Application Note AN-T-188

铁矿石中的铁含量

Fast and accurate analysis according to ISO/TS 2597-4

Iron ores occur in igneous, transformed, or sedimentary rocks. The most widely distributed iron-containing minerals are oxides, such as hematite (Fe_2O_3), magnetite (Fe_3O_4), or limonite ($FeO(OH) \cdot n\ H_2O$), but carbonates such as siderite ($FeCO_3$) are also important.

The total iron content in iron ore plays a central economic role for mining companies. The higher the iron content in the ore, the more profitable the mining operation. Therefore, a fast and accurate analysis is important to determine the most profitable areas to work.

In this Application Note, the iron determination according to ISO/TS 2597-4 is presented. A sample of iron ore is dissolved in hydrochloric acid at elevated temperatures. Afterwards, the total iron content is determined quickly and accurately by potentiometric titration using the Pt ring electrode and potassium dichromate as titrant.

The method is demonstrated for various iron ore samples. The iron ore is milled until the grain size is less than 160 m.

EXPERIMENTAL

This analysis is carried out on a 905 Titrando equipped with a rod stirrer, combined Pt ring electrode, and temperature sensor. Additionally, a heating plate is needed.

Hydrochloric acid, deionized water, and few drops of tin(II) hydrochloride are added to a reasonable amount of prepared sample. The mixture is heated for one hour at 80 °C, followed by 10 minutes at 95 °C. Afterwards by visual inspection of a color change, iron(III) is reduced with tin(II) chloride, and then titanium(III) chloride is added with an excess, which is then oxidized.

After cooling the sample down to room temperature, deionized water and an acid mixture (phosphoric acid and sulfuric acid) are added. Then the sample is titrated with standardized potassium dichromate until after the equivalence point.

Figure 1. 905 Titrando with tiamo. Example setup for the determination of the iron content in iron ore.

RESULTS

The analysis demonstrates acceptable results and well-defined titration curves. Results are summarized in **Table 1**. An example titration curve is displayed in **Figure 2**.

Table 1. Mean total iron content of various iron ore samples determined with a Titrando system (n = 4).

Sample	Mean	SD(rel) in %
1	65.11%	0.21%
2	54.25%	0.27%
3	62.81%	0.41%
4	66.78%	0.32%
5	66.18%	0.45%

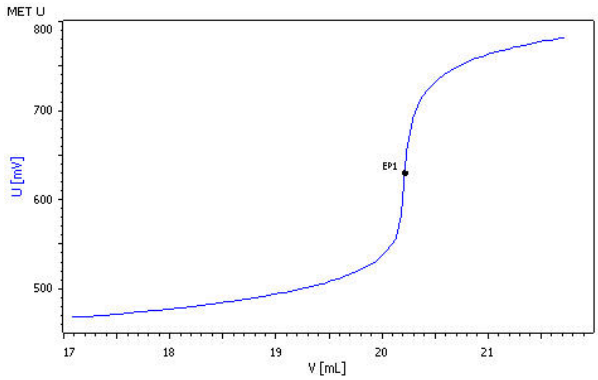

Figure 2. Example titration curve of iron content determination.

CONCLUSION

After sample preparation, the determination of iron content in iron ores can be performed reliably and cost-efficiently by using a Metrohm autotitrator. Fast and precise determination according to **ISO/TS 2597-4** is possible.

The presented method provides an inexpensive and easily performable approach to estimate if an extraction of iron from iron ore is economically feasible or not.

Internal reference: AW TI CH1-1261-122018

CONTACT

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CONFIGURATION

905 Titrando

用于使用 Dosino 加液系统通过一个测量接口滴定分析的电位滴定仪。

- 多达四套 800 Dosino 加液系统
- 动态等当点滴定(DET)、等量等当点滴定(MET)和终点设定滴定(SET)
- 使用离子选择性电极测量(MEAS CONC)
- 带监控的加液功能,LQH
- 用于额外搅拌器或加液器系统的四个 MSB 接口
- 智能电极“iTrode”
- USB 接口
- 使用 OMNIS-Software、*tiamo*-软件或 Touch Control
- 如果需要,满足 GMP/GLP 和 FDA 要求,比如 21 CFR 第 11 部分

802 Stirrer 804 Ti Stand

棒式搅拌器包括搅拌螺旋桨 6.1909.010。

804

滴定台及802杆式螺旋桨搅拌器的控制器,如果与802型杆式螺旋桨搅拌器联用,则可为您在磁力搅拌器之外提供另一选择。Ti Stand工作台带有底板、支撑杆与电极固定器。

Pt

带陶瓷柱隔膜的组合式铂环形电极。

该电极适用于 pH 值可变的氧化还原滴定,例如:

- 按照温克勒法的氧含量
- 用 $KMnO_4$ 测定过氧化氢
- 重氮化滴定

作为参考电解液并进行制备时使用了 c(KCl) = 3 mol/ L。

Pt1000 12.5 cm

Pt1000 (B)

6.1110.110 Pt1000 17.8 cm