

Name of Facility or centre	Environmental Consultancy & Testing Laboratory (ECTL)
Academic year of establishment	2021-22
School Name	School of Engineering
In charge Name	Mr. Ketan Patel

Introduction

Environmental Consultancy & Testing Laboratory (ECTL) will provide expert assessment and advisory services for their clients/industries on matters about the management of environmental issues. ECTL will work on areas such as the effects of new developments on the environment, the control of pollution and noise, the effects of agriculture or recreation on plants and wildlife, and the effect of climate change and waste management and recycling. ECTL is approved as a Schedule-1 Environmental Auditor by Gujarat Pollution control board (GOCB), Gandhinagar. ECTL is also accredited as per ISO 17025:2017 by National Accredited Borad of Testing and Calibration laboratory (NABL). ECTL will have technically efficient with a good management system which will help meet the international quality standards. ECTL will have qualified and experienced personnel with good backgrounds in research and the academic field.

Vision and Impact

ECTL is committed to provide prompt, reliable and accurate testing services, meeting the requirements of our customers. ECTL is also committed to meet the requirement of the international standard ISO/IEC 17025:2017 and continual improvement of the management system. ECTL ensures that only competent persons are employed to perform laboratory activities, which work with impartially and maintain all information confidentially. ECTL also ensures that the testing personnel familiarize with the quality documentation and implement the policies and procedures in their work. ECTL will have

a strong commitment to the aim & objective of providing a complete solution & Consultancy for Environmental Management systems to its clients.

Infrastructure and Facilities

ECTL having good spacing, proper ventilation system, well-ventilated stack rooms, store rooms, laboratory hoods, sinks, miscellaneous safety equipment like eye wash fountain, safety showers, and arrangement for safe disposal of wastes. Lab have divided in diff section and each section serves a crucial purpose in analyzing different types of samples and ensuring the safety of both personnel and the environment. Let's break down each section:

- **Water Analysis Section:** This area would likely focus on testing various parameters in water samples, such as pH, dissolved oxygen, turbidity, and levels of different contaminants like heavy metals or organic compounds.
- **Wastewater Analysis Section:** Here, the focus would be on analyzing wastewater samples, which may contain pollutants from industrial, agricultural, or domestic sources. Parameters such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), and levels of specific pollutants would be tested here.
- **Air Analysis Section:** This section would be dedicated to analyzing air quality samples, measuring concentrations of pollutants like particulate matter, volatile organic compounds (VOCs), and gases such as nitrogen dioxide or sulfur dioxide.
- **Hot Section and/or Sample Digestion Section:** This area would likely involve processes where samples are heated or digested to prepare them for analysis. This step is crucial for breaking down complex samples into forms suitable for accurate testing.
- **Sample Reception Section:** This is where samples are received, logged, and prepared for analysis. Proper handling and labeling of samples at this stage are essential to ensure accurate and traceable results throughout the testing process.

The laboratory furniture and work benches with ergonomic designs are to be given more emphasis to provide a suitable laboratory work environment. The convenience and easiness of laboratory work depend upon the quality, dimension, and placement of laboratory furniture as well as their ergonomic design. The laboratory working benches' top surfaces are to be made up of acid and alkali-resistant materials. The steel/aluminum frames used in furniture or any fittings are to be non-corrosive type. Wherever stainless-steel materials are needed, the same is to be provided.

Water is an essential and basic need for laboratory operations, washing, cleaning, etc. therefore the laboratory should have provision for continuous water supply from through storage tanks.

The laboratory shall maintain sufficient analytical and support instruments/ equipment to conduct required analytical operations since the modern analytical laboratory depends heavily upon instrumentation. The list of instruments/ equipment commonly used for the analysis of water, wastewater, soil, hazardous wastes, air, and measurement of noise level are presented in Table No.1

Table No.1 List of Equipment/Instrument Available

Sr. No.	Item Description	Quantity
1	PH Meter	2
2	BOD Incubator	1
3	Centrifuge	1
4	COD Digester	1
6	Digital Conductivity Meter	2
7	Digital Flame Photometer	1
8	Hot Air Oven	1
9	Light Microscope	1
10	Magnetic Stirrer with Hot Plate	2
11	Muffle Furnace	1
12	Turbidity Meter	2
13	Vertical autoclave	1
14	Weigh balance (0.00001gm)	1
15	Weigh balance (0.001gm)	1
16	UV Visible Spectrophotometer	1
17	Antivibration Table	1
18	Heating Mantel	2
19	Ambient Air Sampler	5
20	Stack Monitoring Kit	2
21	Handy Gas Sampler	2
23	Digital Thermohygro Meter	3
24	Glass Thermometer	1

25	Standard Weight Box	1
26	Flue Gas Analyser	2
27	water bath	2
28	Sound level meter	1
29	Kjeldahl Distillation Assembly	1
30	Refrigerator	2
31	Deep Freezer	1

The laboratory requires calibration of all devices that may not be the actual test instrument but are necessary to support laboratory operations. These include balances, ovens, refrigerators, freezers, incubators, water baths, temperature measuring devices, volumetric dispensing devices, etc. Since the measurements taken using this equipment are important for accuracy and precision, calibration is essential for getting accurate analytical data.

Generally, the glassware of borosilicate glass, which is relatively inert, is used for analytical work. Plastic bottles of polyethylene (PE) or polypropylene (PP) are suitable for collecting and transporting water samples. Unless instructed otherwise, borosilicate glass bottles may be used for the storage of reagents and standard solutions. Standard solutions of silica, boron, and alkali metals should be stored in polyethylene bottles. Whenever necessary, amber or dark-colored glass bottles must be used for storing photo-reactive chemical solutions.

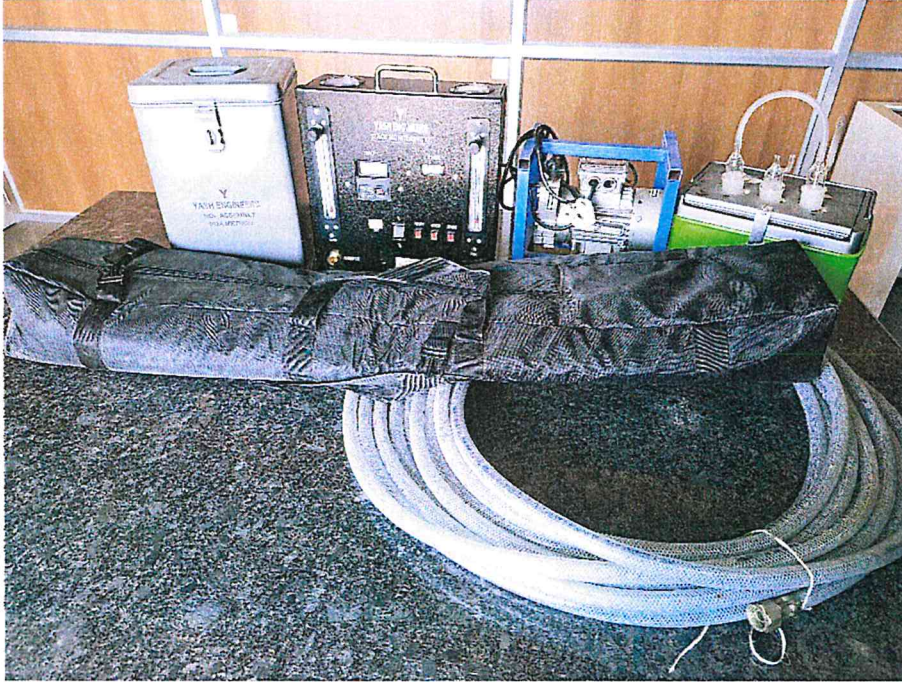
The quality of chemicals/solvents used in the analytical laboratory may vary from laboratory grade to Analytical or Guaranteed Grade [Analar or AR or G.R.]. The quality of chemical/solvents may become one of the causes of analytical errors that may affect the analytical instrument or may lead to interferences during determinations. Hence, the selection of laboratory chemicals of appropriate quality is the most important factor for achieving a result with the desired accuracy. For the preparation of all standard solutions, only "Analytical reagent grade (AR) or guaranteed reagent grade (GR) should be used, since their purity levels are known. Reference Materials (RM's) or Certified Reference Materials (CRM) should be used for calibrations during an analysis of metals, pesticides, and other organics such as THM, PAH's, BTX, etc.

The Key Equipments facilities include:

- **Ambient Air Sampler:** Equipment used to monitor and measure fine particulate matter (PM_{2.5}) levels in the air plays a crucial role in assessing air quality and understanding potential health risks. High-volume samplers draw large volumes of air through filters over a specified period, typically 24 hours. These filters capture particulate matter, which can then be weighed to determine the concentration of PM_{2.5}. A Respirable dust sampler is a device used to collect particulate matter (PM) with a diameter of 10 micrometers or less in ambient air. PM₁₀ includes particles such as dust, pollen, mold spores, and soot, which can have various sources including vehicle emissions, industrial processes, construction activities, and natural sources like wildfires and windblown dust.

- **Stack Monitoring Kit:** The Stack Sampler has been designed to overcome such problems. The operating principle is simple. The Particulate Matter is collected over a filtration thimble. It entraps and absorbs various gaseous pollutants in suitable reagents, which are analysed subsequently by simple Wet Chemistry methods to determine the concentration of specific pollutants.





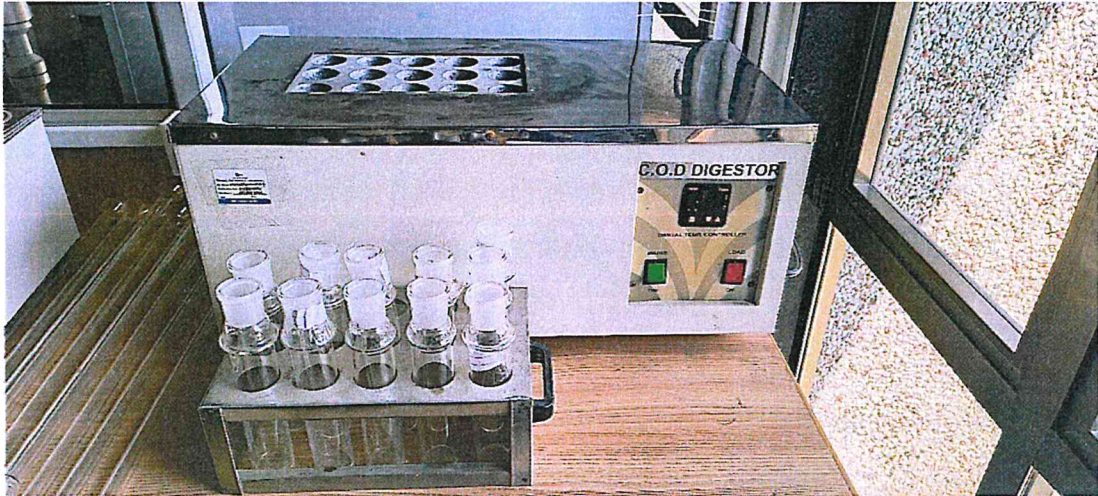
- Hot Air Oven: Hot air ovens are widely used in testing labs across various industries for a range of purposes due to their precise temperature control and uniform heating capabilities. Hot air ovens are often used to sterilize glassware, surgical instruments, and other laboratory equipment. Many materials used in testing labs, such as powders, chemicals, and samples, need to be dried before analysis or testing to remove moisture. Hot air ovens provide a controlled environment for drying at specific temperatures without damaging the samples.



- **BOD Incubator:** A BOD (Biochemical Oxygen Demand) incubator is a specialized piece of laboratory equipment used to determine the amount of oxygen required by microorganisms in the water or wastewater sample for their metabolism. BOD incubators create and maintain controlled environmental conditions such as temperature, humidity, and often agitation to simulate the ideal conditions for microbial growth. It provides a stable and controlled environment for the samples to incubate over a specified period, typically 5 days, during which the microbes in the sample consume oxygen as they metabolize organic matter. BOD incubators play a critical role in environmental testing by providing controlled conditions for measuring the oxygen demand of microorganisms in water samples, which is essential for assessing water quality and environmental pollution levels.

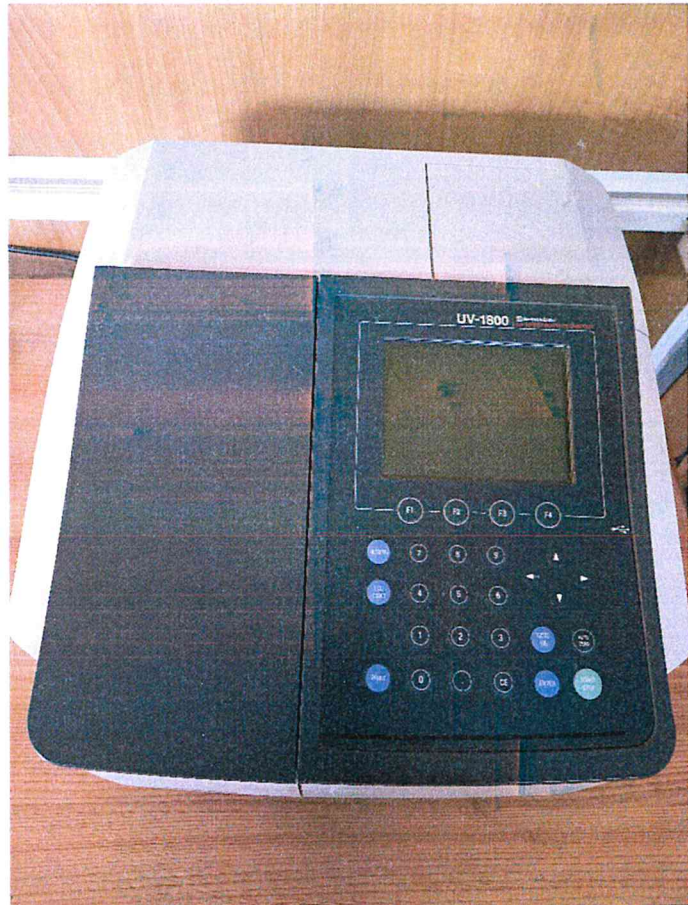


- **COD Digester:** A COD (Chemical Oxygen Demand) digester is a crucial tool in environmental testing and wastewater treatment processes. Its primary function is to determine the amount of organic pollutants present in a sample by measuring the oxygen required to chemically oxidize them. The COD digester initiates a chemical reaction where the organic compounds in the sample are oxidized by a strong chemical oxidizing agent, typically potassium dichromate in an acidic medium. As the organic compounds in the sample react with the oxidizing agent, they consume oxygen from the solution. The COD digester allows for accurate measurement of the amount of oxygen consumed during this reaction.



- UV-visible

spectrophotometer: It is a scientific instrument used to measure the absorption of light in the ultraviolet and visible spectral regions. The primary function of a UV-visible spectrophotometer is to measure how much light is absorbed by a sample at different wavelengths within the UV and visible range. This absorption is due to the interaction of the sample with light, which can provide valuable information about the sample's chemical



composition, concentration, and other properties. UV-visible spectrophotometers

are equipped with a monochromator or a combination of filters and prisms that allow users to select specific wavelengths of light to pass through the sample. This enables researchers to target particular absorption bands characteristic of certain compounds or analyze samples at specific wavelengths of interest.

- Sound Level Meter: A sound level meter (SLM) is a device used to measure the intensity or level of sound in decibels (dB). Its primary function is to quantify the sound pressure level (SPL) in a



given environment. The primary function of a sound level meter is to measure the intensity of sound waves in a particular environment. This measurement is typically expressed in decibels (dB), which is a logarithmic scale representing the relative intensity of sound. Sound level meters often incorporate different frequency weightings to mimic the sensitivity of the human ear to different frequencies. The most common weighting networks are A-weighting (dBA), which is used for general environmental noise measurements, and C-weighting (dBC), which is used for measuring sound levels in industrial environments where low-frequency noise is significant.

Photos



Research and Development Focus

Research and development (R&D) focus in an ECTL typically involves various aspects aimed at assessing, monitoring, and improving

environmental quality and sustainability. Here are some key areas of focus:

Pollution Monitoring and Control: This includes the development of advanced techniques and technologies for monitoring various pollutants such as air pollutants (e.g., particulate matter, gases), water pollutants (e.g., heavy metals, organic compounds), and soil contaminants. R&D efforts might focus on sensor development, remote sensing technologies, and real-time monitoring systems.



Waste Management and Recycling: Research in this area involves finding innovative ways to manage and recycle different types of waste, including solid waste, wastewater, and hazardous waste. This can include studies on waste minimization, treatment technologies, and the development of recycling processes for materials like plastics, metals, and electronics.

Environmental Impact Assessment (EIA): R&D efforts may be directed towards improving methods for assessing the potential environmental impacts of proposed projects or developments. This could involve the development of predictive models, GIS-based analysis, and methodologies for assessing cumulative impacts on ecosystems, biodiversity, and human health.

Collaborations and Applications

Collaboration with Gujarat Pollution control Board is essential for compliance with environmental regulations and standards. These collaborations often involve sharing data, conducting joint research projects, and providing expertise to support policy development and enforcement.

ECTL assist industries and regulatory agencies in monitoring compliance with environmental regulations and permits. By analyzing samples collected from industrial facilities, wastewater discharges, and contaminated sites, these laboratories help ensure adherence to legal requirements and pollution control standards.



Incharge



Principal



Registrar

Registrar
P P Savani University

