



SCHOOL OF CHEMICAL SCIENCES

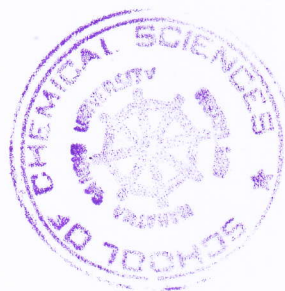
MAHATMA GANDHI UNIVERSITY

Priyadarshini Hills, Kottayam-686560
Kerala, India

Phone: 0481 -2731036

17.03.2021

I hereby certify that we had an online lab visit for 39 Undergraduate students (B. Sc Chemistry) of Providence Women's College, Calicut as a part of their B. Sc Curriculum of Calicut University, on 22nd January 2021 at 10.30 am with lab sessions on instrumentation of FT-IR Spectrometer and UV-Vis Spectrophotometer.



Devdys

Professor & Director

**Professor and Director
School of Chemical Sciences
Mahatma Gandhi University
Priyadarsini Hills P.O.
Kottayam, Kerala 686 560**

Department of Chemistry		
Online Research Lab Visit: List of Students 22/01/2021		
Sl. No	Name of the student	Class of Study
1	HAIFA PARVEEN	III Chemistry
2	ABHIRAMI S M	III Chemistry
3	AGNA EDISON	III Chemistry
4	AISHWARYA P	III Chemistry
5	AISWARYA K	III Chemistry
6	ALEENA JERARDE	III Chemistry
7	ANAGHA M	III Chemistry
8	ANN MARIA JOY	III Chemistry
9	ARCHANA SASIDHARAN	III Chemistry
10	CHINMAYI L MANOJ	III Chemistry
11	KEERTHANA M P	III Chemistry
12	NAVYA PRAMOD	III Chemistry
13	SANDRA MARIA	III Chemistry
14	SANGEETHA M	III Chemistry
15	SANGEETHA T	III Chemistry
16	SNEHA S	III Chemistry
17	SWETHA SAJEEV	III Chemistry
18	ANAGHA.K	III Chemistry
19	ANAGHA V	III Chemistry
20	ANJALI E M	III Chemistry
21	ANUSMERA P	III Chemistry
22	ANUSREE	III Chemistry
23	APARNA JANISH	III Chemistry
24	ARCHANA DINESAN A	III Chemistry
25	ASWATHI K P	III Chemistry
26	ASWATHY PAUL	III Chemistry
27	DRISSYA R DAS	III Chemistry
28	FEDUVA AHAMMED T	III Chemistry
29	GOPIKA RS	III Chemistry
30	GREETA ALPHONSA GEORGE	III Chemistry
31	INDULEKHA R	III Chemistry
32	KAVYALAKSHMI	III Chemistry
33	KAVYA MOHAN	III Chemistry
34	NAMITHA PK	III Chemistry
35	RAHANA E R	III Chemistry
36	SHALIMA M	III Chemistry
37	SHANIMA M	III Chemistry
38	SNEHA SUDHEER N	III Chemistry
39	SUDARSANA M M	III Chemistry

Link to the Google Meet recordings:

Part 1: <https://youtu.be/R7rRQefrcMg>

Part 2: <https://youtu.be/LRMQ46IKTgY>

PROVIDENCE WOMEN'S COLLEGE
CALICUT

DEPARTMENT OF CHEMISTRY

IV REPORT

Online Laboratory Visit

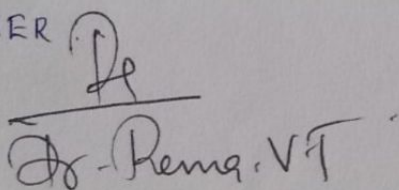
School of Chemical Sciences, MGI University

NAME : ASWATHY PAUL

REG. No : PWASSCH026

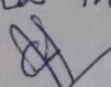
CLASS : III BSC. CHEMISTRY

EXAMINER


Dr. Rema V T

HEAD OF DEPARTMENT

Dr. Asha Thomas


DEPT. OF CHEMISTRY
PROVIDENCE WOMEN'S COLLEGE
CALICUT

INTRODUCTION

Industrial visit is the occasion in which we are watching and analysing the practical applications of our subject. In every year, final year students go for study tour as part of their curriculum. But in this year as we are facing such a pandemic - covid 19, we the department of chemistry, Providence women's college conducted online industrial visit on 21-01-2021 and 29-01-2021 in collaboration with School of Chemical Science, Mahatma Gandhi University. On 21-01-2021 Dr. Devaky, Director of School of chemical science along with Namidha Nandanam, Scientific assistant and Fency, Research scholar explained about Infrared Spectrometer and ultraviolet-visible Spectrometer. On the next day, 29-01-2021 Dr. Sunilkumar P.N, Mahatma Gandhi University explained about Nuclear magnetic Resonance Spectroscopy and conducted demonstration with Sample.

Spectroscopy and Spectrometer :

Spectroscopy is defined as the branch of science which is associated with the interaction of radiations of different wavelengths with matter. There are different types of Spectroscopy, Based on the type of radiation interacting it is classified. A molecule possess quantised translational, Rotational, vibrational and Electronic energy levels. Spectroscopy is the general study of interaction of matter with Electromagnetic waves but and using Spectrophotometer we can quantify the measurement, Light Spectra reflection and transmission as a function of wavelength - Spectrophotometer is an instrument that measure the amount of light absorbed by a sample.

Ultra violet - Visible Spectrometer :

If ultraviolet-visible radiation is incident on a matter it result in the transition from one electronic level to another. The study regarding this is called electronic Spectroscopy or ultra-violet Spectroscopy.

ultra violet-visible spectrophotometry is a technique used to measure light absorbance across the ultraviolet and visible ranges of the electromagnetic spectrum. we know that the absorbance of radiation in UV-visible range cause atomic excitation i, when the atom excites ~~into~~ another higher transition state it must absorb a sufficient radiation and each molecule has a specific energy to undergo these transition. UV-visible spectrophotometer is using this principle to characterise the sample.

Namitha Nandhanan, Scientific assistant demonstrated their UV-visible spectrometer - UV 2600 using silver nanoparticle in distilled water as sample. The sample is taken in one cuvette. The sample should be diluted also. In the beginning blank and the reference is introduced to spectrometer and give preliminary adjustments in the software window. i, about choosing the base line. Then take the blank out of the spectrometer and introduce the sample in the sample holder and a peak is obtained in the software window. This is the UV-visible characteristic of that sample. By analysing the spectrum

obtained we can study and understand about the sample introduced. The most important feature of UV-2600 is the ability to perform wavelength measurements up to 1400 nm and it allows the analysis of organic, inorganic, biological samples, optical materials and photovoltaics.

Infrared Spectrometer :

Infrared Spectroscopy or vibrational Spectroscopy. is the study of interaction of infrared radiation with matter causes the transition in vibrational energy levels. If a molecule gives a characteristic infrared spectrum, it is said to be infrared active - IR active.

The molecules with permanent dipole moment are IR active. Infrared Spectrometer is a useful technique for structural and functional group analysis and it has been used widely to identify unknown substances.

This technique is utilizing the ability of atoms to absorb infrared frequencies that match their transitions to higher vibrational level and generates an absorption spectra specific to particular compounds.

The demonstration was carried out in ATR - Attenuated total reflection model IR Spectrometers. It is a sampling technique used in conjunction with infrared Spectroscopy which enables samples to be examined directly in the solid or liquid state without further preparation. They carried out the characteristic of used and throused sample. ATR uses the property of total internal reflection. In ATR model a crystal which is made of an optical material with a higher refractive index is required. In the case of liquid sample, pouring a shallow amount over the surface of the crystal is sufficient. In case of solid sample, samples are firmly clamped to ensure good contact, it is ensured by adjusting the upper knob. Generally Zinc, Silicon, Germanium, Diamond are the ATR crystals used. Here diamond is used because it has excellent mechanical properties. An ATR accessory operates by measuring the changes that occur in an internally reflected infrared beam. When the beam comes to contact with the sample the beam is divided onto an optically dense crystal with a high refractive index at a certain angle. This internal reflectance

creates an evanescent wave that extends beyond the surface of the crystal into the sample held in contact with the crystal. In regions of the IR spectrum where the sample absorbs energy, the evanescent wave will be attenuated. The attenuated beam returns to the crystal, then exists the opposite end of the crystal and is directed to the detector in the IR Spectrometer. The detector records the attenuated IR beam as an interferogram signal, which can be used to generate an IR spectrum using software comparing to other accessories. ATR have many advantages it only require minimal sample preparation, fast and easy clean up can be done we can analyse the sample in their natural states, it is excellent for thick or strongly absorbing samples.

NMR Spectrometer :

Nuclear Magnetic Resonance Spectroscopy. Here spectrum arises from the transition between the nuclear spin energy levels of the molecules when an external magnetic is applied on it. The radiation in the range of radio frequency provide the energy related to this transition. This technique use the ability

of atomic nuclei to behave like a small magnet and align themselves with an external magnetic field. When irradiated with a radio frequency signal the nuclei in a molecule can change from being aligned with the magnetic field to being opposed to it. The energy frequency at which this occurs can be measured and is displayed as an NMR Spectrum. The most common nuclei observed using this technique are ^1H and ^{13}C .

NMR technique may be used to detect the presence of particular nuclei in a compound and since for a given nuclear species the strength of the NMR signal is directly proportional to the no. of resonating nuclei to estimate them quantitatively. The two characteristics of nmr make it more powerful and useful they are chemical shift and coupling constant. Chemical shift is the difference in the absorption position of a particular proton due to variation in its chemical environment from that of an isolated proton for that we are keeping a reference compound - TMS, Tetramethyl silane in which all the protons have the same chemical environment. The inclined

interaction between the spins of the neighbouring magnetic nuclei that is transmitted through intervening bonding electrons is called spin-spin

coupling. The magnitude of separation between the peaks in a multiplet arising from spin-spin coupling is called spin spin coupling constant.

Dr. Sanilkumar PN explained about all this and demonstrated NMR spectrum of a sample. There Bruker Advance III 400 NMR Spectrometer is used. To get the nuclei in a molecule to get align in the same direction, a very strong magnetic field is generated using a super conducting electro-magnet. Sample taken in a sample tube is inserted to the top of magnet and radio frequency field is generated. When NMR signals are produced it is detected with sensitive radio detector and NMR Spectrum is obtained.

CONCLUSION

From this online industrial visit we get an idea about characterising the samples using UV-visible, IR, NMR Spectroscopy. School of Chemical Science and their faculties help us to understand about the wide range of application of Spectroscopy. Spectroscopy can be applied in many fields - pharmaceuticals, astronomy, forensic, Research and development, food and Beverages, Environmental analysis, mineralogy, Gemology etc.. because using UV-visible we can detect the metals in various samples their quantification is also possible. Then using IR, we can determine the organic structures, functional groups, we can measure bond strength, degree of saturation. Then using NMR we can determine the structure of organic compounds and it is applied in MRI - Magnetic resonance imaging. By realising and understanding all this our mind is enlightened to explore the heights and depths of chemistry.