

● MANGANESE

# EZ Series: Continuous Monitoring of Manganese

**Key Applications: Monitoring of drinking water, source and surface waters, boiler and steam, wastewater**

Manganese is used in steel production to remove impurities and improve malleability, and in aluminium alloys to increase resistance to corrosion. Compounds of Manganese have also been used in pigments, glass, fireworks, batteries, coins and as a fuel additive. Ubiquitous in soil and rock, Manganese occurs naturally in surface water and groundwater in both dissolved and suspended forms. The divalent form, Mn(II), predominates in most water at pH 4-7, and anaerobic groundwater often contains elevated levels of dissolved Manganese. Manganese may be present in drinking water and excessive concentrations can harm the appearance and taste.

## Features EZ Series Analysers

- **Continuously monitor Dissolved and Total Manganese to detect trends, peaks, and excursions**
- **Accurate at low levels starting at 2 µg/L**
- **Multiple stream analysis (1 - 8 streams)**

**Explore the full range of parameters and technologies.  
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# The Why, Where and How of Manganese Monitoring

## About

Manganese is one of the most abundant metals in the Earth's crust; usually occurring with iron, and existing entirely in its oxidative forms. Manganese is an essential element for humans and animals, performing vital roles in the functioning of many enzymes, metabolism, immunity and reproduction. Manganese is also essential for plants; playing important roles in photosynthesis, respiration, germination and nitrogen assimilation. Nevertheless, high levels of Manganese can be toxic. Manganese intake from drinking water is usually substantially lower than intake from food, but discoloration, bad taste and staining are the most common causes of drinking water complaints.

## Manganese in Drinking Water

According to the World Health Organisation Guidelines for Drinking Water Quality - 4th edition, amended 2017: at levels exceeding 0.1 mg/L, Manganese in water supplies may cause an undesirable taste in beverages and stain sanitary ware and laundry. However, the health-based value of 0.4 mg/L for Manganese is higher than the 0.1 mg/L acceptability threshold.

The US EPA has established National Secondary Drinking Water Regulations that set non-mandatory water quality standards for 15 contaminants, including Manganese. These guidelines assist the management of drinking water for aesthetic considerations, such as taste, colour, and odour. The Maximum Contaminant Level (MCL) for Manganese is 0.05 mg/L. This limit is also applied by the Food and Drug Administration to bottled water products.

In Europe, Directive (EU) 2020/2184, on the quality of water intended for human consumption, entered into force in January 2021. It states that monitoring programmes shall be supply-specific, taking into account the outcomes of a risk assessment of the catchment areas for abstraction points and of the supply systems. Manganese is included in a list of 'Indicator Parameters' (Part C of Annex 1) with a parametric value of 0.05 mg/L.

Monitoring Manganese at a plant's intake helps to inform process control and final water monitoring checks for any Manganese break-through and for compliance with the plant's target.

## Manganese in Ground and Surface Waters

With both natural and anthropogenic inputs, Manganese in water is affected by microbial activity and dissolved Oxygen, which cause complex cycling between oxidation states and species. A water body may have aerobic upper regions, whereas anoxic, reducing conditions may exist at lower levels in thermally stratified reservoirs. In addition to variability between different water depths, the form and concentration of Manganese also varies between different seasons, causing variability at water abstraction points and necessitating continuous monitoring.

## Manganese in Industrial Water

In industrial cooling systems Manganese dioxide is deposited by chemical and biological oxidation of dissolved Manganese. These deposits degrade heat exchanger performance and promote corrosion. The monitoring of total Manganese for corrosion protection in water systems helps to identify potentially problematic background levels, and it may be necessary to monitor dissolved Manganese where Manganese salts are used for corrosion inhibition.

## Manganese in Wastewater

In many countries, to protect aquatic life and groundwater quality, permit limits are imposed when a discharge is liable to cause pollution or result in the deterioration of receiving water quality. Wastewater discharge consents can therefore include limits for Manganese with sensitive receiving waters and where wastewater includes industrial discharges or mine drainage.

## Manganese Monitoring Solutions

EZ Series online analysers are available in several models:

EZ1025	Manganese Mn(II), dissolved
EZ2003	Manganese, total
EZ2303	Manganese, total & Mn(II), dissolved

### Options

- Selection of measuring ranges to match your application
- Monitoring of up to 8 sample streams per analyser, reducing cost per sampling point
- Analogue and digital communication outputs
- Self-cleaning sample preconditioning panel