Australian Government

Department of Education, Employment and Workplace Relations

PMBTECH508A Develop a new compound

Revision Number: 1

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Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers the development of a new compound/formulation or the major modification of an existing compound. The aims of the modification may be broad (eg reduce cost, improve performance, improve manufacturing) or specific (eg meet a particular specification). Typically the brief will be broad enough to require examination of all components of the compound.

This technician would typically take the lead in this development project, although they may be working with a more senior technician as part of a larger project.

Application of the Unit

Application of this unit

This competency applies to technicians who are required to develop new compounds/ formulations and demonstrate that an appropriate formulation and manufacturing method have been developed.

It includes:

- determining the appropriate base polymer/polymer blend
- determining the appropriate additives
- determining the appropriate mixing methods and order
- verifying that compound and methods are acceptable in the factory
- ensuring the factory is able to mix this compound as a routine product.

This competency may be used to complement *PMBTECH505A Choose polymer materials for an application*. While PMBTECH505 concentrates on selecting the right polymer from a knowledge of polymer properties, this unit concentrates on the creation of an appropriate formulation using that polymer. Where choice of polymer is obvious/restricted/trivial then this unit stands alone from TECH505.

Where colour is an important part of the compound then *PMAOPS550A Develop a colour formulation* may also be a complementary unit.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites
This unit has **no** prerequisites.

Employability Skills Information

Employability Skills
This unit contains employability skills.

Elements and Performance Criteria Pre-Content

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

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ELEMENT	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1. Confirm required properties of compound.	1.1 Communicate with stakeholders regarding technical and aesthetic specification. 1.2 Identify project constraints such as timelines and cost. 1.3 Draft compound specification and project plan. 1.4 Identify required tests to verify compound meets specification. 1.5 Confirm with stakeholders and modify as appropriate.
2. Develop base formulation.	2.1 Identify appropriate base polymer/polymer blend. 2.2 Select appropriate fillers/reinforcers and estimate required proportions. 2.3 Select appropriate plasticisers and related materials and estimate required proportions. 2.4 Select appropriate other materials and estimate required proportions. 2.5 Draft initial formulation. 2.6 Draft trial mixing procedure and order of addition. 2.7 Identify any Health Safety and Environment (HSE) issues and modify as appropriate.
3. Mix, test and modify formulation.	3.1 Identify and control all hazards for laboratory development program. 3.2 Obtain all required materials and tools/ equipment. 3.3 Produce the trial compound following the draft procedures. 3.4 Evaluate the compound compliance with the specification. 3.5 Modify formulation and procedure as required. 3.6 Draft factory trial formula and procedure
4. Monitor factory trials.	4.1 Identify and control al HSE issues for factory trials. 4.2 Ensure all required materials and tools/equipment are available. 4.3 Organise trial(s) at an appropriate time. 4.4 Ensure trial is monitored and required data

ELEMENT ELEMENT	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
	collected. 4.5 Evaluate factory trial compound and procedure. 4.6 Modify formulation and procedure as required.
5. Complete compound development.	5.1 Ensure final formulation and procedures are recorded in standard procedures. 5.2 Ensure all required materials and tools and equipment will be routinely available as required. 5.3 Ensure HSE controls are standardised. 5.4 Ensure skill needs of operators have been addressed. 5.5 Complete all required reports and records. 5.6 Advise stakeholders of the outcome of the project.

Required Skills and Knowledge

This describes the essential skills and knowledge and their level required for this unit.
Competence in this unit requires:

- an understanding of compound components to a level necessary to select appropriate components from a range of similar, competing components
- an understanding of mixing processes to a level necessary to select an appropriate mixing method, an order of addition and mixing conditions
- appropriate tests so as to select the tests needed to check for compliance with the specification, and interpret test results
- HSE issues related to various compound components.

Language, **literacy and numeracy requirements**
This unit requires the ability to communicate at all levels about technical issues and bring agreement as to requirements from the different parties.
Reading is required to the level of interpreting technical information, and writing technical specifications, procedures and reports.
Numeracy is required to the level of interpreting technical information and test results, calculating required proportions and scaling up to a factory sized trial.

Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.
Overview of assessment
A holistic approach should be taken to the assessment.
Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria and skills and knowledge.
This competency should be assessed by examining a number of compound development projects where that development has resulted in a new compound introduced into the factory.
Critical aspects
It is essential that competence is demonstrated in the knowledge and skills defined in this unit. These may include the ability to:

- interpret the requirements of the new compound and express this in suitable form
- make appropriate choices of components and justify those choices
- develop appropriate mixing procedures and conditions and justify those choices
- introduce the new compound into the factory successfully.

Consistent performance should be demonstrated. For example, look to see that:

- a range of compounds meeting different types of specifications are developed
- a range of compounds requiring different components/component amounts are developed.

Context of assessment
Competence in this unit may be assessed:

- on the plant
- using questions to assess knowledge
- in a laboratory/pilot plant
- by using suitable simulation and/or a range of case studies/scenarios
- through a combination of these techniques.

Method of assessment

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and theoretical assessment will be combined with appropriate practical/simulation or similar assessment. Assessors need to be aware of any cultural issues that may affect responses to questions.

Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

Specific resources for assessment

This section should be read in conjunction with the Range Statement for this unit of competency. Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

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. Add any 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. Where reference is made to industry codes of practice and/or Australian/international standards, the latest version must be used.

Context

This competency applies to technicians who develop new compounds/formulations or who make significant modifications to existing compounds. They will typically be based in a laboratory/office or similar and will also have responsibility for ensuring the new compound works in the factory.

A technician working at this level would typically take the lead responsibility for the development of a new compound, but may work with other technicians of similar or greater responsibility for large or complex projects or as part of the development of a new product

Compound

Compound is used to mean any mixture of materials which is undertaken to a set formula and in specified proportions.

Tests

Tests includes the normal range of physical, chemical and environmental (weathering) tests which might be applied to the product.

Identify polymers

Identification of base polymer is a necessary starting point for any compound, but this competency does not necessarily require the choosing of a polymer from an understanding of its characteristics. Identification may be done in liaison with others, or by choosing the base polymer used in other products with similar requirements.

Select components

Selecting of components, and the proportions of components to be used should be done from a knowledge of a wide range of possible components, the properties each would bring to the compound, the relative advantages and disadvantages of each and the change in compound properties with changing amounts of each component.

Procedures

All operations are performed in accordance with procedures.

Procedures means all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.

Health, **Safety and Environment** (**HSE**)

All operations are subject to stringent Health, Safety and Environment requirements, which may be imposed through State or federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the technician needs to ensure the HSE requirements take precedence.

Unit Sector(s)

Not applicable.