Introduction

Water treatment plays a crucial role in ensuring clean and safe water for various applications, from consumption to industrial processes. The water treatment process involves selecting the right techniques to optimize treatment, balancing health and safety with financial considerations. Achieving sustainability in water treatment requires understanding the processes involved and making informed decisions based on the available water resources.

This course explores the water treatment process and covers essential topics such as water chemistry, treatment technologies, regulatory compliance, and the management of water treatment systems. With a focus on industry applications, the course prepares participants to address water quality challenges and improve water management practices.

What is Water Treatment?

Water treatment involves a series of processes aimed at improving water quality by removing contaminants and impurities, making water safe for consumption or industrial use. Water treatment engineers play a key role in ensuring water meets specific standards and is safe for its intended purpose.

The process includes coagulation, flocculation, sedimentation, filtration, disinfection, and advanced methods like membrane filtration or reverse osmosis. A water treatment certificate equips individuals with the knowledge needed to perform these tasks and ensure sustainable water management practices.

Targeted Groups

- Project Managers
- Water Treatment Engineers / Plant Engineers
- Maintenance Personnel in Process Industries
- Regulatory Authorities (Hygiene, Health, and Safety Inspectors)
- Facility Management Personnel
- Maintenance Personnel in the Hotel and Catering Industry

Course Objectives

By the end of the course, participants will be able to:

- Assess their water resources and needs.
- Select appropriate water treatment techniques.
- Develop monitoring regimes to ensure treatment effectiveness.
- Optimize the application of water treatment techniques.
- Understand the technical limitations of various water treatment methods.

Targeted Competencies

- Knowledge of water quality definitions in domestic and industrial sectors.
- Understanding key water chemistry parameters and their interpretation.
- Understanding water microbiology.
- Familiarity with different water treatment techniques and their combinations.

Course Content

Unit 1: Water Quality – Water Chemistry and Microbiology and Physical Properties

- Definition of chemical and microbiological indicators.
- Water chemistry basics (pH, Electrical conductivity, Total hardness).
- Key water constituents (cations, anions, heavy metals, organic compounds).
- Implications of water composition for different uses.
- Water microbiology: pathogens vs. non-pathogenic bacteria, biofilm formation, bacterial growth factors.
- Physical properties of water.

Unit 2: Introduction to Water Treatment

- Reasons for water treatment and possible alternatives.
- Effect of treatment techniques on water composition (e.g., softening, ion exchange, reverse osmosis).
- Effect of treatment techniques on microbiological quality (e.g., membrane filtration, UV sterilization).
- Biological and physical treatment methods (biological oxidation, aeration, sedimentation, filtration).
- Considerations for hot and cold water systems (corrosion and scale inhibition).

Unit 3: Wastewater Treatment

- Domestic and industrial wastewater treatment processes.
- Primary treatment methods: settlement, flocculation, coagulation, filtration.
- Secondary treatment: biological oxidation.
- Tertiary treatment: disinfection.
- Applications of treated wastewater and sewage sludge, including regulations.
- Treatment of special wastewater types (e.g., landfill leachates).

Unit 4: Boiler Water Treatment and Steam Generation

- Basic feedwater requirements and chemistry.
- Necessity of pre-treatment for boiler water.
- Boiler efficiency and the impact of water quality.
- Continuous monitoring of water quality and process optimization.

- Common treatment techniques for boiler feedwater.
- Examples of boiler failures due to poor water quality.

Unit 5: Cooling Water Treatment and Evaporative Cooling Systems

- Types of evaporative cooling systems and feedwater treatment regimes.
- Performance and operation criteria for cooling systems.
- Managing concentration factors, calcium balance, and temperature differences.
- Health and safety considerations for cooling systems, including legionellosis prevention.

Conclusion

This water treatment course equips participants with the knowledge and skills needed to ensure clean and safe water for various applications. By learning about water treatment techniques, wastewater treatment, boiler water treatment, and cooling water treatment, participants gain a comprehensive understanding of water management systems.

Completing this course leads to certification in water treatment, validating expertise in the field and enhancing career prospects in water treatment operations. As technology advances and environmental challenges increase, ongoing professional development in water treatment remains essential to ensuring sustainable water management practices.