Australian Government

Department of Education, Employment and Workplace Relations

FDFTEC4009A Identify the physical and chemical properties of materials, food and related products

Release: 1

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Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the skills and knowledge required to identify the physical and chemical properties of materials, food and related products. It requires application of this knowledge to a production environment.

Application of the Unit

Application of the unit	This unit has application in the food processing industry where knowledge of physical and chemical properties of materials, food and related products is used to inform work in product development, production, testing, communication and problem solving.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Apply understanding of common physical phenomena in the food industry	1.1. An understanding of common physical phenomena is applied to explain relevant changes that occur to ingredients and product through the production process 1.2. Information on the changes that occur is communicated to others in appropriate formats
2. Apply an understanding of the physical states of matter	2.1. The three states of matter and the atomic changes that occur at each phase are identified 2.2. The behaviour of each type of matter and its relationship to the production process is described 2.3. The relationship between pressure and temperature in phase transition is identified
3. Apply an understanding of common food science principles to a production process	3.1. The significance of pH for processing, food safety and cleaning applications is identified 3.2. The reactions and properties of carbohydrates, proteins and fats can be tracked through a given process 3.3. The properties of common emulsions, suspensions and solutions can be described 3.4. Common chemical reactions that occur, factors required to cause a reaction and the effect of reactions can be identified 3.5. Safe work procedures for processes requiring handling of chemicals and/or involving chemical reactions are reviewed and/or established
4. Communicate and interpret technical information	4.1. Appropriate technical terms are used to communicate information on properties of food and materials commonly used in the food industry 4.2. Test results and reporting formats to communicate information on composition, properties and reactions are interpreted and applied

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Ability to:

- identify physical characteristics or phenomena that occur through processing, including the following common physical phenomena, and any additional phenomena appropriate to the production process:
  - shear and strain
  - friction
  - surface tension
  - pressure
  - crystallisation
  - total solids
  - heat and temperature
  - relative humidity
  - work/energy input
  - viscosity
  - particle size
  - melting points, boiling points, freezing points
  - dew/condensation point
  - other phenomena as appropriate to product/process
- identify products and processes where these phenomena can be observed
- based on phenomena that can be observed in a production process, develop explanatory sketches or flow charts to communicate how these phenomena affect product and process
- identify tests commonly used to measure these phenomena and related units of measurement
- identify molecular changes that occur in states of matter, and apply this to an understanding of common applications, such as refrigerant or freeze drying
- for transition phases that apply in a given production process, identify the role of temperature and pressure in the transition process
- identify the difference between acids and bases
- classify commonly used materials, ingredients and indicators according to pH
- identify the difference between a strong acid and a concentrated acid and related units of measurement used to describe these acids
- identify typical strengths and concentration levels required for acids and bases commonly used in a production process (e.g. cleaning agents)
- for cleaning agents, identify compatibility with equipment surface materials

REQUIRED SKILLS AND KNOWLEDGE

- identify the significance of pH for processing, food safety and cleaning applications
- identify the basic molecular structures of carbohydrates, proteins and fats
- identify the processing stages designed to affect the structure of these compounds (e.g. hydrogenation or denaturing proteins in cooking processes of oil)
- distinguish the difference between solutions, suspensions and colloidal systems. Colloidal systems include:
  - emulsions (oil in water/water in oil)
  - sols (solid-liquid/solid-solid)
  - gels
  - foams (gas-liquid/gas-solid)
- identify typical applications of solutions, suspensions and colloidal systems in food processing
- distinguish between dispersed particles and the dispersion medium in colloids
- identify factors that the affect stability of colloidal systems, including the stages in a production process that can cause a change in the structure of a colloid
- identify common chemical reactions that occur in food processing, including both spontaneous and controlled reactions (reactions to be covered include oxidation, enzymic, Maillard and acid-based reactions, and other reactions relevant to a given product type and production process)
- identify the role of enzymes in generating biological reactions (e.g. amylase in bread)
- identify safety hazards and control methods required when handling chemicals and working with processes that involve chemical reactions
- review and/or develop workplace procedures to include advice on hazards and related instructions on control methods, including advice on action required in the event of an incident such as a chemical spill or an emergency
- read and interpret technical information to describe food properties and/or reactions, including recognition and application of appropriate units of measurement and terms
- use communication skills to interpret and complete work information to support operations of work team or area
- demonstrate and support cooperative work practices within a culturally diverse workforce

Required knowledge

knowledge of:

- physical characteristics or phenomena that occur through processing and products and processes where these phenomena can be observed
- tests commonly used to measure these phenomena and related units of measurement
- molecular changes that occur in states of matter

REQUIRED SKILLS AND KNOWLEDGE

- transition phases that apply in a given production process
- role of temperature and pressure in the transition process
- differences between a strong acid and a concentrated acid and related units of measurement
- classifications of commonly used materials, ingredients and indicators according to ph
- typical strengths and concentration levels required for acids and bases commonly used in a production process
- basic molecular structures of carbohydrates, proteins and fats
- difference between solutions, suspensions and colloidal systems
- typical applications of solutions, suspensions and colloidal systems in food processing
- factors that the affect stability of colloidal systems
- common chemical reactions that occur in food processing
- role of enzymes in generating biological reactions
- safety hazards and control methods
- technical information resources

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	Assessment must be carried out in a manner that recognises the cultural and literacy requirements of the assessee and is appropriate to the work performed. Competence in this unit must be achieved in accordance with food safety standards and regulations.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of ability to: • identify physical and chemical characteristics of food materials and the impacts of production processes on these characteristics • identify common tests and measures to assess food materials • identify the characteristics of acids and bases and their application in food processing • identify the basic molecular structures of carbohydrates, proteins and fats • distinguish the difference between solutions, suspensions and colloidal systems • identify hazards and control methods in managing hazardous materials • communicate technical information using correct technical terms, flow charts and sketches.
Context of and specific resources for assessment	Assessment must occur in a real or simulated workplace where the assessee has access to: • production process and related equipment, manufacturers' advice and operating procedures • tests used to report relevant product/process information and recorded results.
Method of assessment	This unit should be assessed together with core units and other units of competency relevant to the function or work role.
Guidance information for assessment	To ensure consistency in one's performance, competency should be demonstrated on more than one occasion over a period of time in order to cover a variety of circumstances, cases and responsibilities, and where possible, over a number of assessment activities.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Handling and processing of product and materials	Handling and processing of product and materials is consistent with company standards and requirements, legislative requirements, codes, industrial awards and agreements
Identification of molecular structure	Identification of molecular structure can be supported by others and does not necessarily involve use of microscopes in a laboratory

Unit Sector(s)

Unit sector	Technical

Competency field

Competency field	

Co-requisite units

Co-requisite units		