Permanganate index

Fully automated determination according to
DIN EN ISO 8467 (DIN 38409-5)

- **Economical:** fully automated process reduces the time, reagents and personnel required

- **Reliable:** reproducible results thanks to robust automation

- **Convenient:** easy control and professional data handling with *tiamo*™ titration software

Ω Metrohm

«Determining the permanganate index used to require considerable manual effort. Thanks to the automated Metrohm method manual work has been minimized and reproducibility and reliability of results has been increased.»

David Welter, Teamleader sum parameters, SGS INSTITUT FRESENIUS

Permanganate index – an important parameter in drinking water analysis

The permanganate index is a sum parameter that indicates the total load of organic and inorganic substances in drinking water. The substances concerned are mainly humic materials/acids that are formed primarily when dead organic material in the soil breaks down and becomes transformed. The permanganate index is used to evaluate the quality of different types of water, e.g. drinking water, mineral water, spring water, table water and wastewater. It is determined in accordance with DIN EN ISO 8467 (DIN 38409-5).

For titrimetric determination, the water sample is heated with a $KMnO_4$ solution of known concentration and sulfuric acid in a boiling water bath for 10 minutes. In the process, some of the permanganate oxidizes the oxidizable constituents in the water. The exact consumption of permanganate is determined by adding an excess of sodium oxalate solution and then titrating the excess oxalate with permanganate solution.

The challenge of sample preparation

The determination of the permanganate index is a procedure that is performed in a very large number of water laboratories, but it is not without snags. In particular, it is very difficult to carry out the time-critical heating of samples manually in exactly the same way all the time if there is a high sample throughput.

Efficient and reliable solution with the Metrohm method

The method developed by Metrohm solves this problem efficiently and reliably. The key lies in a heatable, external cell, with which the samples can be dealt with completely automatically. Users need only to place the samples on the rack of the sample processor and start the system. The transfer of the sample to the external titration cell and all the other sample preparation steps, including the heating of the sample, are performed automatically. (see Chart 1).

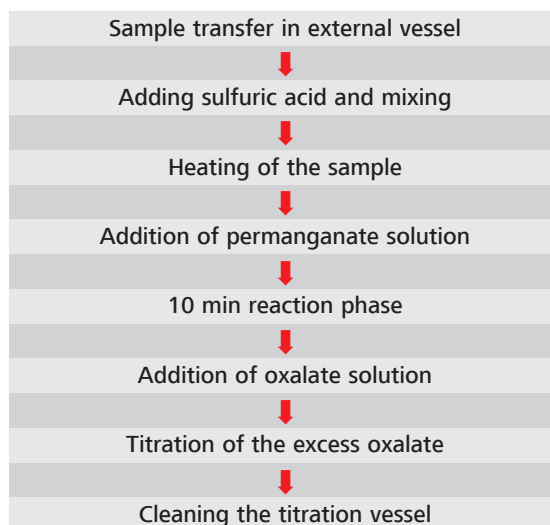| Sample transfer in external vessel |
| Adding sulfuric acid and mixing |
| Heating of the sample |
| Addition of permanganate solution |
| 10 min reaction phase |
| Addition of oxalate solution |
| Titration of the excess oxalate |
| Cleaning the titration vessel |

Chart 1: Steps in the fully automated determination of permanganate

Because of the clear database in **tiamo**™ users always have an overview of the situation. Control cards, filter and export functions and the freely definable layout of the user interface make it possible to manage the data comfortably and flexibly.

Drinking water	PMI [mg/L]
1	0.39
2	0.39
3	0.42
Mean value	**0.40**
s(abs)	**0.017**
s(rel)	**4.33%**

Results of determiation of the permanganate index (PIM) of a drinking water
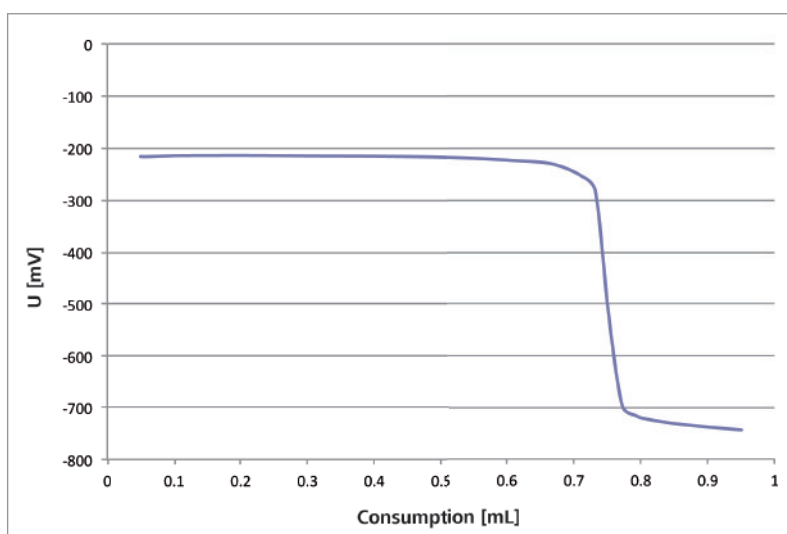
Titration curve of the permanganate index determination of a drinking water

Ordering information

MATi 13: Completely automated permanganate index
determination*

* The thermostat for heating the external titration cell must be
  ordered separately.

Details of the external titration cell in MATi 13

www.metrohm.com

Ω Metrohm