



**10 DAYS ONLINE CERTIFICATION PROGRAM ON
NATURAL GAS PROCESSING: CONDITIONING,
HANDLING, DEHYDRATION, REFRIGERATION,
FRACTIONATION, COMPRESSOR AND
INSTRUMENTATION**



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COURSE INTRODUCTION

Natural gas, as it is used by consumers, is much different from the natural gas that is brought from underground up to the wellhead. Gas conditioning and processing separates contaminants to make it suitable for use.

The process and equipment vary widely depending on the desired specification and applications of gas. Since its discovery, natural gas has become an indispensable fuel source throughout the world.

The knowledge on handling issues in gas conditioning and processing will identify productivity, safety and profitability of the company. This course will improve knowledge of professionals involved in operations of gas processing plants and related facilities.

The trainer will discuss processes used to dehydrate natural gas and remove acid gas components and mercury, meet hydrocarbon dew point specification, specification and selection as well as principles of gas liquefaction and storage.



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COURSE OBJECTIVES

Upon the successful completion of the course, the participants will be able to

- Learn the causes of overpressure and how to deal with them
- Enhance knowledge on sizing, specification and selection of compressors and be able to integrate compressor systems into process facilities
- Identify water content and hydrate formation conditions for gas streams using hand calculation methods and gain techniques to inhibit hydrate formation
- Provide professionals with knowledge on how to design, operate and address issues on gas conditioning & processing
- Effectively select and evaluate processes used to dehydrate natural gas
- Maximize profitability thru proper techniques on gas conditioning and processing
- Gain insights from expert on liquefaction and regasification of cryogenic gases

WHO IS THIS TRAINING COURSE FOR?

This training course is suitable to a wide range of professionals but will greatly benefit:

- Process engineers along with the petroleum and production engineers
- Field operators and technicians
- Other company staff involved in gas treatment and processing
- Process engineers who are new to the profession



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COURSE DAILY AGENDA

Day-1: Introduction to Natural Gas Processing

- Introduction to natural gas
- Natural gas origin & reservoir of natural gas
- Natural gas production
- Physical properties of natural gas
- Impurities in the gas
- Heating value/ BTU (British Thermal Unit) importance

Day-2: Receiving Gas at a Plant & Separation

- Gas-liquid separation system
- Separators (types of separators - separator sizing)
- Common variables such as pressure, temp., flow and level
- Instrumentation, control, and measurement of natural gas and gas liquids
- Control valves & actuators
- Pressure, temperature, and level controls
- Field application of instruments
- Structured approach to the process operation
- Contaminants removal
- Process plant machinery specific plant issues
- Management, planning and control
- Startup and shutdown planning & control



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Day-3: Dehydration of Natural Gas -1

- Water content in the Natural gas.
- Dew point & Dew point depression
- Hydrate.
- Hydrate Formation, Hazard, prevention and handling Types of dehydration processes: absorption, adsorption and condensation
- Gas Dehydration methods
- Selection of gas dehydration methods
- Gas Dehydration by Absorption -TEG
- Process Description of the TEG (Triethylene Glycol) Dehydration Unit
- The Factors that affect the TEG Dehydration Unit Performance
- Troubleshooting of the TEG Dehydration Unit

Day-4: Gas Dehydration by Adsorption process-2

- Mole sieve gas dehydration
- Mass transfer zone
- Regeneration system
- Operation and adsorbent life
- Mole Sieve operating problems and troubleshooting
- Mole Sieve loading & unloading procedures
- Troubleshooting of the TEG Dehydration Unit



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Day 5: Gas Sweetening Process -1

- Gas Sweetening Introduction
- Process classification
- Selection criteria for sweetening processes
- Adsorption processes
- How adsorption systems work
- Types of adsorbents
- Characteristics for adsorbents
- Regenerative adsorption systems
- Physical and chemical adsorption
- Regeneration methods for adsorption
- Troubleshooting of gas Sweetening Unit

Day 6: Gas Sweetening Process -2

- Absorption processes
- How absorption systems work
- Absorption processes using a regenerative chemical reaction
- Equipment for absorption
- Removing H₂S with physical and chemical absorption
- Columns for distillation, absorption and stripping
- Stages processes (Plate/ Packed)
- Chemical absorption
- Amines
- Types of amines
- Troubleshooting of the Amine treatment process



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Day 7: Mercury Removal Systems

- Mercury Problem in Natural Gas
- Process Description of the Mercury Removal Units
- Hydrate Formation Conditions
- Hydrate Prevention and Mitigation Methods
- Water Content Estimation
- Water Dew Point Control
- Dehydration Systems and Methods

Day 8: Compression

- Compressors Types
- Determining Discharge Pressure
- Work of Compression
- Compression Ratio
- Ratio of Specific Heats
- Reciprocating Compressor Capacity
- Specifying Reciprocating Compressors
- Trouble Shooting Reciprocating Compressors
- Centrifugal Compressors - General Operating Characteristics
- Centrifugal Compressor Controls
- Specifying Centrifugal Compressors
- Trouble Shooting Centrifugal Compressors



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Day-9: Sulfur Recovery

- The Claus Process.
- How the process works.
- Claus process considerations
- Technology overview
 - I. Types of plants
 - II. Straight-through process
 - III. Split-flow Process.
- Combustion operation
- Sulfur condenser operation.
- Catalyst converter operation
- Claus tail gas treating process selection.
- Solvent selection criteria in the tail gas unit



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Day -10: Liquefied Natural Gas (LNG)

- Introduction
- The LNG Chain
- The LNG liquefaction facility
- Liquefaction process
- LNG storage
- In-tank pump process objectives
- LNG shipping
- Liquefaction and refrigeration
 - I. Refrigeration cycle
 - II. Expansion step
 - III. Compression step
 - IV. Condensation step
- The effect of natural gas pressure on liquefaction processes
- Classification of natural gas liquefaction processes
- Type of LNG plants



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