

WATER ANALYSIS AND TREATMENT IN PETROLEUM INDUSTRY

LAB006

COURSE DESCRIPTION

Without water, there would be no oceans, no lakes, no rivers, no rain, no snow, no hail, no clouds, no polar ice caps, no Jolt cola, nothing to drink whatsoever, and probably no you, no me, no nothing! Water is everywhere; it defines our planet; it is intricately involved in just about every process on this planet in one way or another. Water rules! This course describes the chemistry of water, water treatment system, and also chemical analysis of water in petroleum industry.

COURSE GOAL

To enhance the participants' knowledge, skills, and abilities necessary to focus on the optimization of water treatment and Reservoir requirement.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Understand the basics of different water treatment systems, pretreatment systems, drinking water systems, boiler water treatment systems, demineralization plants, reverse osmosis (feed and product water treatment).
- Be aware of industrial waste water plants (API, TPI, CPI, & DAF), chlorination of water for drinking and cooling purposes.
- Understand the related lab tests for every water treatment system.
- Know the significance and standard legislations of all parameters.
- Relate between lab tests and the different water plant.

WHO SHOULD ATTEND

Water Handling

- Operator II
- Field Operator II

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Fundamental theoretical principles:

- Introduction
- Atomic structure
- Quantum number
- Energy levels
- Chemical bonds
- Acids, base and salts
- Compound, mixture and solutions
- Acids and base radicals
- The electrolytic dissociation
- The law of mass action
- Strengths of acids and bases
- Complex ions
- The ionic product of water
- The hydrogen-ion exponent, PH
- Buffer solutions
- Standard solutions
- Normal solutions
- Molar solutions
- Atomic weight and equivalent weight
- Indicators
- Electrode potentials
- Chemical reaction
- First law of thermo-dynamic
- Reversible and irreversible processes
- Heat content
- Heat of reaction
- Heat of solution
- Heat of neutralization

2. Water quality

3. Reservoir requirements

- Drinking Water
- Raw Water Sources for Public Supply

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4. Purification processes

- Removal of insoluble particles
- Distillation vapor compression distillation
- Ion exchange
- Reverse osmosis
- Electrolysis

5. Desalination

- Vapor compression desalination plants
- Process description
- Operation and control

6. Uses of water in petroleum industry

7. Unit operation of water treatment:

- Coagulation and flocculation
 - Coagulation
 - Flocculation
 - Coagulation and flocculation chemical
- Solids/liquid separation
- Removal of solids from water
 - Sedimentation
 - Hindered Settling
 - Filtration
- Removal of water from sludge
 - Thickening
 - Gravity Thickening
 - Chemical Treatment
 - Electro-osmosis
- Precipitation
- Softening by preoccupation
- Complete lime softening
- Silica removal

8. Boiler Water Treatment

- Deposits

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- Corrosion
- External Treatment
 - Suspended Solids
 - Hardness
 - Alkalinity
 - Silica
 - Total Dissolved Solids
 - Organic Matter
 - Dissolved Gases
- Condensate Returns
- Internal Treatment
- Coagulation Program

9. Cooling Water Treatment and Evaporative Cooling Systems

- Different forms of evaporative cooling systems
- Feed-water treatment regimes – Softening and/or blending
- Performance/Operation criteria for evaporative cooling systems
- Concentration factor – Calcium balance – Temperature difference operation regime
- Health & Safety considerations for evaporative cooling systems
- Legionellosis – Prevention & Control – Case studies

10. Waste water treatment

- Introduction
- Physical methods
- Chemical methods
- Biological methods
- General conclusions on wastewater treatment
- Effectiveness of aqueous waste removal

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