



**SATHYABAMA
UNIVERSITY**

**INTERNSHIP REPORT
BACHELOR OF SCIENCE IN CHEMISTRY**

Hiyoshi India Ecological Services Private Limited

SUBMITTED

BY

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Ecological Services Pvt. Ltd.

Certificate of Training

This is to certify that

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Of

Sathyabama Institute of Science and Technology (Deemed to be University), Jeppiaar Nagar, Rajiv Gandhi Salai (OMR), Sholinganallur, Chennai - 600 119, Tamilnadu, India

Successfully completed the "Internship" in the field of Water and Wastewater analysis at Hiyoshi India Ecological Services Pvt. Ltd., Chennai - 600 113, Tamilnadu, India

From 11th to 26th September 2023.



Dr. M. MAYILSAMY
Director

ACKNOWLEDGEMENT

I want to thank my advisers and everyone at the company for their patience and assistance during my on-site training. Thanks to their guidance, I was able to develop my industrial skills and learn about total dissolved solids & total suspended solids, mixed liquid suspended & total solids, phosphorus, ammonical nitrogen, chemical oxygen demand, bio chemical oxygen demand, chlorine and sulphate. These skills will help me to expand my resume and advance my career

ABOUT COMPANY

➤ Hiyoshi India Ecological Services Private Limited a 100% subsidiary company of Hiyoshi Corporation, Japan was established in the year 2011.

➤ To provide Hiyoshi's 70 years of acquired knowledge in the field of drinking water analysis, wastewater analysis, O&M of STP, solid waste etc. in Chennai.



➤ To be a place where the water test results provided are true and reliable which is extremely essential for environmental conservation.

➤ "Worldwide environmental problems are constantly changing. These problems have no borders and so it is important for all of us to come and work together irrespective of nationality, culture, race and collectively address the challenges that the entire world is facing so that we leave behind a cleaner environment

TOTAL DISSOLVED SOLID& SUSPENDEDSOLIDS

Total Dissolved Solids (TDS) and Total Suspended Solids (TSS) are parameters used to measure the total amount of solids in water, but they refer to different types of solids and are typically expressed separately.

Total Dissolved Solids (TDS):

Total dissolved solids (TDS) is a measure of the dissolved combined content of all inorganic and organic substances present in a liquid in molecular, ionized, or micro-granular (colloidal sol) suspended form. TDS are often measured in parts per million (ppm). TDS in water can be measured using a digital meter.

- TDS represents the total concentration of all inorganic and organic substances that are dissolved in a water sample.
- These substances are typically in a molecular or ionic form and cannot be physically separated from the water using standard filtration methods.

- TDS can include minerals, salts, ions, dissolved organic matter, and other soluble substances.
- TDS is typically measured in milligrams per liter (mg/L) or parts per million (ppm).

Total Suspended Solids (TSS):

Total suspended solids (TSS) are defined as solids in water that can be trapped by a filter. To measure TSS, the water sample is filtered through a pre-weighed filter. The residue retained on the filter is dried in an oven at 103–105°C until the weight of the filter no longer changes.

- TSS refers to the total concentration of solid particles that are suspended in the water but not dissolved.
- These solid particles can include silt, clay, organic matter, microorganisms, and other particulate matter.
- TSS is typically measured by collecting a water sample and filtering it through a fine filter paper or membrane to separate the suspended solids from the liquid phase. The solid material retained on the filter is then dried and weighed.
- TSS is also typically expressed in milligrams per liter (mg/L) or parts per million (ppm).

It's important to note that TDS and TSS are separate measurements, and their values are not additive. The sum of TDS and TSS does not equal the total solids content of the water because they represent different components of the solid material in the water.

MLSS & TOTAL SOLIDS, PHOSPHOROUS

MLSS (Mixed Liquor Suspended Solids), Total Solids, and Phosphorous are important parameters used in wastewater treatment and environmental monitoring to assess water quality and the performance of treatment processes.

MLSS (Mixed Liquor Suspended Solids):

Mixed liquid suspended solids (MLSS) is the concentration of suspended solids, in an aeration tank during the activated sludge process, which occurs during the treatment of waste water.

- MLSS refers to the concentration of suspended solids (biological and non-biological) in the mixed liquor of an activated sludge wastewater treatment system.
- It includes suspended biomass (microorganisms) and any non-biological solids present in the wastewater.
- MLSS is a crucial parameter in the operation of biological wastewater treatment systems, such as activated sludge processes. It indicates the concentration of microorganisms responsible for breaking down organic matter in the wastewater.
- MLSS is typically measured in milligrams per liter (mg/L) or grams per liter (g/L).

Total Solids:

Mixed Liquor Suspended Solids or MLSS in wastewater treatment is the measure of the total concentration of solids in an aeration tank. It includes non-biodegradable suspended matter, organic solids and microorganisms.

- Total Solids represent the total concentration of both suspended and dissolved solids in a water or wastewater sample.
- This parameter includes all solid matter present in the sample, both organic and inorganic, regardless of whether it is in a suspended or dissolved state.
- Total Solids can be measured by evaporating a known volume of the sample and measuring the weight of the remaining solids. It is typically expressed in mg/L or g/L.
- It is an important parameter in water quality assessment and can be used to assess the overall pollution level of a water sample.

Phosphorous (Phosphorus):

- Phosphorous, often expressed as phosphorus (P), is a chemical element that can be found in water in various forms, including orthophosphate (soluble), organic phosphorus (particulate or dissolved), and polyphosphates.
- Phosphorus is a critical nutrient in aquatic ecosystems and plays a role in the growth of aquatic plants and algae. In excessive amounts, it can contribute to eutrophication, which can harm aquatic ecosystems.
- Monitoring and controlling phosphorus levels in wastewater effluents and natural water bodies is essential to manage water quality.
- Phosphorus concentrations are typically measured in mg/L or $\mu\text{g/L}$ (micrograms per liter).

AMMONICAL NITROGEN, COD

Ammonical nitrogen ($\text{NH}_3\text{-N}$) and Chemical Oxygen Demand (COD) are two important parameters used in water quality analysis, often used to assess the pollution level and overall health of water bodies.

Ammonical Nitrogen ($\text{NH}_3\text{-N}$):

- Ammonical nitrogen is a measure for the nitrogenous organic matter as ammonia, a toxic pollutant that can directly poison humans and upset the equilibrium of water ecology systems.
- This parameter measures the concentration of ammonia nitrogen in water. Ammonia can enter water bodies through various sources, including agricultural runoff, wastewater discharges, and natural processes. High levels of ammonium can negatively impact aquatic life as it can lead to eutrophication, a process in which excessive nutrients in the water cause algae blooms and deplete oxygen levels, harming fish and other organisms. Ammonical nitrogen is usually expressed in milligrams per liter (mg/L) or parts per million (ppm).

Chemical Oxygen Demand (COD):

The chemical oxygen demand (COD) test is commonly used to indirectly measure the amount of organic compounds in liquid waste. It is expressed in

milligrams/grams per liter, which indicates the mass of oxygen consumed per liter of solution.

- COD is a measure of the amount of oxygen required to chemically oxidize organic and inorganic contaminants in water. It provides an indication of the overall organic and inorganic pollution in a water sample. High COD levels indicate a higher amount of pollutants that can deplete dissolved oxygen in water bodies, potentially leading to adverse environmental impacts. COD is typically measured in milligrams per liter (mg/L) or parts per million (ppm).
- Both ammonical nitrogen and COD are important parameters in water quality management and are used to assess the impact of pollution on aquatic ecosystems. Monitoring and controlling these parameters are essential to protect the quality of water resources and ensure the health of aquatic life and the environment.

BOD, CHLORIDE

Biological Oxygen Demand (BOD) and chloride are two more parameters commonly used in water quality analysis:

Biological Oxygen Demand (BOD):

- BOD is a measure of the amount of dissolved oxygen that microorganisms need to break down organic material present in water. It's a crucial parameter for assessing the organic pollution level in a water body. BOD is typically measured over a specific period, such as 5 days (BOD₅), and is expressed in milligrams of oxygen per liter of water (mg/L). High BOD levels indicate a high concentration of biodegradable organic matter, which, when present in excess, can lead to oxygen depletion in the water, harming aquatic life. BOD is a key parameter used in wastewater treatment plant design and monitoring to ensure that the discharged water doesn't negatively impact receiving waters.

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SULFATE

- Sulfate (SO_4^{2-}) is a chemical compound found in water and the environment. It can come from natural sources like minerals and volcanic activity, as well as human activities like industry and mining.
- While sulfate itself is not usually harmful to humans, very high levels in drinking water can cause a mild laxative effect. In the environment, sulfate can contribute to the growth of certain bacteria that produce a gas called hydrogen sulfide, which can be toxic to aquatic life and cause bad odors.
- So, when we talk about sulfate in water quality, we're mainly concerned with its effects on the environment and its potential to affect water quality and aquatic ecosystems. Monitoring sulfate levels helps ensure the health of water bodies and the organisms that depend on them.

CONCLUSION

- Drinking water analysis is primarily concerned with ensuring the safety and quality of water for human consumption, monitoring various parameters to meet regulatory standards, and optimizing treatment processes.
- On the other hand, wastewater analysis focuses on assessing and controlling pollution in wastewater before its discharge into the environment, aiming to protect ecosystems, evaluate treatment efficiency, and maintain compliance with environmental regulations.
- Both analyses play crucial roles in safeguarding public health and environmental well-being, collectively contributing to responsible water resource management.