



Department of Chemistry  
**ASUTOSH COLLEGE**  
**UNIVERSITY OF CALCUTTA**



**Report on “Industrial Visit” to**  
**TCG Lifesciences | Chembiotek**

Salt Lake Sector-V, Kolkata



---

**Semester** : 5<sup>th</sup>  
**Batch** : 2021-2024

---

Faculty accompanied : Dr. Srijita Basumallick

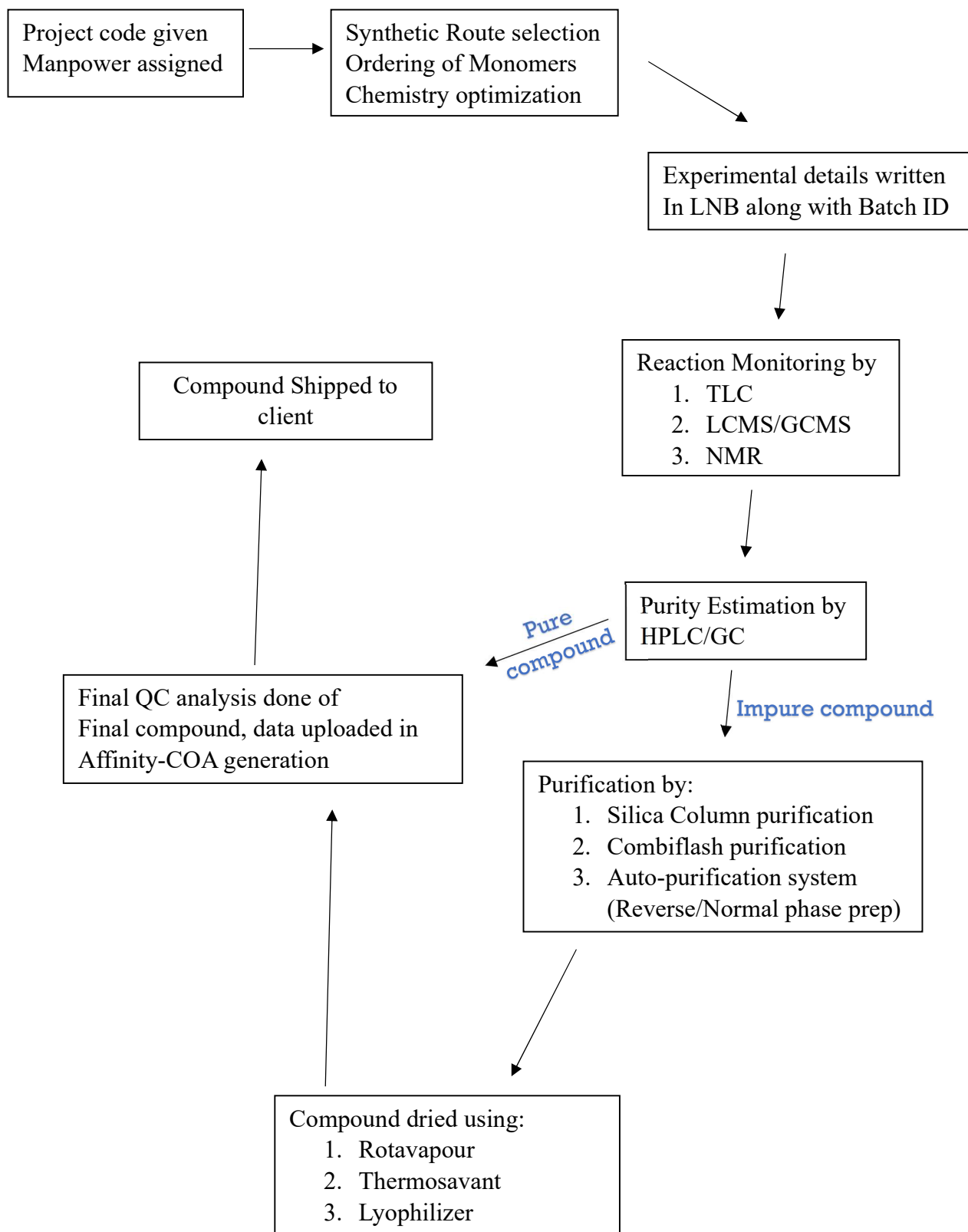
Lab Visit guided by : Dr. Soma Sharma  
Director – Analytical  
TCG Lifesciences

## Introduction about TCG Lifesciences

TCG Lifesciences Pvt. Limited (formerly “Chembiotek Research International”) is a leading global Contract Research and CDMO company delivering innovative R&D services in the areas of pharmaceutical, biotech and related industries. They started their operations in 2001 in Kolkata, India, and currently have their presence in the United States, Europe, and Japan.

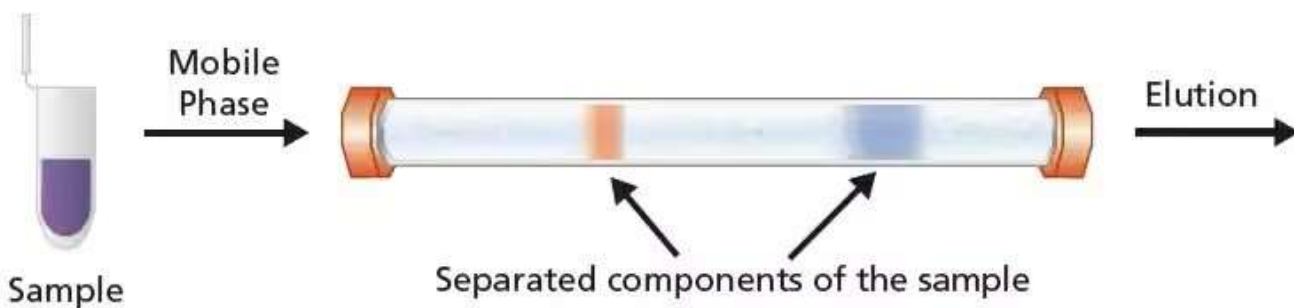
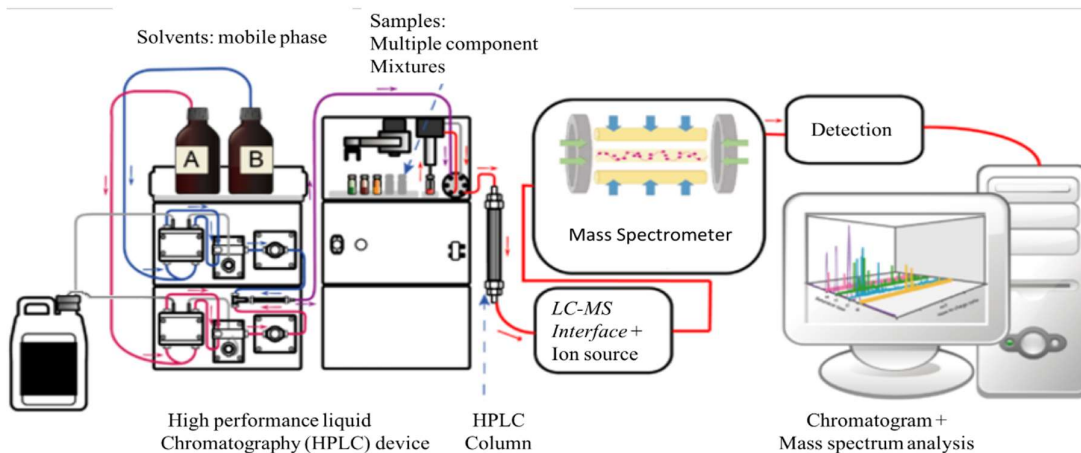
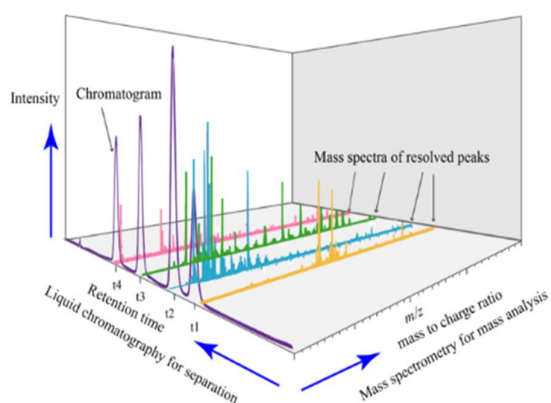
TCGLS and its subsidiaries have a strong talent pool of more than 1,300 scientists, of which over 300 have PhDs and the balance hold master’s degrees; drawn from leading global academic institutions and industry. Their services span chemistry synthesis, in vitro and in vivo pharmacology, DMPK, analytical development and validation and data science. They offer specific/functional solutions to integrated projects across multiple therapeutic areas with a specific focus on Inflammation & Pain, Infectious Diseases, Central Nervous systems, and Oncology. Their infrastructure includes world-class chemistry and biology laboratories, AAALAC certified animal facility, electrophysiology laboratory, BSL 2 laboratory, and cGMP kilo labs and US FDA accredited manufacturing company.

# TCG Process Flow



# Liquid Chromatography Mass Spectrometry (LCMS)

Liquid chromatography (LC) is a technique widely used to separate compounds from a sample prior to analysis and is frequently coupled to mass spectrometry. With LC, separation of the sample components is based on the interactions of the compounds with the mobile and stationary phases, and the degree of compound separation is related to each compound's affinity for the mobile phase. Following chromatographic separations, compounds elute off of the column, desolvated into the gas phase and ionized at an ionization source, and are then introduced into the mass spectrometer for mass analysis.



# Nuclear Magnetic Resonance (NMR) Spectroscopy

**Nuclear magnetic resonance spectroscopy**, most commonly known as **NMR spectroscopy** or **magnetic resonance spectroscopy (MRS)**, is a spectroscopic technique to observe local magnetic fields around atomic nuclei. This spectroscopy is based on the measurement of absorption of electromagnetic radiations in the radio frequency region from roughly 4 to 900 MHz. Absorption of radio waves in the presence of magnetic field is accompanied by a special type of nuclear transition, and for this reason, such type of spectroscopy is known as Nuclear Magnetic Resonance Spectroscopy. The sample is placed in a magnetic field and the NMR signal is produced by excitation of the nuclei sample with radio waves into nuclear magnetic resonance, which is detected with sensitive radio receivers. The intramolecular magnetic field around an atom in a molecule changes the resonance frequency, thus giving access to details of the electronic structure of a molecule and its individual functional groups. As the fields are unique or highly characteristic to individual compounds, in modern organic chemistry practice, NMR spectroscopy is the definitive method to identify monomolecular organic compounds.

The principle of NMR usually involves three sequential steps:

1. The alignment (polarization) of the magnetic nuclear spins in an applied, constant magnetic field  $B_0$ .
2. The perturbation of this alignment of the nuclear spins by a weak oscillating magnetic field, usually referred to as a radio-frequency (RF) pulse.
3. Detection and analysis of the electromagnetic waves emitted by the nuclei of the sample as a result of this perturbation.



The NMR spectrometer used in TCG Lifesciences, Kolkata, as we observed, was Buckner Ultrashield 400 with capacity upto 400 MHz.



# High-Performance Liquid Chromatography (HPLC)

High-performance liquid chromatography (HPLC) is a broad analytical chemistry technique used to separate compounds in a chemical mixture. These separations utilize the pressure-driven flow of a mobile phase through a column packed with a stationary phase.

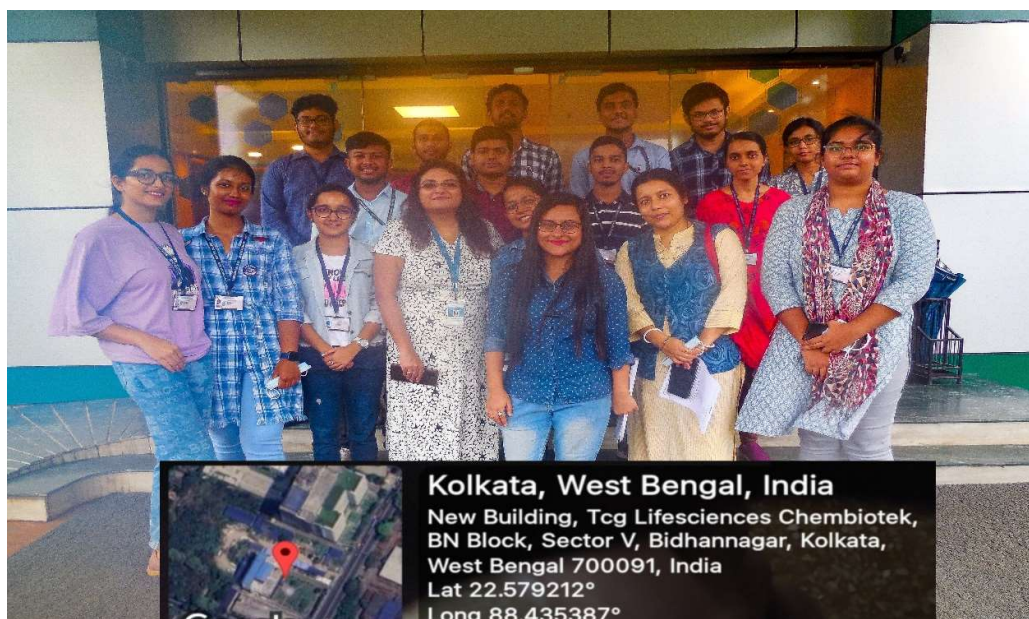
An HPLC instrument has four major components: a pump to deliver the mobile phase, an autosampler to inject the sample, a stationary phase column to separate the sample compounds, and a detector to measure the compounds. Additional elements include connective capillaries and tubing to allow the continuous flow of the mobile phase and sample through the system and a CDS package to control the HPLC instrument, separation, detection, and result evaluation.



The device used for HPLC in TCG Lifesciences, Kolkata was **Waters Alliance Acquity 2998 PDA Detector** .

# Conclusion

It was a highly enriching experience for all the students. Students came to know about a lot of things that were not possible to explain at the level of undergraduation laboratory. Students saw the industrial application side of Chemistry and its usage in everyday life. Students saw the theories taught in class coming to life at a grand scale and in a world class environment of TCG Lifesciences, Kolkata due to their best-in-class equipments and laboratory devices which are used to design and produce drugs.





# Acknowledgement

I would like to thank our Principal Dr. Manas Kabi , our Head of the Department Dr. Keya Ghosh , our Faculty Dr. Srijita Basumullick , Dr. Soma Sharma , Director – Analytical , TCG Lifesciences and the entire authority and staff of TCG Lifesciences, Kolkata for taking out time for us and making it possible for us, the students, to get an exposure of the industrial aspect of Chemistry at such a world class facility and gain enormous knowledge . In the Last, I would like to thank our batch mates for their cooperation.



# **References :**

1. TCG Lifesciences main website
2. Wikipedia
3. Shimadzu
4. Waters Corporation
5. Chemistry views
6. Chemistry LibreTexts
7. Thermo Fisher Scientific
8. Science Direct