by attending this course you will:

- Gain a deep knowledge of the properties, specifications and end uses of natural gas.
- Gain a deeper understanding of typical natural gas processing operations, including:
  - Dehydration
  - Acid gas removal
  - Recovery of ethane, propane and NGL (natural gas liquids)
  - Sulfur recovery
- Gain a deeper understanding of the production of liquefied natural gas (LNG).
- Gain a deeper knowledge of the different equipment and facilities found in natural gas processing plants.
- Learn about fundamentals of gas transportation and distribution.

## **TRAINING AUDIENCE**

Technical and non-technical personnel involved in the activities of natural gas industry. Specifically, technical, operations and maintenance personnel who had limited exposure to this area, or professionals involved in other areas of the gas industry who require a comprehensive overview of natural gas processing will find this course ideally suited for them.

## **TRAINING OUTLINE**

### **Day 1:**

- What is natural gas?
- Origins
- Properties
- Specifications
- End uses and markets for natural gas
- Environmental advantages
- Physical behavior of natural gas systems
- Physical and thermal properties
- Phase behavior analysis
  - Pure substances
  - The phase rule
  - Behavior of mixtures
  - Vaporization by gas pressure
  - Molecular theory of gases and liquids
  - Natural gases
  - Density of natural gas

- Density of liquids
- Dense phase
- Surface tension
- Viscosity
- Thermal conductivity of gases
- Thermodynamic properties
- Sampling and analysis

## **Day 2:**

- Natural gas processing plant
  - Flowsheet
  - Equipment and components
- Heat exchange in gas processing
  - Heat transfer theory
    - Mechanisms of heat transfer
    - Process heat duty
  - Heat exchangers types
    - Shell and tube
    - Double-pipe
    - Plate and frame
    - Aerial coolers
  - Fired heaters
  - Heat recovery units

## **Day 3:**

- Hydrates
  - Determination of hydrate formation temperature or pressure
  - Condensation of water vapor
  - Temperature drop due to gas expansion
  - Thermodynamic inhibitors
  - Kinetic inhibitors and anti-agglomerators
- Low temperature exchange (LTX) units and line heaters
  - LTX units
  - Line heaters
  - Heat duty
  - Fire-tube size
  - Coil size

- Standard size line heaters
- Condensate stabilization
  - Partial pressure
  - Multistage separation
  - Multi flashes
  - Cold feed distillation tower
  - Distillation tower with reflux
  - Condensate stabilizer design
  - Trays and packing
  - Condensate stabilizer as a gas processing plant
  - LTX unit as a condensate stabilizer

#### **Day 4:**

- Acid gas treating
  - Gas sweetening processes
    - Solid bed absorption
    - Chemical solvents
    - Physical solvent processes
    - Direct conversion of H<sub>2</sub>S to sulfur
    - Sulfide scavengers
  - Process selection
  - Design procedure for iron-sponge units
  - Design procedure for amine systems
- Amine absorber
- Amine circulation rates
- Flash drum
- Amine reboilers
- Amine stripper
- Rich/lean amine exchanger
- Amine cooler
- Amine solution purification
- Materials of construction
- Gas dehydration
  - Water content determination
  - Glycol dehydration
    - Process description
    - Choice of glycol
    - Design considerations
    - System sizing

- Solid bed dehydration

### **Day 5:**

- Gas processing
    - Absorption/lean oil
    - Refrigeration
    - Choice of process
  - Compressors
    - Types of compressors
    - Specifying a compressor
    - Reciprocating compressors process considerations
  - Mechanical design of pressure vessels
    - Design considerations
    - Inspection procedure
    - Specification and design of pressure vessels
  - Pressure relief
    - Relief requirements
    - Type of devices
    - Valve sizing
    - Installation
  - Valves, fittings and piping details
  - Safety systems
    - Hazard tree
    - Developing a safe process
    - Failure mode effect analysis (FMEA)
    - API recommended practice 14C
    - Manual emergency shutdown
    - Hazard analysis
    - Safety management systems
- Gas transportation and distribution

### **TRAINING CERTIFICATE**

**MAESTRO CONSULTANTS** Certificate of Completion for delegates who attend and complete the training course

### **METHODOLOGY**

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring

knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.