

Title	Demonstrate knowledge of textile and dyestuff chemistry		
Level	5	Credits	30

Purpose	<p>This advanced unit standard is for specialists in the dyeing and finishing industry.</p> <p>People credited with this unit standard are able to demonstrate knowledge of: chemistry relevant to dyeing; organic compounds relevant to dyeing; fibre structure; the chemistry of dyes and the dyeing process; and water for dyeing.</p>
----------------	---

Classification	Textiles Manufacture > Textile Dyeing and Finishing
-----------------------	---

Available grade	Achieved
------------------------	----------

Guidance Information

None.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of chemistry relevant to dyeing.

Performance criteria

1.1 Matter is described in terms of concepts, states, and classes.

Range concepts – matter, mass, weight, volume, density, specific gravity;
states – solid, liquid, gas;
classes – elements, compounds, mixtures, metals, non-metals.

1.2 Matter is described in terms of atomic structure.

Range neutron, electron, proton, atomic number, atomic weight.

1.3 The periodic table is described in terms of structure and relationship between elements.

Range atomic number, groups, periods, alkali metals, halogens, inert gases, transition elements.

- 1.4 Elements are recognised by their chemical symbol.
- Range hydrogen, carbon, nitrogen, oxygen, sodium, magnesium, aluminium, silicon, phosphorus, sulphur, chlorine, potassium, calcium, chromium, iron.
- 1.5 Chemical bonding types are described in terms of ionic, covalent, polar, non-polar, hydrogen, and Van der Waal types.
- 1.6 Solutions are described in terms of their characteristics and nature.
- Range solvents, electrolytes, solvent selectivity, ionisation, dissociation.
- 1.7 Acids, bases, and salts are compared in terms of their nature, properties, and reactions.
- 1.8 pH is described in terms of hydrogen and hydroxyl ion concentration, the pH scale, and measurement methods.
- Range measurement methods – chemical indicators, electrical measurement.
- 1.9 Chemical equilibrium and buffer solutions are explained in terms of mechanism.

Outcome 2

Demonstrate knowledge of organic compounds relevant to dyeing.

Performance criteria

- 2.1 Compounds of carbon are described in terms of structure, formation, and reactions.
- Range tetravalency, straight chain molecules, cyclic molecules, homologous series, organic functional groups, saturated and unsaturated hydrocarbons.
- 2.2 Organic compounds are classified according to functional group and structure.
- Range alcohols, carboxylic acids, esters, soaps, fats and oils, amines, amides.
- 2.3 Soaps and detergents are described in terms of their chemical nature and activity.

Outcome 3

Demonstrate knowledge of fibre structure.

Performance criteria

3.1 Reactions with chemicals of textile fibres are described in terms of chemical structure.

Range cotton, wool, silk, other natural fibres, regenerated cellulose, polyamide, polyester, polyacrylonitrile, polyolefins.

Outcome 4

Demonstrate knowledge of the chemistry of dyes and the dyeing process.

Performance criteria

4.1 Description identifies chemical and radical groupings that determine suitability as a dyestuff.

Range chromophores, chromogens, auxochromes.

4.2 Dyes are classified according to type and substrate suitability.

Range type – acid, chrome, metal complex, reactive, direct, sulphur, vat, developed, reactive, disperse, basic, optical brightening agents.

4.3 Phases of dyeing are described according to dye movement and chemical bonding.

Range phases – approach, adsorption, diffusion, migration, fixation.

4.4 Dyeing is explained in terms of factors that influence the dyeing process.

Range dyestuff solubility, pH, dye liquor flow, temperature, affinity, substantivity, concentration, dyeing assistants and auxiliary chemicals.

4.5 Temperature, and temperature measurement and control are described in terms of their effect on the dyeing process.

4.6 pH, and pH measurement and control are described in terms of their effect on the dyeing process.

4.7 Auxiliaries and dyeing assistants are described in terms of nature, function, and use.

Range pre-treatments – bleaching, desizing, metal sequestering, wetting; application of dyestuff – anti-foaming, buffering, de-aeration, dispersion, exhaustion, dye carriers, levelling, fibre protection; after-treatment – fixation, fastness, removal of loose dye, additional properties, change of handle, application of processing aids and silicone application.

Outcome 5

Demonstrate knowledge of water for dyeing.

Performance criteria

5.1 The supply source and chemical composition of different water types are compared.

Range rain water, surface water, subsoil water, deep bore water, local body water supply.

5.2 Textile dyeing and chemical treatments are described in terms of the origin and effect of water contaminants.

Range calcium and magnesium, iron, copper, other transition metals, residual chlorine, dissolved oxygen, carbon dioxide, silicon, solids.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 October 1995	31 December 2019
Revision	2	8 August 1997	31 December 2019
Revision	3	18 July 2000	31 December 2019
Revision	4	10 October 2001	31 December 2019
Revision	5	15 January 2004	31 December 2019
Rollover	6	25 July 2007	31 December 2019
Review	7	17 April 2009	31 December 2019
Review	8	19 May 2016	31 December 2023
Review	9	24 March 2022	31 December 2023

Consent and Moderation Requirements (CMR) reference	0030
--	------

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.