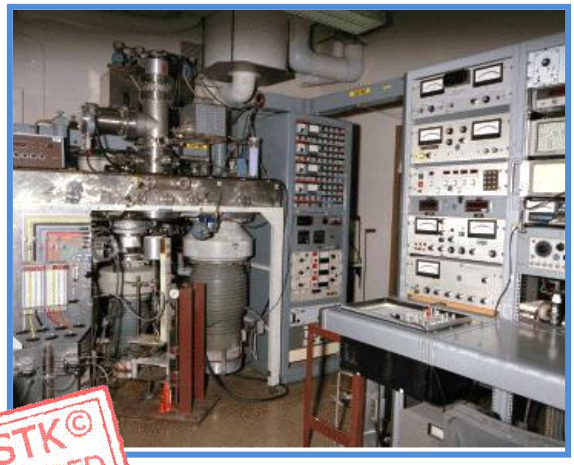
COURSE OVERVIEW LE0179
Transfat in Food Analysis Using GC/MS Method

Course Title
Transfat in Food Analysis Using GC/MS Method



Course Date/Venue
April 20-24, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
LE0179

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

Gas chromatography-Mass spectrometry (GC/MS) combines the fine separating power of GC with the uniquely powerful detection capabilities of MS. The GC/MS has been widely heralded as the "gold standard" in scientific analysis as Gas Chromatography/Mass Spectrometry combines the strengths of the two powerful analytical techniques. The GC/MS instrument is made up of two parts.

The gas chromatography (GC) portion separates the chemical mixture into pulses of pure chemicals and the mass spectrometer (MS) identifies and quantifies the chemicals. This powerful technique is particularly suitable for the analysis of mixtures of volatile and low relative molecular mass compounds (<800) such as hydrocarbons, fragrances, essential oils and relatively non-polar drugs. Chemical derivatisation, e.g. trimethylsilylation, can often be employed to increase the volatility of compounds containing polar functional groups (-OH, -COOH, -NH2, etc.) thereby extending the range of suitable analytes to such compounds as steroids, polar drugs, prostaglandins, bile acids, organic acids, amino acids and small peptides.

Chromatographic and mass spectrometric analyses have become increasingly demanding. Chromatographers need to know more about the principles of ion formation and mass spectral fragmentation to identify separated analytes. Mass spectrometrists need to know about analyte separations to obtain a more meaningful mass spectrum that can lead to an unambiguous identification.

The course is designed to introduce the fundamental principles of GC/MS technique and its applications, with special emphasis on the recent development and technology. The course will cover Enrichment Techniques, Interfaces, Ionization Modes, Mass Filters, Data Acquisition, Qualitative & Quantitative Analysis, System Maintenance and Troubleshooting and more.

The course **combines lecture, laboratory,** and **problem-solving sessions** that use actual GC/MS experimental data acquired by the participants. Through the analysis of these data, you will learn important fundamental operational techniques and will solve common problems that require you to hone your interpretational and experimental skills.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply a comprehensive knowledge on transfat in food analysis using GC/MS method
- Define trans fats, and discuss transfat in food analysis using GC/MS method, trans fatty acids and how and why they are made
- Describe the chemistry of fat and the presence of trans fats in food
- Explain the nutritional guidelines, health risks, public response and regulations in USA, UK, KSA, Denmark, etc
- Review food manufacturer response and collection of representative sample
- Apply the correct procedure for GC/MS sample preparation which includes extraction techniques, static and dynamic headspace sampling, adsorption, pyrolysis, etc.
- Enumerate the different GC/MS inlet systems, parallel detectors for GC/MS and MS capillary columns
- Explain the uses of vacuum systems, mass analysers and mass fragment detection in GC/MS hardware
- Acquire knowledge on the mass spectrometry in relation to mass resolution, ionization techniques, measuring techniques, tandem MS and mass calibration
- Illustrate the correct method of GC/MS analysis evaluation which includes total ion and mass chromatographs, MS libraries, spectral interpretation and isotopes
- Carryout proper GC/MS calibration and quantitation as well as become familiar with the different applications of GC/MS
- Apply protocol for measuring trans fatty acids in foods covering analytical method, safety precaution, reagents, extraction of fat, methylation of extracted fat and calculation of total fat

- Demonstrate accurate validation of GC methods which includes Installation Qualification (IQ), Operational Qualification (OQ), Performance Qualification (PQ), method validation & sample tracking and chain of custody
- Emphasize on the system maintenance and troubleshooting of Gas Chromatograph which includes injector port and liner, septum replacement, syringe cleaning & carrier gas selection and purification
- Employ proper system maintenance and troubleshooting of Mass Spectrometer including problem diagnostics, source cleaning, cleaning quadrupole rods, detector replacement & pump maintenance and oil change

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of GC/MS technology and problem solving for analytical chemists, chromatographers, mass spectrometrists, operators, researchers, biochemists and biotechnologists, specifically: -

- Those who work with gas chromatography and find that their future responsibilities combine gas chromatographic techniques with mass spectrometry.
- Those who wish to expand their technical expertise by learning gas chromatography/mass spectrometry

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Dr. Mohamed Elsayed, PhD, MSc, BSc is an **HACCP Expert** with over **25 years** of experience in **HACCP Standards**, **HACCP Accreditation**, **HACCP Application**, **Food Hygiene**, **Food Safety** and **Analytical Laboratory Management**. He is an **authority** in **Food Analysis** & Quality Control, Quality Management Systems (**ISO 17025**, **ISO17020**, **15189** and **9001**), Laboratory Accreditation, Laboratory Auditing, Statistical Analysis of Laboratory Data, Chemical Laboratory Management, Good Laboratory Practices (**GLP**), Uncertainty Measurement, **Process Analyzers**, **GC** and **HPLC**. Further, his wide experience and expertise also cover **Food Safety Management**, **Hazard Analysis of Critical Control Points** (**HACCP**), **Food Sampling** and **Food Additives**. He is currently a **Consultant** and **Lead/Technical Assessor** in various industries wherein he provides technical assistance & expert services, consultancy and training services for testing and calibration of laboratory equipment, guiding medical laboratories to establish their quality management systems and develop accreditation based on **ISO17025/15189** requirements, designing validation/verification schemes for all test methods, estimation of uncertainty and planning & developing laboratories towards accreditation.

In his career life, Dr. Mohamed has served as a **Senior Expert**, **Lead Technical Auditor**, **Project Manager**, **Quality Manager** and **Senior Analytical Chemist** for **Government Companies** and **Internationally Funded Projects**. He has **participated** in the **accreditation** of more than **100 laboratories globally** and as a **Senior Accreditation Expert** he has participated in the development of more than 35 laboratories towards being ISO 17025 Accredited.

Dr. Mohamed has **PhD** and **Master** degrees in **Environmental Analytical Chemistry** and **Bachelor's** degree in **Chemistry**. He is a **Certified Auditor** of **ISO 17025**, **ISO 15189**, **ISO 9000** and **ISO 14000**. Further, He is an active member of the **Society for Analytical Chemists**, Association of Official Analytical Chemists (**AOAC**) and the **Egyptian Society for Quality**.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 20th of April 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Trans Fats*** ***What are Trans Fats • Definition • Sources & Examples***

0930 – 0945	Break
0945 -1100	***Trans Fatty Acids, How & Why are Transfats Made?***
1100 – 1230	***Chemistry of Fat, Presence of Trans Fats in Food***
1230 – 1245	Break
1245 – 1420	***Nutritional Guidelines, Health Risks, Public Response & Regulations. Example USA, UK, KSA, Denmark,***
1420 – 1430	***Recap***
1430	Lunch & End of Day One

Day 2: Monday, 21st of April 2025

0730 – 0930	***Food Manufacturer Response, Collection of Representative Sample***
0930 – 0945	Break
0945 -1100	***GC/MS Sample Preparation for GC/MS*** Extraction Techniques • Solid Phase Micro Extraction • Supercritical Fluid Extraction • Static and Dynamic Headspace Sampling • Purge and Trap Sampling • Adsorption • Pyrolysis • Sample Derivatisation
1100 – 1230	***Introduction to GC/MS*** Why Use GC/MS? • Systems and Costs • Competitive Analytical Systems
1230 – 1245	Break
1245 – 1420	***GC/MS Systems*** GC/MS Inlet Systems
1420 – 1430	***Recap***
1430	Lunch & End of Day One

Day 3: Tuesday, 22nd of April 2025

0730 – 0930	***GC/MS Systems - Parallel Detectors*** Parallel Detectors for GC/MS • Parallel Detectors for GC/MS (cont'd)
0930 – 0945	Break
0945 – 1100	***GC/MS Systems – Columns, Gas Flows, etc.*** MS Capillary Columns
1100 – 1230	***GC/MS Hardware*** Vacuum Systems • Mass Analysers • Mass Fragment Detection
1230 – 1245	Break
1245 – 1420	***Mass Spectrometry*** Mass Resolution • Ionization Techniques • Measuring Techniques • Tandem MS • Mass Calibration
1420 – 1430	***Recap***
1430	Lunch & End of Day Two

Day 4: Wednesday, 23rd of April 2025

0730 – 0930	***GC/MS Analysis Evaluation*** Total Ion Chromatographs • Mass Chromatographs • MS Libraries • Spectral Interpretation • Isotopes •
0930 – 0945	Break
0945 – 1100	***MS Features of Substance Classes*** Volatile Organic Compounds BTEX • Alkylaromatics • Polyaromatic • Hydrocarbons • Phenols • Pesticides • PCB's

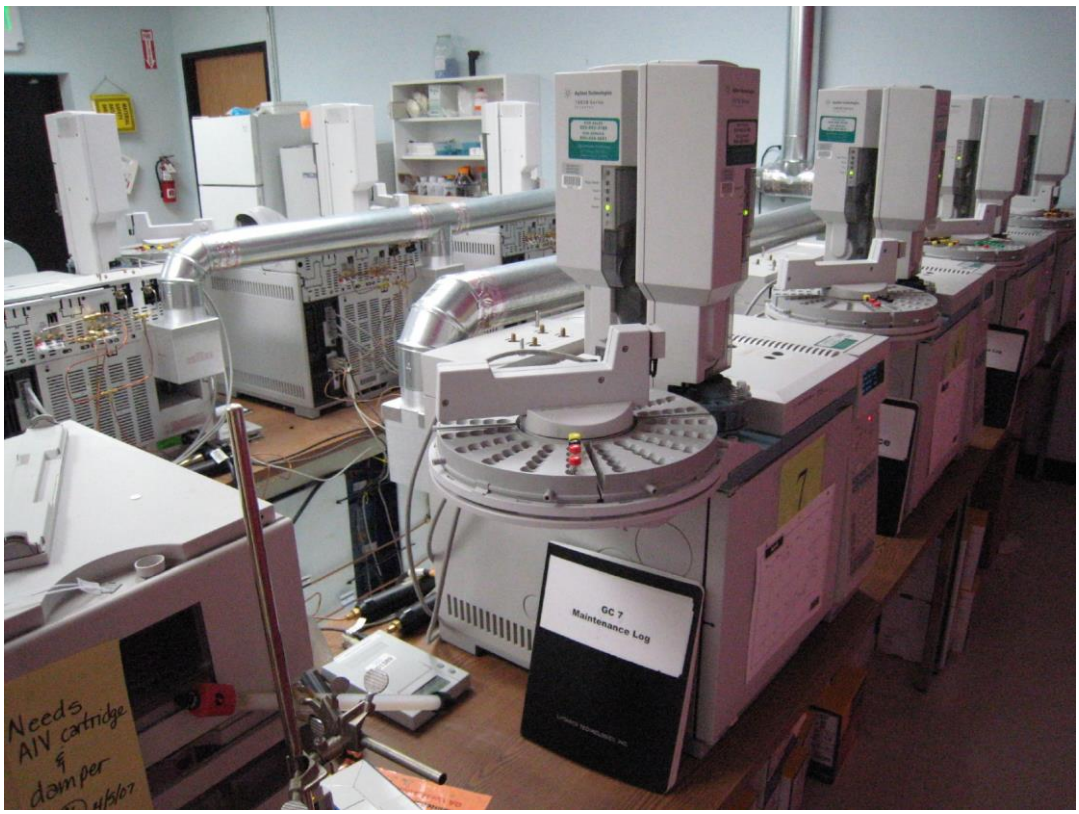
1100 – 1230	***Calibration & Quantitation*** *Quantitation • Decision Limit • Level of Detection • Level of Quantitation • Sensitivity • Calibration*
1230 – 1245	*Break*
1245 – 1420	***Applications of GC/MS (Protocol for Measuring Trans Fatty Acids in Foods)*** *Analytical Method: Safety Precaution • Analytical Method: Reagents • Analytical Method: Extraction of Fat • Analytical Method: Methylation of Extracted Fat & Calculation of Total Fat*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 5: ***Thursday, 24th of April 2025***

0730 – 0930	***Validation of GC Methods*** *Installation Qualification (IQ) • Operational Qualification (OQ) • Performance Qualification (PQ)*
0930 – 0945	*Break*
0945 – 1100	***Validation of GC Methods (cont'd)*** *Method Validation • Sample Tracking and Chain of Custody*
1100 – 1230	***System Maintenance & Troubleshooting*** *Gas Chromatograph Maintenance*
1230 – 1245	*Break*
1245 – 1345	***System Maintenance & Troubleshooting (cont'd)*** *Mass Spectrometer Maintenance*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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