

Starch Technology

Product Development and Operational Aspects

DIRECTED BY

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ACCREDITED
COURSE

Course Topics Include:

- Science and Application
- Thermal/Mechanical Processes
- Newtonian and Non-Newtonian Products
- Gelatinization and Retrogradation Phenomena
- Proper Equipment Selection
- Formulation and Processing

about the course

Starch is a recognized natural hydrophilic polymer widely employed in different formulations as a swelling agent and gel forming excipient. It possesses diverse structural arrangements and functionalities.

This accredited 12-hour course will delve into the scientific and operational aspects of products utilizing starches, which rank among the most crucial ingredients employed across various industries. The course will explore the scientific principles underlying starches, their behavior when hydrated at different temperatures, the rheology of gelatinized starches, techniques for measuring viscosity, the relationship between viscosity and desired attributes of the final product, as well as changes that occur during processes like extrusion, powder processing, batch liquid dispersion, and cooking.

who should attend

This course is intended for Food Scientists, Engineers, Operations, and any other professionals involved in the development, production, and product designs requiring an understanding of processes which uses starches as one of its main ingredients. Professionals who work in the Food, Beverage, Cosmetics, Pharmaceutical, and Cleaning Products industries, just to name a few, will gain scientific and practical knowledge to help in their day-to-day challenges.

learning objectives

Upon completion of this course, you will be able to:

- Describe the behavior of hydrated starches under different conditions of temperature
- Explain the starch gelatinization and retrogradation phenomena
- Explain the rheological behavior of Newtonian and non-Newtonian products, especially gelatinized starches
- Describe the correlation between viscosity and desired product attributes
- List different applications for starches in various products, with the corresponding benefits in processing and product attributes
- Describe the behavior of starches through the cooking extrusion process
- Explain the importance of the starch behavior in processing parameters and its impact in the proper equipment selection

course outline

Review of Learning Objectives

Introduction to Starches

- Starch: What is it?
- The Starch Granule
- Amylose and Amylopectin and the structure of the starch granule
- Starches from different cereals
- Thermal process of starches
- Starches gelatinization
- Stabilizers
- Modified Starches
- Q&A

Introduction to Rheology

- Definition of Viscosity
- Newtonian x Non-Newtonian Fluids
- Non-Newtonian fluids rheological behaviors
- Rheological parameters of the gelatinized starch
- Rheological measurements
- Q&A

Applications Thermal/Mechanical Processes

- Grain refining – Starch separation
- Wet milling
- Maltodextrin process
- Introduction to extrusion
- Extrusion line components
- Changes inside the barrel
- Extrusion line variables
- Behavior of different types of cereal in the extrusion process
- Rheological behavior of gelatinized starch
- Cereals tempering and conditioning
- Starch cooking inside the barrel
- Cereal products – effect of Amylose and Amylopectin ratios in different formulas
- Q&A

Formulation and Processing Considerations

- Harvesting and storage effects in starch-based products
- Starches Hydrolyzation
- Emulsions and stabilizers
- Effects of starches in texture and mouth feel
- Dispersion of starches and stabilizers in water
- Cooking – Effects of thermal processing in starches
- Processing equipment considerations in formulas handling starches
- Critical measurements and analytical instruments: Viscometers, Rheometers, Amylographs
- Q&A

Assessment Opportunity

course instructor

Herberto Dutra, Mechanical Engineer with 30 years experience in manufacturing, primarily in food, beverages, specialty chemicals, and bio-pharma, having worked in companies like Linde Gas, Kraft Foods, Nestle, Schering-Plough, Sensient, and Bay Valley. Mr. Dutra is currently the head of engineering and commercialization for ACH Food Companies, with many years of experience in the design, construction, operation, and optimization of processing and packaging lines. Academically, Mr. Dutra holds a B.S. in mechanical engineering from Ueri (Rio de Janeiro State University, Brazil), a Master of Business Administration from Keller graduate school of management, and a Master of Science in mechanical engineering from Purdue University. Mr. Dutra also has many years of experience developing and teaching industry-related topics both through his employers and through the Cobblestone.

Accreditations



International Accreditors for Continuing Education and Training (IACET)

Cobblestone has been approved as a CEU Accreditor by IACET and awards CEUs for participation in qualified courses. Cobblestone has demonstrated that it complies with the ANSI/IACET Standards and is authorized to offer IACET CEUs for its programs. CEUs will be awarded for participation in Cobblestone's courses at the rate of .1 CEU per contact hour upon successful completion of the entire course and 70% accuracy in the required Learners' Assessment. A minimum score of 80% is required for all courses within a Cobblestone Certification Program. This course offers a total of 12 contact hours, or 1.2 CEUs. For further information, visit www.iacet.org

The American Institute of Chemists (AIC)

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