



CIVIL & ENVIRONMENTAL
ENGINEERING



MISSISSIPPI STATE
UNIVERSITY

Kelly Gene Cook, Sr
Civil and Environmental Engineering
ENVIRONMENTAL AND INSTRUMENTATION LABORATORY

Analytical Instrumentation Description

Instrumentation for physical analysis (particle size distribution, density of particle, total solids, specific gravity, Atterburg limits, water content), chemical analysis (dissolved phosphorous, total phosphorous, nitrogen, chlorophyll “a”, Blue Green algae, Rhodamine, total organic carbon, heavy metals, pH, electrical conductivity, total nitrogen, organic matter) and biological analysis is available. Equipment at the Environmental Lab is periodically revised and calibrated to ensure good results.

The Kelly Gene Cook, Sr. Environmental Laboratories include automated analytical and research facilities that incorporate an ICP speciation of metal, a TOC-V analyzer for determination of organic substances in water such as total carbon, inorganic carbon, non-purgable organic carbon and purgable organic carbon; a Trilogy Fluorometer with modules to measure fluorescence, absorbance and turbidity, for chlorophyll a, cyanobacteria, CDOM, ammonium, turbidity and dye tracers plus the determination of some chemicals/nutrients in water; a Gas Chromatography, and Bioreactors and a full bioengineering laboratory component.

Shimadzu TOC-V analyzer: This equipment efficiently oxidizes hard-to-decompose insoluble and macromolecular organic compounds. The 680°C combustion catalytic oxidation method is capable to analyze all organics compounds. Measurements that can be done with this equipment include: total carbon (TC), inorganic carbon (IC), non-purgable organic carbon (NPOC) and purgable organic carbon (POC). Measurements on the TOC-V has a wide range from 4 µg/L to 25,000 mg/L.

Fluorometer: The new “Trilogy Fluorometer” has modules capable to measure fluorescence, absorbance and turbidity. This equipment can be used to make measurements of chlorophyll a, (extractive acidification and non-acidification plus in vivo), rhodamine and fluorescein dye,

cyanobacteria, CDOM, ammonium, turbidity and the determination of some chemicals/nutrients in water systems (i.e. Nitrate, Silicate, Phosphate etc).

Electrolytic Respirometer BI-1000: Microbial respirometer for BOD testing, biodegradability assessments, bioremediation testing and toxicity screening studies. This instrument continuously and precisely resupplies oxygen needed to sustain bioreactions. This unit features Cells 1-8 and the bath openings measure 5" in diameter and 5" deep.

Turbidimeter: The Hach Model 2100N Laboratory Turbidimeter is designed for measurements of turbidity from 0 to 4000 NTU (Nephelometric Turbidity Units) with automatic range selection and decimal point placement. This equipment also provides direct display in units of Nephelos (0–26800 Nephelos) and EBCs (European Brewery Convention, 0–980 EBCs). These units are displayed using the conversion factors of 6.7 Nephelos per NTU and 0.245 EBCs per NTU. The instrument meets the design criteria of the United States Environmental Protection Agency (Method 180.1).

DCode Universal Mutation Detection System: The DCode system is a vertical electrophoresis instrument for the detection of gene mutations. The DCode system can be used to perform any vertical gel-based mutation detection method. The system is optimized for DGGE, CDGE, TTGE, SSCP, PTT and Heteroduplex Analysis. Some of the advantages of the DCode system include uniform buffer temperature around the gel, buffer circulation; buffer temperature runs from 5 to 70 °C and a modular design to allow customization.

XL-1000 UV Crosslinker: The UV crosslinkers provide super-fast DNA and RNA crosslinking to membranes for improved hybridization-signal sensitivity. At peak, these units can process samples in under 30 seconds. Full range display resolution is accurate to 5µW/cm² EMI/RFI protection.

High Temperature Digestion System: The DigiPREP HT systems have a temperature range from ambient to 450°C and is ideal for Kjeldahl/TKN, WEEE RoHS, and for any application using sulfuric acid (H₂SO₄). This system can be used for the steam distillation of Kjeldahl ammonia solutions. In the Kjeldahl application, the additions of NaOH, H₂O, and H₃BO₃ may be automated. Samples can be distilled in 3 to 5 minutes.

Mastercycler Gradient: It is a PCR device for all molecular biological and biochemical routine diagnostics. It has a temperature control, which enable extremely rapid changes in temperature of up to 3 °C per second. This allows the temperature of the samples to be controlled extremely rapidly between 4 °C and 99 °C. An advantage of the Mastercycler is the Gradient function, which enables the temperature across the entire block to be varied within a range of up to 20 °C.

Dismembrator: The Sonic dismembrator disrupts cells, extracts samples, reduces particle sizes, accelerates chemical reactions and mixes and dissolves particles in solution.

Spectrophotometer: The Spectronic 20 is used to measure the absorbance (or transmittance) of solutions. A Spectronic 20 is capable of measuring % transmittance and absorbance over the range from 340 to 950 nm.

The Kelly Gene Cook, Sr. Environmental Laboratories also includes basic equipment such as: pH meters, electrical conductivity meter, centrifuge with a speed range from 250 to 13,500 rpm and capacity of 4x100 mL; microcentrifuge with a maximum speed of 14,000 rpm and capacity of 18x2.0 mL, oven and muffle furnaces; and cabinets class II and chemical fume hoods.