Application Note AN-T-222

Sulfur dioxide content in traditional Chinese medicines

Reliable and accurate photometric determination of the SO2 content in TCM according to ISO 22590

Traditional Chinese medicine (TCM) remedies are gaining popularity in other cultures.
In some TCM, sulfur dioxide (SO_2) is used as a preservative, antioxidant, and disinfectant. The products are treated by sulfurization with SO_2 gas. This prevents the browning or discoloration of ingredients and can increase the product's shelf life.
However, sulfur dioxide is a very poisonous gas. Global health authorities have set strict limits for the content of SO_2 in products. It is therefore of crucial importance to determine the sulfur dioxide content to comply with these limits.
In this well-suited method, the SO_2 content in different natural TCM products are analyzed reliably and accurately according to ISO 22590 using the Eco Titrator equipped with an Optrode and sodium hydroxide as titrant.

This application is demonstrated on caterpillar fungus (*dong chong xia cao*), earthworm (*di long*), seaweed (*hai zao*), arabian pea (*bu gu zhi*), turtle shell (*gui ban*), and a sodium sulfite standard.

Before testing, the sample must be dried and pulverized.

In the first step, an appropriate amount of sample is digested with boiling hydrochloric acid, and the resulting released sulfur dioxide is added into a solution of hydrogen peroxide by means of a nitrogen stream. The sulfur dioxide is oxidized to sulfuric acid via the following reaction mechanism:

$SO_2 + H_2O_2 \rightarrow H_2SO_4$

In the second step, the formed sulfuric acid is titrated with sodium hydroxide to determine the sulfur dioxide content.

The determination is carried out with an Eco Titrator equipped with an Optrode.

Table 1. Summarized results for SO2 in TCM samples and for the sodium sulfite standard

Sample	SO_2 (mg/kg)
Caterpillar fungus	4.4
Earthworm	4.6
Seaweed	6.1
Arabian pea	6.2
Turtle shell	26.3
Standard	**Recovery (%)**
Na_2SO_3	98.9

CONCLUSION

Titration is an accurate and precise method to accurately determine the SO_2 content in different natural TCM products.

Using the Eco Titrator equipped with an Optrode allows a reliable determination. The system offers low-priced analyses and user-friendly handling. The Optrode is completely maintenance-free, easy to use, and robust in daily laboratory work.

Internal reference: AW TI CH-1319-042021

CONTACT

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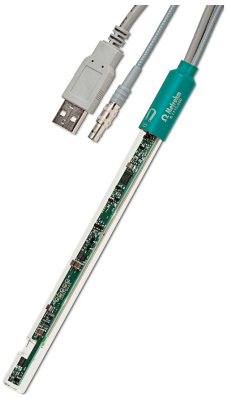
CONFIGURATION

Eco Titrator

紧凑型 Eco Titrator 具有内置磁力搅拌器和触摸感应式用户界面,可以满足日常分析需求。其始终提供符合 GLP 标准的结果。

普遍适用于几乎所有电位分析式滴定,例如:

- 食品:脂肪的酸度、氯化物、维生素 C、碘和过氧化物值
- 水分析:碳酸盐和 Ca/Mg 硬度、氯化物、硫酸盐、高锰酸盐指数
- 石化:酸/碱值、硫化物和硫醇、氯化物、溴值
- 电镀:总酸度、金属含量、氯化物
- 表面活性剂分析:阴离子、阳离子和非离子表面活性剂
- 光度计与光度电极:p 和 m 值、金属、水硬度



Optrode

有 8 种可用波长的光度滴定用光学传感器。可以通过软件控制(tiamo 2.5 及以上版本)或通过磁铁来进行波长切换。该玻璃鞘对溶剂耐受,并且易于清洁。这种节省空间的传感器适用于,例如:

- 按照 USP 或 EP 的非水溶性滴定
- 羧基端基的测定
- TAN/TBN 根据 ASTM D974
- 硫酸测定
- 混凝土中的 Fe、Al、Ca
- 水硬度
- 根据 USP 的硫酸软骨素

传感器不适合通过测量颜色强度(比色法)来测定浓度。