



Application Note AN-T-235

测定炭黑中的 pH 值

Fast, accurate pH measurement in carbon black for battery cathodes according to ASTM D1512, ISO 787-9, and GB/T 1717

Conductive carbon black is an essential additive in modern lithium-ion batteries. It is used as an ingredient in the cathode and forms a conductive chemical structure that ensures that non-conductive materials (e.g., lithium nickel manganese cobalt oxides) are electrically connected to each other and to the current collector. Without conductive carbon black, no electrical current would flow, and the battery cell would not work. It is therefore essential to confirm the properties and quality of carbon

black. In this respect, the pH value is among the first easy-to-check parameters.

However, in order to determine the correct pH value, both the method and the measuring equipment must meet the highest quality standards.

In this Application Note, the pH value in carbon black is accurately and reliably analyzed by using a 913 pH Meter equipped with a pH electrode according to ASTM D1512 as well as ISO 787-9 and GB/T 1717.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on carbon black used as a conductive additive cathode

material.

Sample preparation is not required.

EXPERIMENTAL

The pH values are carried out using a 913 pH Meter equipped with a pre-calibrated Unitrode easyClean (Figures 1 and 2).

To create the cathode slurry, an appropriate amount of sample is weighed into the sample

beaker, and deionized water plus an organic solvent as wetting agent (according to the standards) are added. Afterwards, the cathode slurry pH is determined.



Figure 1. 913 pH Meter from Metrohm.



Figure 2. Unitrode easyClean with Pt1000 temperature sensor

RESULTS

This method offers very accurate results, as shown in **Tables 1 and 2**.

Table 1. Results of the pH measurement of carbon black according to ASTM D1512 (n = 6).

Sample (n = 6)	pH value	Temperature in ° C
Mean	8.62	24.3
SD(abs)	0.01	0.1
SD(rel) in %	0.1	0.2

Table 2. Results of the pH measurement of carbon black according to ISO 787-9 and GB/T 1717 (n = 6).

Sample (n = 6)	pH value	Temperature in ° C
Mean	8.00	24.9
SD(abs)	0.02	0.1
SD(rel) in %	0.2	0.3

CONCLUSION

The 913 pH Meter equipped with the Unitrode easyClean is an excellent combination to measure pH in cathode materials.

This setup is inexpensive, user-friendly, and takes up minimal bench space. Furthermore, as the

name indicates, the easyClean diaphragm of the Unitrode can be easily cleaned even in the case of heavily contaminating samples like carbon black.

CONTACT

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CONFIGURATION



913 pH Meter

便携式双通道 pH 测量设备,用于测量 pH/mV 和温度。通过这种电池供电且带有支架板的测量设备,您便可以实现面向现场和在实验室中测量的装备。

- 内置电池组和两个电流隔离 pH 测量输入端的便携式 pH 值计
- 模拟 pH 测量输入端,用于万通标准 pH 电极
- 数字 pH 测量输入端,用于万通智能 pH 电极
- 坚固实用的防水防尘外壳 (IP67),适合户外及实验室使用
- 背光 LCD 彩色显示屏,用于方便读取结果
- USB 接口,用于方便将数据从计算机导出到打印机上
- 更大的内存(10000 数据组)
- 引线保护型用户和专家模式,防止修改一些默认参数
- GLP 达标打印和数据导出,带用户 ID 和时间戳