



**Australian Government**

# **FBPTEC4009 Identify the physical and chemical properties of materials, food and related products**

**Release: 1**

## FBPTEC4009 Identify the physical and chemical properties of materials, food and related products

### Modification History

| Release   | Comments                                                                                           |
|-----------|----------------------------------------------------------------------------------------------------|
| Release 1 | This version released with the FBP Food, Beverage and Pharmaceutical Training Package Version 2.0. |

### Application

This unit of competency describes the skills and knowledge required to identify the physical and chemical properties of materials, foods and related products within a production environment.

The unit applies to individuals who apply knowledge of physical and chemical properties of materials, food and related products, used to inform work in product development, production, testing, communication and problem-solving.

No occupational licensing or certification requirements apply to this unit at the time of publication. However, legislative and regulatory requirements for food processing exist, so local requirements must be checked. All work must comply with Australian food safety standards and relevant codes of practice.

### Pre-requisite Unit

Nil

### Unit Sector

Technical (TEC)

### Elements and Performance Criteria

| Elements                                                                            | Performance Criteria                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i>                                    | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                          |
| 1. Apply common physical phenomena in food ingredients to food production processes | 1.1 Apply an understanding of common physical phenomena to explain relevant changes that occur to ingredients and products during the production process<br>1.2 Communicate the changes to others in appropriate format for use |

| Elements                                                                | Performance Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i>                        | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                         | in production process                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2. Apply the principles of physical states of matter to food production | <p>2.1 Recognise the three states of matter and the atomic changes that occur at each phase</p> <p>2.2 Determine the behaviour of each state of matter and its relationship to the production process</p> <p>2.3 Consider the relationship between pressure and temperature in phase transition in food production</p>                                                                                                                                                                                                                    |
| 3. Apply common food science principles to a production process         | <p>3.1 Relate the significance of pH in processing, food safety and cleaning applications</p> <p>3.2 Track the reactions and properties of carbohydrates, proteins and fats through a given process</p> <p>3.3 Describe the properties of common emulsions, suspensions and solutions</p> <p>3.4 Identify commonly occurring chemical reactions, factors required to cause a reaction, and the effects of reactions</p> <p>3.5 Review safe work procedures for processes that involve chemical reactions or the handling of chemicals</p> |
| 4. Communicate and interpret technical information                      | <p>4.1 Use appropriate technical terms to communicate information about the properties of commonly used foods and materials</p> <p>4.2 Interpret and apply test results and reporting formats to communicate information on composition, properties and reactions</p>                                                                                                                                                                                                                                                                     |

## Foundation Skills

*This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.*

| Skill    | Description                                                                                                                                   |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Reading  | <ul style="list-style-type: none"> <li>Read and interpret safe work procedures, and consolidate information for review</li> </ul>             |
| Numeracy | <ul style="list-style-type: none"> <li>Perform mathematical calculations to interpret test results to provide accurate information</li> </ul> |

| Skill             | Description                                                                                                                                                                                                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Get the work done | <ul style="list-style-type: none"><li>• Apply systematic and analytical decision-making processes for complex and non-routine situations</li><li>• Investigate innovative ideas as a means to continuously improve work practices and processes through formal and analytical thinking</li></ul> |

## Unit Mapping Information

| Code and title current version                                                                      | Code and title previous version                                                                      | Comments                                                                                                       | Equivalence status |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------|
| FBPTEC4009<br>Identify the physical and chemical properties of materials, food and related products | FDFTEC4009A<br>Identify the physical and chemical properties of materials, food and related products | Updated to meet Standards for Training Packages<br><br>Minor changes to Performance Criteria to clarify intent | Equivalent unit    |

## Links

Companion Volume Implementation Guides are found in VETNet: -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=78b15323-cd38-483e-aad7-1159b570a5c4>

## Assessment Requirements for FBPTEC4009 Identify the physical and chemical properties of materials, food and related products

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### Performance Evidence

An individual demonstrating competency in this unit must satisfy all of the elements and performance criteria of this unit.

There must be evidence that the individual has effectively identified the physical and chemical properties of materials, food and related products, including:

- accurately identifying and describing the physical and chemical characteristics of three different foods and the impact that processing has on each
- using common tests and measures to identify the components of three different food items
- identifying the characteristics of acids and bases and their application in food processing
- identifying the basic molecular structures of carbohydrates, proteins and fats
- distinguishing the difference between solutions, suspensions and colloidal systems
- identifying hazards and control methods in managing hazardous materials when working with food
- communicating technical information using correct technical terms, flow charts and sketches.

### Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- characteristics and phenomena that occur during processing; and products and processes where these phenomena are observable, including:
  - shear and strain
  - friction
  - surface tension
  - pressure
  - crystallisation
  - total solids
  - heat and temperature

- relative humidity
- work and energy input
- viscosity
- particle size
- melting points, boiling points, freezing points
- dew and condensation points
- additional phenomena appropriate to the production process
- common chemical reactions that occur in food processing, including both spontaneous and controlled reactions, including:
  - oxidation
  - enzymic
  - Maillard
  - acid-based
  - the role of enzymes in generating biological reactions
- tests commonly used to measure phenomena, and related units of measurement
- transition phases applicable to a given production process
- the role of temperature and pressure in the transition process
- pH and its impact on food processes, including:
  - differences between a strong acid and a concentrated acid
  - units of measurement
  - classification of commonly used materials, ingredients and indicators according to pH
  - the typical strengths and concentration levels required for commonly used acids and bases
  - the significance of pH for processing, food safety and cleaning applications
- basic molecular structures of carbohydrates, proteins and fats
- molecular changes that occur in states of matter, and common applications, including:
  - refrigerant
  - freeze drying
- effect and compatibility of cleaning agents with equipment surface materials
- processing stages designed to affect the structure of compounds (including hydrogenation or denaturing proteins in cooking processes of oil)
- typical applications of solutions, suspensions and colloidal systems in food processing, including:
  - emulsions (oil in water/water in oil)
  - sols (solid-liquid/solid-solid)
  - gels
  - foams (gas-liquid/gas-solid)
  - differences between dispersed particles and the dispersion medium in colloids
  - factors that affect stability of colloidal systems, including the stages in a production process that can cause changes to colloid structure
- technical information resources

- how to develop explanatory sketches or flow charts to communicate how observed phenomena affect products and the process
- safety hazards and required control methods when handling chemicals and working with processes involving chemical reactions
- basic research skills required for technical information to describe food properties and reactions, including recognising and applying appropriate units of measurement and terms.

## Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - skills must be demonstrated in a workplace setting or an environment that accurately represents a real workplace
- resources, equipment and materials:
  - production process and related equipment
  - tests used to report relevant product/process information and recorded results
- specifications:
  - manufacturers' advice and operating procedures for equipment
  - test methods.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

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