



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

Sugar Crystal Cultivation And Growth Techniques Training

Agriculture and Nature Conservation / Secondary Agriculture

Unit Standard 114311 · NQF Level 2 · 15 Credits · 12 Days

COURSE OVERVIEW

This course provides comprehensive training in the cultivation and growth techniques of sugar crystals, focusing on controlled environments and process optimization. Participants will gain the skills to produce high-quality sugar crystals efficiently while adhering to safety and quality standards.

Category	Agriculture and Nature Conservation
Subfield	Secondary Agriculture
Unit Standard	114311
Accreditation	SAQA Accredited · NQF Level 2 · 15 Credits
Duration	12 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply principles of sugar crystal nucleation and growth to optimize crystallization processes.
- Analyze factors affecting crystal size, shape, and purity to improve product quality.
- Evaluate different cultivation techniques (e.g., batch, continuous) for specific applications.
- Design a sugar crystal growth experiment with controlled parameters.
- Implement monitoring and control strategies to maintain consistent crystal quality.
- Demonstrate proper handling and storage of sugar crystals to prevent contamination.

WHO SHOULD ATTEND

- This course is designed for laboratory technicians, process engineers, and quality control personnel involved in sugar crystallization in food processing or chemical industries.

COURSE OUTLINE

Day 1: Introduction to Sugar Crystallisation Science

- Overview of sugar industry in South Africa
- Fundamentals of crystallisation: saturation, supersaturation, nucleation
- Crystal structure and morphology of sucrose
- Factors affecting crystal growth: temperature, concentration, agitation
- Impurities and their impact on crystal quality
- Laboratory safety and equipment orientation

Day 2: Raw Materials and Solution Preparation

- Types of sugar: cane, beet, and specialty sugars
- Solution preparation: dissolving, heating, and mixing
- Brix measurement using refractometers
- Purity analysis and ash content determination
- Clarification methods: carbonatation, phosphatation
- Filtration techniques and equipment

Day 3: Nucleation Techniques and Seeding

- Mechanisms of nucleation: primary and secondary
- Seeding techniques: slurry, dry seed, and shock seeding
- Seed crystal preparation: milling, sieving, and grading
- Monitoring nucleation: turbidity, conductivity, microscopy
- Factors influencing nucleation: supersaturation, temperature, mixing
- Common nucleation problems and solutions

Day 4: Crystal Growth Kinetics and Control

- Crystal growth mechanisms: layer growth, spiral growth
- Growth rate equations: effect of supersaturation, temperature, impurities
- Cooling crystallisation: natural, controlled, and flash cooling
- Evaporative crystallisation: vacuum and atmospheric
- Controlling crystal size distribution: seeding, cooling rate, mixing
- Preventing agglomeration: additives, agitation, and pH control

Day 5: Monitoring and Measurement Techniques

- Online monitoring: FBRM, Raman spectroscopy, NIR
- Offline analysis: laser diffraction, sieving, microscopy
- Crystal morphology assessment: shape, defects, agglomerates
- Data interpretation: trends, correlations, troubleshooting
- Equipment calibration and maintenance procedures
- Record keeping and documentation

Day 6: Impurity Management and Crystal Quality

- Types of impurities: invert sugars, organic acids, colourants, mineral salts
- Effects of impurities: growth inhibition, habit modification, colour
- Purification methods: ion exchange, activated carbon, membrane filtration
- Quality tests: colour measurement, ash content, moisture, pH
- Strategies to reduce impurity incorporation: controlled growth, washing

- Case studies on impurity challenges in SA sugar mills

Day 7: Batch and Continuous Crystallisation Processes

- Batch crystallisation: cycle phases, control strategies
- Continuous crystallisation: MSMPR, forced circulation, fluidised bed
- Scale-up principles: geometric similarity, mixing, heat transfer
- Process control: temperature, supersaturation, level, flow
- Operational issues: fouling, scaling, blockages
- Pilot plant demonstration and hands-on operation

Day 8: Separation and Washing of Crystals

- Separation equipment: centrifuges, rotary vacuum filters, belt filters
- Centrifugation: basket type, pusher type, screen bowl
- Filtration: cake formation, washing, dewatering
- Washing techniques: displacement, repulp, spray washing
- Efficiency evaluation: conductivity, colour, ash of washed crystals
- Maintenance and troubleshooting of separation equipment

Day 9: Drying and Conditioning of Sugar Crystals

- Drying theory: moisture equilibrium, drying rate curves
- Dryer types: rotary, fluidised bed, flash, vibratory conveyor
- Drying parameters: temperature, air flow, residence time
- Crystal damage prevention: attrition, breakage, caking
- Conditioning: cooling, polishing with wax, anti-caking agents
- Post-drying quality tests: moisture, colour, particle size

Day 10: Quality Control and Assurance in Crystal Production

- Quality standards: South African Sugar Association specifications
- Physical tests: particle size, colour, hardness, flowability
- Chemical tests: pol, ash, moisture, colour, pH
- Statistical process control: control charts, capability indices
- Corrective actions: adjusting process parameters
- Food safety: HACCP, GMP, allergen management

Day 11: Advanced Topics and Troubleshooting

- Root cause analysis: fishbone diagram, 5 whys
- Advanced techniques: ultrasound, antisolvent, evaporative
- Crystal habit modification: surfactants, polymers, solvents
- Process analytical technology: in-line sensors, feedback control
- Energy efficiency: heat integration, vacuum system optimisation
- Waste reduction: mother liquor recovery, effluent treatment

Day 12: Practical Application and Assessment

- Practical session: full crystallisation batch from preparation to drying
- Real-time monitoring and parameter adjustment
- Sampling and quality analysis: brix, purity, crystal size, colour
- Technical report writing: methods, results, discussion
- Written assessment: theoretical knowledge
- Practical assessment: hands-on skills and troubleshooting

- Course wrap-up and feedback

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 **15 NQF credits** at **NQF Level 2**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 41,000.00	R 41,000.00
1	In-House	R 53,300.00	R 53,300.00
1	On-Campus (Pretoria)	R 61,500.00	R 61,500.00

UPCOMING SESSIONS

Start	End	Method	Venue
10 Aug 2026	25 Aug 2026	On-Campus	Cape Town, South Africa
11 Aug 2026	26 Aug 2026	On-Campus	Dubai, UAE
12 Aug 2026	27 Aug 2026	On-Campus	Pretoria, South Africa
13 Aug 2026	28 Aug 2026	On-Campus	Abu Dhabi, UAE
14 Aug 2026	31 Aug 2026	On-Campus	Durban, South Africa
14 Aug 2026	31 Aug 2026	On-Campus	Mauritius
17 Aug 2026	01 Sep 2026	On-Campus	Harare, Zimbabwe
17 Aug 2026	01 Sep 2026	On-Campus	Dubai, UAE

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 114311) 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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