

DEPARTMENT OF ALLIED SCIENCES



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Department of Allied Sciences, MDNIY is dedicated for teaching allied science subjects to Yoga students/sadhaks/followers. Specifically, department is having a fully equipped Biochemistry Laboratory for academics, research and monitoring purpose.

In Biochemistry, students are taught with chemical changes which occur in the organism during digestion, absorption, excretion, growth and multiplication of the organism. Qualitative and quantitative analysis of body fluids, which are subject of clinical biochemistry assist the clinicians in the diagnosis, treatment and prevention of the disease and drug monitoring, tissue and organ transplantation, forensic investigations and so on are the subject of clinical biochemistry. Various biological fluids subjected to chemical tests and assays include blood, plasma, serum, urine, cerebrospinal fluid (CSF), ascetic fluid, pleural fluid, faeces, calculi and tissues.

The Biochemistry Laboratory of the Department consist of advanced equipments such as Analytical Weighing Balance, pH meter, Vortex mixer, micro-centrifuge, Water Distillation Unit, Incubator, Oven, Centrifuge, Hot Water Bath, Refrigerator, Calorimeter, Paper chromatography apparatus, Thin layer Chromatography apparatus, Urinometer, Urinalysis material, Semi-auto-analyser, Immuno-analyser, Hand-held Blood analyser, Dual Beam UV-Vis Spectrophotometer, Multi-mode microplate reader.



Biochemistry laboratory, MDNIY.

INSTRUMENTS & FACILITIES OF BIOCHEMISTRY LABORATORY

Multimode Microplate reader

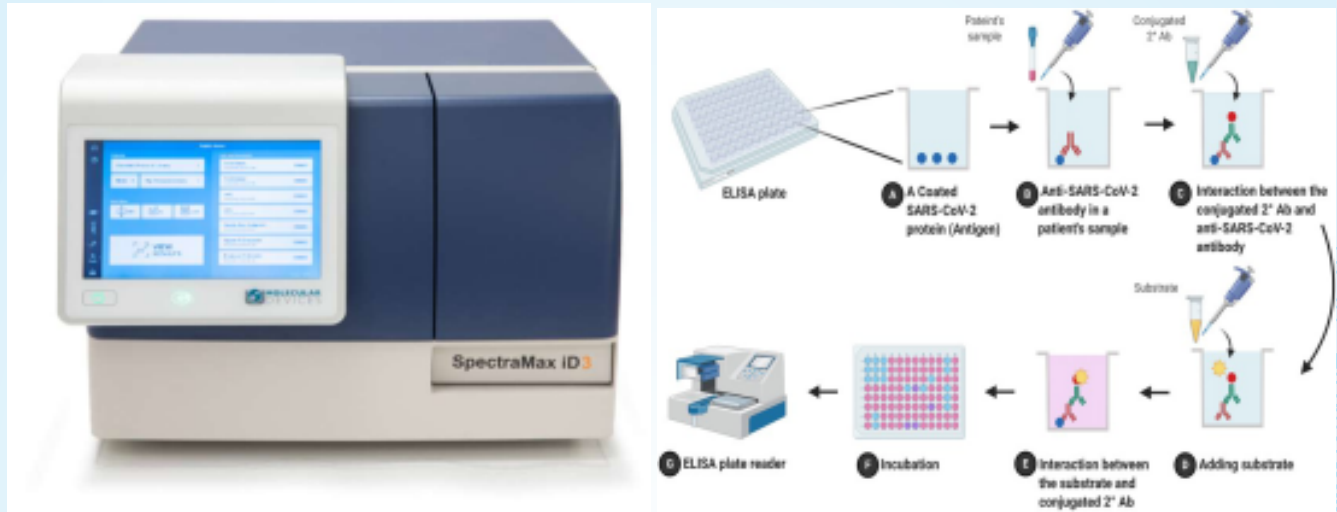


Figure: Multi-Mode Microplate Reader (Molecular Devices, USA, SpectraMax Id3)

Multi-Mode Microplate Reader (Molecular Devices, USA, SpectraMax ID3) is a monochromator-based, multi-mode plate reader. The touchscreen interface provides integrated instrument control, data display, and the ability to export results over your network for statistical data analysis. The instrument touchscreen uses the embedded SoftMax Touch Software to run basic noninjector reads. It also uses computer running the SoftMax® Pro Data Acquisition and Analysis Software to operate the instrument for advanced acquisition settings. The high sensitivity and flexibility of the instrument make it useful for applications in the fields of biochemistry, cell biology, immunology, molecular biology, and microbiology. Typical applications include ELISA, nucleic acid, protein, enzymatic type homogeneous and heterogeneous assays, microbial growth, endotoxin testing, and pipettor calibration.

The instrument supports the following read modes:

- Absorbance Read Mode
- Fluorescence Intensity Read Mode,
- Luminescence Read Mode

The instrument supports four read types.

- Endpoint
- Kinetic
- Well Scan
- Spectrum

REFERENCE

1. Spectramax ID3 with SoftMax® Pro Data Acquisition and Analysis system has been extensively validated with research papers and publication worldwide with 16400 citations. For details click the link.

<https://www.moleculardevices.com/resources/citations/softmax-pro>

2. Handheld blood analyser (Portable)

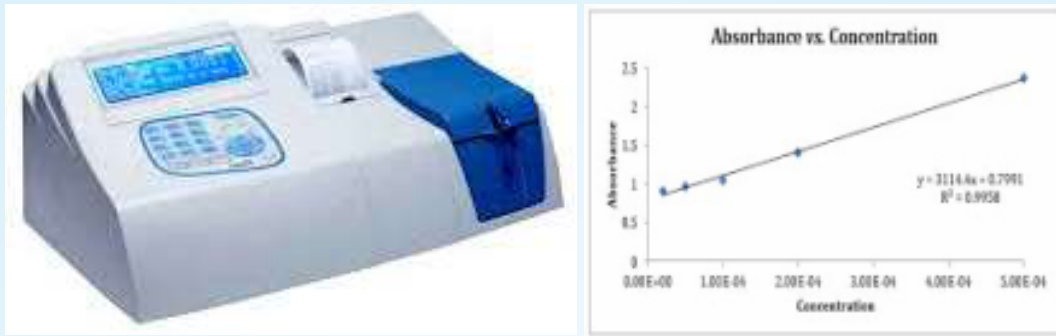


i-STAT Portable Clinical Analyzer (Abott Laboratories) is a handheld device is a fully automated system used for point-of-care clinical testing. It uses small amount of whole blood to provide time sensitive test at patient's side in just minutes. The analyzer is designed to provide rapid and accurate results for various blood tests such as arterial blood gases, blood electrolytes, haematology and other biochemistry markers.

REFERENCE

1. Steinfelder-Visscher J, Teerenstra S, Gunnewiek JM, Weerwind PW. Evaluation of the i-STAT point-of-care analyzer in critically ill adult patients. *J Extra Corpor Technol.* 2008 Mar;40(1):57-60. PMID: 18389666; PMCID: PMC4680657.
2. Thomas Mock, Douglas Morrison, Randall Yatscoff. Evaluation of the i-STAT™ system: A portable chemistry analyzer for the measurement of sodium, potassium, chloride, urea, glucose, and haematocrit. *Clinical Biochemistry.*2004. Volume 28, Issue 2, April 1995, Pages 187-192
3. W. L. NG*, T. G. SHORT†, K. N. GUNN†, G. S. FUGE‡, B. SLON§. Accuracy and reliability of the i-STAT point-of-care device for the determination of haemoglobin concentration before and after major blood loss. *Anaesth Intensive Care* 2014; 42: 495–499

Semi Auto-Biochemistry analyser



Semi-Autoanalyzer (Transasia Pvt. Ltd. Chem5x) is the frequently used device in clinical biochemistry laboratories comes with Monochromatic & biochromatic measurement system. It consists of Multi-point calibration with graphical display and built in self-diagnosis. It can be used in laboratories to perform various tests like albumin tests, sugar level tests, or to detect levels of enzymes and creatinine in the blood. Entire Range of Clinical Chemistry Tests Including Blood glucose levels, lipid profile test, LFT, KFT etc.

REFERENCE

1. Kumari S, Bahinipati J, Pradhan T, Sahoo DP. Comparison of test performance of biochemical parameters in semiautomatic method and fully automatic analyzer method. J Family Med Prim Care. 2020 Aug 25;9(8):3994-4000. doi: 10.4103/jfmpe.jfmpe_94_20. PMID: 33110800; PMCID: PMC7586617.
2. X. Lv, Y. Luo, M. Deng and Y. Chen, "The design of the semi-automated biochemistry analyzer", Proc. Int. Conf. Inf. Acquisition, pp. 164-167, 2004.

Advanced Immuno-analyser (Portable)



ichroma™ II (Boditech) is a fluorescence and Europium nanoparticle scanning instrument to be used in conjunction with various ichroma™ Immunoassay Tests which are based on antigen-antibody reaction and fluorescence technology. It comes with a two-level quality control/calibration and control system for better accuracy. ichroma™ II is a compact, easy-to-use diagnostic immuno-analyzer to measure the presence of various biomarkers for cardiac, cancer, Vitamins, hormones, infectious diseases, autoimmune diseases, and metabolic diseases.

REFERENCE

1. Bolodeoku J., Bass M., TK Kim, Anyaeche C., and Retnasingham V., (2020) Performance of the Boditech iCHROMA Covid-19 IgG antibody assay with the external quality control from UK NIBSC (National Institute of Biological Standards and Control) J, Clin Med Rev and Rep. 2(8); DOI: 10.31579/2690-8794/048
2. Bolodeoku J, Bains S, Pinkney S, Coker O, Kim TK, et al. (2019) An evaluation of the Boditech i-CHROMATM Thyroid Stimulating Hormone (TSH) Method: Precision and Accuracy. Ann Clin Lab Res Vol. 7 No. 2: 302.
3. Oh Joo Kweon a, Yong Kwan Lim a, Hye Ryoung Kim a, Tae-Hyoung Kim b, Mi-Kyung Lee. Performance evaluation of newly developed fluorescence immunoassay-based interferon-gamma release assay for the diagnosis of latent tuberculosis infection in healthcare workers. Journal of Microbiology, Immunology and Infection. Volume 55, Issue 2, April 2022, Pages 328-331

Dual Beam Spectrophotometer



Applications that require stability, flexibility and speed will benefit from using a double beam spectrophotometer (Analytical technologies ltd, Spectro 20925) instead of a single beam spectrophotometer. These instruments are used in research and clinical laboratories for:






- DNA analysis
- Wavelength scanning
- Protein analysis
- Kinetics
- Quantitative analysis







Physicists, biologists and chemists use double beam spectrophotometers for measuring visible, near-infrared and near-ultraviolet light.







REFERENCE



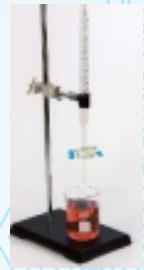

- Jain PS, Chaudhari AJ, Patel SA, Patel ZN, Patel DT. Development and validation of the UV-spectrophotometric method for determination of terbinafine hydrochloride in bulk and in formulation. Pharm Methods. 2011 Jul;2(3):198-202. doi: 10.4103/2229-4708.90364. PMID: 23781456; PMCID: PMC3658052.

Equipments/ Instruments for Student's regular Practical's

S.No.	Instrument/Device	Use	Photo
1.	Analytical Weighing Balance	Analytical weighing balances are critical tools in biochemistry labs for accurate measurement of the mass of substances.	
2.	pH meter	It is used to measure the acidity or alkalinity of solutions, critical for optimizing enzymatic reactions and assessing reaction conditions.	
3.	Water Distillation Unit	It is use to produce purified water for various experiments, ensuring high-quality reagents and reliable results.	
4.	Paper Chromatography Unit	It is use to separate and analyses complex mixtures of compounds, aiding in identifying and quantifying components within samples.	
5.	Thin layer Chromatography Unit	It is used to separate compounds within mixtures, assisting in substance identification and analysing reactions swiftly.	

S.No.	Instrument/Device	Use	Photo
6.	Colorimeter	It measures the intensity of light absorbed by substances, aiding in quantifying concentrations and assessing chemical reactions based on colour changes.	
7.	Centrifuge	It rapidly spins samples, separating components by density, essential for isolating molecules, cells, or particles from complex mixtures.	
8.	Vortex mixer	It swiftly agitates tubes or vials, aiding in mixing reagents, solvents, or samples for homogenous reactions.	
9.	Hot Plate and Magnetic Stirrer	It combines heating and stirring, crucial for preparing solutions and maintaining consistent temperatures during experiments.	
10.	Incubator	It provides controlled temperature and environment, fostering optimal conditions for cultivating and studying biological samples or reactions.	
11.	Hot Water Bath	It offers consistent heating, aiding in tasks like enzyme reactions, sample thawing, and maintaining stable temperatures for experiments.	

S.No.	Instrument/Device	Use	Photo
12.	Microcentrifuge	It rapidly spins small samples, separating biomolecules or particles, vital for quick analyses and DNA/RNA purification	
13.	Multi-channel micropipette	It dispenses precise volumes simultaneously, streamlining high-throughput pipetting tasks, such as sample preparation and reaction setup.	
14.	Urinometer	It measures urine density, aiding in assessing kidney function and detecting potential health conditions based on urine specific gravity.	
15.	Urinalyses strips	It quickly tests urine for various parameters like pH, glucose, and protein, aiding in diagnosing metabolic disorders and kidney-related issues.	
16.	Vacutainers	These are pre-measured blood collection tubes that simplify and standardize blood sampling, crucial for accurate diagnostics and testing various biochemical parameters.	
17.	Micro-pipettes	It precisely measures and transfer small volumes of liquids, essential for preparing samples, reagents, and conducting various assays with high accuracy.	

S.No.	Instrument/Device	Use	Photo
18.	Laboratory Oven	It provides controlled heating, enabling processes like sample drying, sterilization, and promoting consistent reactions or material preparation.	
19.	Refrigerator	It maintains low temperatures, preserving sensitive reagents, enzymes, and samples crucial for accurate experiments and storage.	
20.	Burette setup	It enables precise dispensing of liquids, aiding in titrations and accurate measurement of reactants for analytical purposes.	
21.	Sample vials	It holds small quantities of liquids or substances, facilitating storage, organization, and efficient handling during analyses and experiments	

* Additionally, glassware's, plasticwares, chemicals, Reagents and kits are also the part of Biochemistry Laboratory.