

<b>Title</b>	<b>Manufacture sodium chlorate in a pulp and paper chemical plant</b>		
<b>Level</b>	<b>5</b>	<b>Credits</b>	<b>15</b>

<b>Purpose</b>	People credited with this unit standard are able to: explain fundamentals of sodium chlorate manufacture; operate and maintain equipment to manufacture sodium chlorate efficiently; and monitor and control the efficient performance of process and equipment to manufacture sodium chlorate.
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<b>Classification</b>	Wood Fibre Manufacturing > Pulp and Paper - Chemical Plants
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<b>Available grade</b>	Achieved
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### Guidance Information

#### 1 Definition

*Worksite documentation* refers to instructions to staff on policy and procedures (including the application of legislation to worksite situations) which are formally documented, and are available for reference at the worksite. Examples are standard operating procedures, specifications, manuals, and manufacturer's information.

#### 2 The following apply to the performance of all outcomes of this unit standard:

- a All work practices must meet recognised codes of practice and documented worksite health and safety and environmental procedures (where these exceed code) for personal, product, and worksite health and safety, and must meet the obligations required under current legislation, including the Health and Safety in Employment Act 1992, the Resource Management Act 1991, the Hazardous Substances and New Organisms Act 1996, and their subsequent amendments.
- b All work practices must meet documented worksite operating procedures. This includes the recording (by electronic or non-electronic means) of activities, events, and decisions.
- c All communications made in relation to this unit standard must be made in accordance with worksite procedures for content, recipient, timing, and method.

### Outcomes and performance criteria

#### Outcome 1

Explain fundamentals of sodium chlorate manufacture.

**Performance criteria**

- 1.1 Operating principles of sodium chlorate manufacturing plant are explained in accordance with worksite documentation.
- Range chemical reactions, electrolysis, pH control, hydrogen-oxygen-chlorine explosion triangle, wet and dry gas range, pressure and temperature effects, earthing systems, sacrificial anodes.
- 1.2 Operating parameters and capability of sodium chlorate manufacturing plant are explained in accordance with worksite documentation.
- Range parameters may include but are not limited to – pressure, pH, voltage and current, temperature, chemical ratios, chemical strengths.
- 1.3 Operating components and process controls of sodium chlorate manufacturing plant are identified, and their operation and purpose are explained, in accordance with worksite documentation.
- Range sodium chlorate manufacturing plant may include but is not limited to – holding tank or sump, electrolyzers, reactor, chemical feed tanks, coolers, degasifiers, air purge system, nitrogen purge system, chlorine scrubber, peroxide scrubber, hydrogen seal pot.
- 1.4 Hazards associated with sodium chlorate manufacture are identified and actions to be taken to isolate, minimise, or eliminate the hazard are described in accordance with worksite documentation.
- Range hazards include but are not limited to – over pressure, gas leaks, electromagnetic fields, chlorate leaks, stack fires, voltage, current, temperature, blockages.
- 1.5 Consequences of non-conformance with worksite operating procedures are described in accordance with worksite documentation.
- 1.6 Hazards associated with chemicals in the manufacture of sodium chlorate are identified and management of the risks is explained.
- Range chemicals include – chlorine dioxide, chlorine, sulphuric acid, sodium hypo chlorite, sodium dichromate, hypochlorous acid, sodium chlorate, hydrochloric acid, nitrogen.
- 1.7 Roles and responsibilities of the sodium chlorate manufacturing plant operator are described in accordance with worksite documentation.

**Outcome 2**

Operate and maintain equipment to manufacture sodium chlorate efficiently.

**Performance criteria**

- 2.1 Safe work practices associated with operating equipment to manufacture sodium chlorate are demonstrated in accordance with worksite documentation and legislative requirements.
- Range practices may include but are not limited to – plant entry procedures, isolation procedures, lock-outs, emergency stops, machine guarding, wearing appropriate safety equipment.
- 2.2 Equipment is set up, started up, operated, and shut down efficiently in accordance with worksite documentation.
- Range equipment may include but is not limited to – holding tank or sump, electrolyzers, reactor, chemical feed tanks, coolers, degasifiers, air purge system, nitrogen purge system, chlorine scrubber, peroxide scrubber, hydrogen seal pot.
- 2.3 Chemicals are assembled in accordance with worksite documentation.
- 2.4 Setting and timely adjustment of operating parameters enables production requirements to be achieved in accordance with worksite documentation.
- Range operating parameters – chemical concentrations, pH, temperatures, pressures, densities, voltages, flows, purity; production requirements – purity, chemical strength, production rate.
- 2.5 Preventative maintenance and cleaning requirements are carried out in accordance with worksite documentation.

**Outcome 3**

Monitor and control the efficient performance of process and equipment to manufacture sodium chlorate.

**Performance criteria**

- 3.1 Monitoring and interpretation of feedback information and the timely adjustment of control parameters enable product quality, efficient plant performance, and process and legislative requirements to be maintained in accordance with worksite documentation.
- Range control parameters – chemical concentrations, pH, temperatures, pressures, densities, voltages, flows, purity, current; process requirements – customer demand, storage levels, production priority.

3.2 Operating and equipment faults and malfunctions are identified, and corrective action is taken, in accordance with worksite documentation.

Range operating faults and malfunctions – leakages, blockages, gas composition changes, contamination, cell deactivation; equipment faults and malfunctions – electrical, mechanical, hydraulic, pneumatic, instrumentation, distributed control system.

3.3 Output product meets the requirements of worksite documentation for oxygen content, pH, and chemical concentration.

3.4 Production rate is regulated in accordance with worksite documentation and process requirements.

**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 February 1999	31 December 2025
Review	2	18 December 2006	31 December 2025
Review	3	24 October 2014	31 December 2025
Review	4	30 November 2023	31 December 2025

<b>Consent and Moderation Requirements (CMR) reference</b>	0173
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.