

<b>Title</b>	<b>Demonstrate knowledge of liquid analytical measurement systems</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>3</b>

<b>Purpose</b>	<p>This unit standard covers principles of industrial liquid analytical measurements and the operation of systems used to perform the measurements.</p> <p>People credited with this unit standard are able to demonstrate knowledge of:</p> <ul style="list-style-type: none"> <li>– pH measurement;</li> <li>– conductivity measurement;</li> <li>– dissolved oxygen measurement;</li> <li>– consistency and viscosity measurement;</li> <li>– density measurement; and</li> <li>– analytical sampling systems.</li> </ul>
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<b>Classification</b>	Industrial Measurement and Control > Industrial Measurement and Control - Theory
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<b>Available grade</b>	Achieved
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### Guidance Information

None.

### Outcomes and performance criteria

#### Outcome 1

Demonstrate knowledge of pH measurement.

#### Performance criteria

- 1.1 Define the term pH and its associated scale.
  - Range positive hydrogen ions, 14 alkaline, 3 acidic, 7 neutral, log scale.
- 1.2 Describe components of a pH measuring system.
  - Range reference electrode, measuring electrode, temperature compensation, very high input impedance amplifier.
- 1.3 Describe the operating principles of the pH measuring system.

1.4 Identify calibration methods for pH measuring systems.

Range buffer solution, backing off unwanted e.m.f.s.

1.5 Identify problems associated with pH measuring systems.

Range electrode cleaning, ultrasonic, mechanical wiping, lead wire connections, probe failure, earthing.

## Outcome 2

Demonstrate knowledge of conductivity measurement.

### Performance criteria

2.1 Describe principles of conductivity measurement.

Range siemens, micro mho, electrolyte.

2.2 Define factors to be taken into account when making conductivity measurements.

Range non-linear solution strengths, temperature compensation, probe constant.

2.3 Describe calibration techniques.

Range amplifier decade box injection, dedicated test equipment, standard solutions.

## Outcome 3

Demonstrate knowledge of dissolved oxygen measurement.

### Performance criteria

3.1 Describe principles of dissolved oxygen measurement.

Range galvanic cell, polarographic cell.

3.2 Explain air exposure at valve glands, and its prevention, in relation to making dissolved oxygen measurements.

3.3 Describe calibration techniques.

Range transmitter adjustment, sample 5% sodium sulphite, water saturated air.

## Outcome 4

Demonstrate knowledge of consistency and viscosity measurement.

**Performance criteria**

4.1 Describe types and uses of consistency transmitters.

Range pulp stock, shear forces, force balance, blade type, rotating blade, optical.

4.2 Describe types and uses of viscosity transmitters.

Range oil, liquid, rotational, capillary, float.

**Outcome 5**

Demonstrate knowledge of density measurement.

**Performance criteria**

5.1 Describe methods of density measurement and state their applications.

Range differential pressure, displacement transmitter, weight of fixed volume, nuclear radiation, refractometer, ultrasonic, vibrating mass.

**Outcome 6**

Demonstrate knowledge of analytical sampling systems.

**Performance criteria**

6.1 State steps to obtain and process an analytical sample and show in a block diagram.

6.2 State the components of a sampling system.

Range may include but is not limited to – pumps, valves, flowmeters and switches, filters, phase separating devices, heat exchangers.

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<b>Replacement information</b>	This unit standard and unit standard 28081 replaced unit standard 2641.
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**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	28 November 2013	31 December 2027
Rollover and Revision	2	28 June 2018	31 December 2027
Review	3	30 January 2025	31 December 2027

**Consent and Moderation Requirements (CMR) reference**

0003

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