



Application Note AN-T-204

Permanganate index in water

Fully automated determination according to GB/T 11892

The permanganate index (PMI) is a sum parameter that indicates the total load of oxidizable organic and inorganic matter in water. The substances concerned are mainly humic materials/acids that are primarily formed when dead organic material present in soil is further broken down and released into water sources. Another source of organic material in the water can be attributed to birds or fish. As it is an indicator of the water quality, testing of the PMI for drinking water is obligatory in many countries.

For the determination, it is necessary to heat the

stabilized water sample to 95 ° C and higher for a stipulated time. Afterwards, the amount of permanganate that has remained after the reaction with the sample is determined titrimetrically. This sample preparation step requires considerable manual effort.

In this Application Note, a fully automated procedure for the determination of the PMI according to GB/T 11892 is described, including all sample preparation steps. The gains in productivity because of a reduced manual workload are considerable.

SAMPLE AND SAMPLE PREPARATION

The application is demonstrated for a resorcinol standard (6 mg/L corresponding to a PMI of 9.32–10.28 mg/L) and a water sample from a

stream.

To stabilize the sample, sulfuric acid is added directly after sampling.

EXPERIMENTAL

The analysis is carried out on an automated system using an 810 Sample Processor with an external jacketed vessel, 916 Ti-Touch, a Pt Titrode for indication, and a Pt1000 temperature sensor.

The stabilized sample is poured into a titration beaker, which is then covered with aluminum foil, fixed with a foil holder, and placed on the sample rack.

For the sample determination, an aliquot of sample is pipetted into the external vessel. Sulfuric acid and potassium permanganate solution are added. The solution is heated up and the temperature is maintained for 30 minutes between 96–98 ° C. Sodium oxalate solution is added, and its excess is then back-titrated with standardized potassium permanganate until after the equivalence point. After the determination, the vessel is automatically emptied and rinsed twice with deionized water. The transfer tube is also rinsed with deionized water. A blank determination is performed in the same way, by replacing the sample with the same amount of deionized water.



Figure 1. 916 Ti-Touch and 810 Sample Processor. Example setup for the determination of the permanganate index in water.

RESULTS

According to EN ISO 8467, a resorcinol standard of 6 mg/L has a PMI between 9.32 and 10.28 mg/L. The analysis demonstrates acceptable and

reproducible results for the standard and the sample, which are summarized in **Table 1**. An example titration curve is displayed in **Figure 2**.

Table 1. Mean PMI value for two different samples determined by a fully automated titration system (n = 5).

Sample	PMI / mg/L	SD(rel) / %
Resorcinol standard	10.04	1.75
Stream water	8.93	0.92

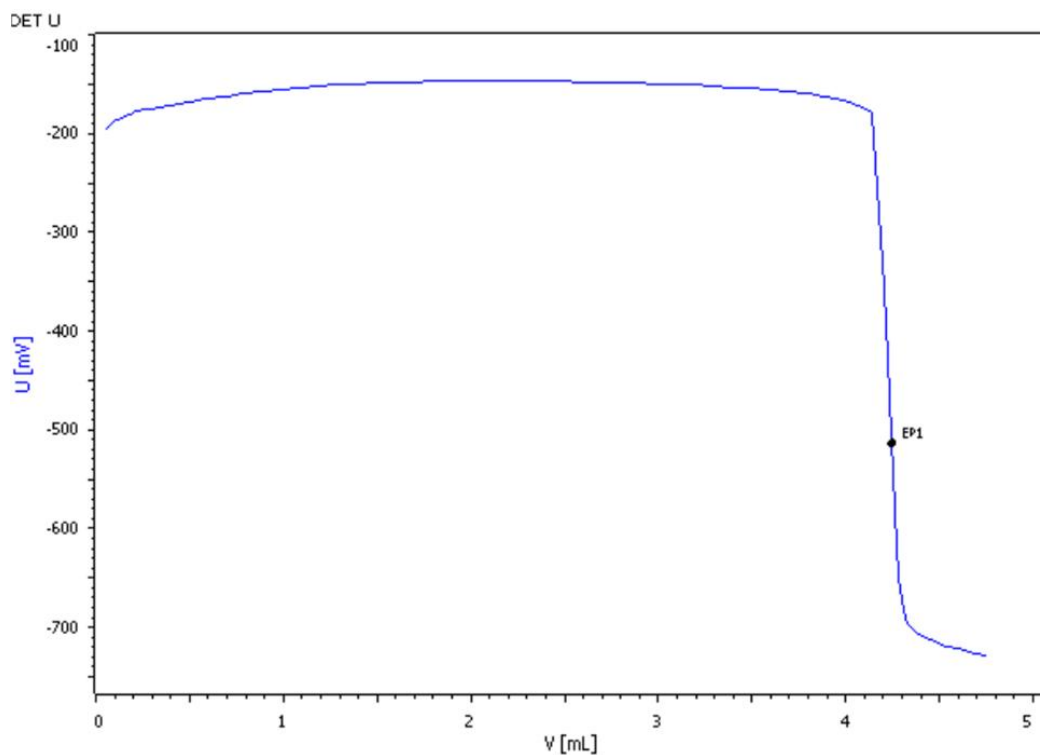


Figure 2. Example titration curve for the permanganate index determination in a stream water sample.

CONCLUSION

The determination of the PMI value in water samples can efficiently be carried out by using a Metrohm autotitrator equipped with an automation system. Fast and precise

determination according to **GB/T 11892** is possible. Furthermore, by fully automating all sample preparation steps, the productivity within the laboratory is significantly increased.

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CONFIGURATION



916 Ti-Touch

“Reduce to the max”(少到最大)-是 916 Ti-Touch 的理念。万通新型型滴定是同品中用于常分析的最秀的机系。

安装有磁力拌器的 916 Ti-Touch 支持所有位分析滴定:滴定模式 DET(等当点滴定)、MET(等量等当点滴定)、SET(点定滴定,滴定至一个或个定好的点)、STAT(催化和 pH-STAT 滴定)及 MAT(手滴定)。

新 916 Ti-Touch 同符合 FDA 条例 21 CFR,第 11 部分的要求。因此在能保始万无一失。

有了 810 Sample Processor,便可 916 Ti-Touch 展自功能 -,便增加了品通量,并改了精度和重性。



810 Sample Processor

用于通 916 Ti-Touch 或 915 KF Ti-Touch 自分析常品的 Sample Processor。

Sample Processor 包括一个客端和一个内置的隔膜,用于自理少量至中等量的位分析滴定,比如·休滴定法。除了内置的之外,可再接一台(隔膜或蠕)和多三台加液元用来行 LQH 加液理。

由于其用范很广,因此必根据具体用来合的品、拌器、滴定和 Swing Head 以及品容器并独。



iPt Titrode

pH 玻璃膜且集成了传感器数据芯片的智能合式形,用作参比。

适用于 pH 恒定的化原滴定,例如:

- 量法
- 重酸法
- 量法
- 高酸滴定法

存放在蒸水中。

iTrodes 可以在 Titrande、Ti-Touch 或 913/914 Metern 上使用。