



Accredited Africa Training Institute for Capacity Development

Unit FO409, Hatfield Plaza · 1122 Burnett St, Hatfield 0028 · Pretoria, Gauteng · South Africa

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COURSE BROCHURE

Gas Chromatography Substance Composition Analysis Training

Manufacturing, Engineering and Technology / Fabrication and Extraction

Unit Standard 110378 · NQF Level 4 · 13 Credits · 10 Days

COURSE OVERVIEW

This course provides participants with the knowledge and skills to perform substance composition analysis using gas chromatography. It covers the principles of gas chromatography, instrument operation, data interpretation, and quality assurance procedures to ensure accurate and reliable analytical results.

Category	Manufacturing, Engineering and Technology
Subfield	Fabrication and Extraction
Unit Standard	110378
Accreditation	SAQA Accredited · NQF Level 4 · 13 Credits
Duration	10 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply the principles of gas chromatography to separate and identify components in a mixture.
- Operate gas chromatography equipment safely and effectively according to standard operating procedures.
- Analyze chromatographic data to determine substance composition and concentration.
- Evaluate the quality of analytical results using calibration standards and control samples.
- Implement troubleshooting techniques to resolve common gas chromatography issues.
- Demonstrate adherence to laboratory safety and quality assurance protocols during gas chromatography analysis.

WHO SHOULD ATTEND

- This course is designed for laboratory technicians, analytical chemists, and quality control professionals who are involved in or responsible for substance composition analysis in industries such as petrochemicals, pharmaceuticals, environmental testing, and food and beverage.

COURSE OUTLINE

Day 1: Introduction to Gas Chromatography and Its Applications

- Overview of gas chromatography: history and principles
- Components: injector, column, detector, data system
- Types of samples and analytes suitable for GC
- Applications in petrochemical, environmental, and food industries
- Safety considerations in GC operation

Day 2: Chromatographic Theory and Separation Mechanisms

- Partitioning and adsorption mechanisms
- Retention factor, selectivity factor, resolution
- Van Deemter equation and band broadening
- Column efficiency: theoretical plates and HETP
- Temperature programming principles

Day 3: GC Instrumentation – Injectors and Columns

- Injector types and operation
- Capillary vs. packed columns
- Stationary phases: non-polar, polar, and specialty phases
- Column dimensions: length, ID, film thickness
- Column installation and conditioning

Day 4: Detectors in Gas Chromatography

- Flame ionization detector (FID): principle and applications
- Thermal conductivity detector (TCD): universal detection
- Electron capture detector (ECD): halogenated compounds
- Mass spectrometry (MS) as a detector
- Detector sensitivity, selectivity, and maintenance

Day 5: Method Development and Optimization

- Steps in method development
- Temperature programming optimization
- Carrier gas selection and flow optimization
- Split ratio and injection volume adjustment
- Method validation parameters: precision, accuracy, linearity

Day 6: Qualitative and Quantitative Analysis

- Qualitative analysis: retention time matching and Kovats indices
- External standard calibration
- Internal standard calibration
- Standard addition method
- Integration techniques: peak area and height

Day 7: Sample Preparation Techniques for GC

- Liquid-liquid extraction (LLE)
- Solid-phase extraction (SPE)
- Derivatization reactions
- Static and dynamic headspace sampling

- Solid-phase microextraction (SPME)
- Filtration and dilution techniques

Day 8: Troubleshooting and Maintenance of GC Systems

- Common issues: ghost peaks, baseline drift, tailing
- Injector maintenance: septum, liner, syringe
- Column care: cutting, conditioning, storage
- Detector maintenance: cleaning, replacement
- Leak checking and gas purity
- Troubleshooting flow and pressure problems

Day 9: Data Analysis and Interpretation

- Data system features: integration, calibration, reporting
- Peak deconvolution and resolution enhancement
- Statistical analysis: repeatability, reproducibility
- Reporting results with uncertainty
- Compliance with ISO 17025 and other standards

Day 10: Advanced Applications and Course Review

- Comprehensive two-dimensional GC (GC×GC)
- Tandem mass spectrometry (GC-MS/MS)
- GC in forensic toxicology and drug analysis
- GC in pharmaceutical impurity profiling
- Course review and practice assessment
- Final Q&A; and competency evaluation preparation

ASSESSMENT & CERTIFICATION

Delegates are assessed through exercises and a final test. A mark of **50% or above** earns an **AATICD Certificate of Completion**, issued digitally with a unique verification code. This course carries **13 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 35,800.00	R 35,800.00
1	In-House	R 46,500.00	R 46,500.00
1	On-Campus (Pretoria)	R 53,700.00	R 53,700.00

UPCOMING SESSIONS

Start	End	Method	Venue
03 Aug 2026	14 Aug 2026	On-Campus	Cape Town, South Africa
04 Aug 2026	17 Aug 2026	On-Campus	Dubai, UAE
05 Aug 2026	18 Aug 2026	On-Campus	Pretoria, South Africa
05 Aug 2026	18 Aug 2026	On-Campus	Lagos, Nigeria
06 Aug 2026	19 Aug 2026	On-Campus	Johannesburg, South Africa
07 Aug 2026	20 Aug 2026	On-Campus	Mauritius
10 Aug 2026	21 Aug 2026	On-Campus	Dubai, UAE
11 Aug 2026	24 Aug 2026	On-Campus	Pretoria, South Africa

Contact us if no suitable date is listed – on-demand sessions can be arranged for groups.

HOW TO GET A QUOTE OR APPLY

1. **Get an instant quotation online:** visit www.aaticd.co.za, open the page for this course (Unit Standard 110378) and click **Get A Quote / Apply**. Select your training method and number of delegates – your quotation is generated immediately and emailed to you with the course brochure attached.
2. **Apply by email:** send the course title, your preferred training method (Online, In-House or On-Campus Pretoria), the number of delegates and your preferred dates to apply@aaticd.co.za – our team will reply with a formal quotation.
3. **Apply by phone or WhatsApp:** call **+27 12 004 8389** or WhatsApp **+27 65 077 6310** and we will prepare your quotation and reserve your seats.
4. **Confirm your booking:** accept the quotation and settle the invoice. As soon as payment is confirmed your delegates are enrolled and receive their AATICD LMS login details by email, along with joining instructions for their chosen training method.

Group discounts apply automatically – the more delegates you enrol, the lower the price per delegate. No payment is required to request a quotation.

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