Australian Government

MEM48033 Apply chemistry principles to materials used in manufacturing and engineering processes

Release: 1

MEM48033 Apply chemistry principles to materials used in manufacturing and engineering processes

Modification History

Release 1. New unit.

Application

This unit of competency defines the chemistry skills and knowledge required to support manufacturing and engineering processes including materials selection, monitoring of materials forming and processing, and materials recycling. The unit applies to technicians working in a range of industrial environments.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil.

Competency Field

Materials

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Identify chemical characteristics of materials used in a design or manufacturing process	1.1 Classify materials used in a design or manufacturing process into elements, organic and inorganic compounds, and mixtures 1.2 Use chemical formulae to describe design or manufacturing process into elements and compounds 1.3 Identify the design and manufacturing materials' atomic structure including sub-atomic particles, charge, atomic number, mass number, and valency 1.4 Use the periodic table of elements to determine the properties of elements used in the design or manufacturing process from the periodic table of elements
2. Review bonding	2.1 Categorise design or manufacturing process materials as metals,

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
structure of design or manufacturing process materials	polymers, composites and ceramics solids from their structure and properties 2.2 Relate the physical properties of any design or manufacturing process crystalline and non-crystalline solids materials to the nature of the forces between particles 2.3 Describe any composites in the design or manufacturing process types in terms of component materials and adhesion and setting processes 2.4 Describe basic bonding processes for ceramics and glasses in the design or manufacturing process and relate to structure
3. Determine the reactivity of metals and non-metals in the design or manufacturing process	3.1 Identify the activity of design and manufacturing process materials' elements and other key properties in terms of their position on the Periodic Table 3.2 Use first ionisation energy to determine the relative reactivity of metals in a design or manufacturing process
4. Identify the key chemical properties of acids and bases relevant to the in the design or manufacturing process	4.1 Identify acids and bases relevant to the manufacturing process including relevant salts which form acidic, basic or neutral solutions 4.2 Identify the pH of relevant acids and bases and classify as either a strong or weak acid or base
5. Analyse chemical reactions relevant to the design or manufacturing process	5.1 Prepare appropriate balanced chemical equations to describe reactions relevant to the design or manufacturing process using acid-base and electron transfer principles 5.2 Determine the heat of reaction in relevant chemical reactions 5.3 Identify the factors affecting reaction rate in the relevant chemical reactions including concentration, surface area, pressure, temperature and catalysis 5.4 Use the stoichiometry of the reactions to determine the amounts of reactants consumed and products made

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Crystalline solids include:	• molecular • metallic • ionic • extended covalent solids.
Physical properties of crystalline and non-crystalline solids include one or more of the following:	• boiling point • melting point • phases and phase transition • solubility in polar and/or non-polar solvents • conductivity • ductility • brittleness • hardness • structure (matrix, lattice etc.) • density • modulus.
Key properties of elements in terms of their position on the Periodic Table includes:	• electrical conductivity • ionisation energy • atomic radius • melting point • boiling point • combining power (valency) • electronegativity • reactivity.
Use of formulae includes:	• correctly written for given compounds • correct names will be written from given formulae.
Definitions of acids and bases include:	• arrhenius definition • bronsted-lowry definition.
Strong acids include:	• those that have high degrees of dissociation yielding hydrogen ions.
Weak acids include:	• those that have partial dissociation of hydrogen ions and exist mostly in the associated form.

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Strong bases include:	• those that completely or almost completely dissociate into hydroxide ions and a conjugate acid.
Weak bases include:	• those that partially dissociate into hydroxide ions and a conjugate acid.
Stoichiometry includes:	• the calculation of the quantities of chemical elements or compounds involved in a chemical reaction.

Unit Mapping Information

Release 1. New unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2