# Particle Sizing of Alkaline Battery Materials

## Introduction

Alkaline batteries have unique features compared to zinc-carbon batteries, including high energy density, a wide operating temperature range, high current capability, and a leak-proof design. They are also used for a wide range of purposes. The alkaline battery is generally made with a positive electrode consisting of a mixture of manganese oxide and graphite, a negative electrode of zinc, and an electrolyte solution of potassium hydroxide. The performance of the alkaline battery is attributed from the particle size of these components. The particle size of the battery materials shall be measured for the purpose of the quality control. Furthermore, it is also necessary to measure the particle size of alternative metals in order to develop new batteries with improved stability and/or lifetime. In this application note, the measurement examples of zinc metal powder and graphite powder by laser diffraction method are shown.

## Method and materials

Zinc

- Dispersion medium: Water
- Dispersant: 0.1% Darvan® C
- Measurement method: Flow measurement
- Distribution base: Volume

Graphite

- Dispersion medium: Water
- Dispersant: Surfactant
- Measurement method: Flow measurement (ultrasound)
- Distribution base: Volume

## Results and discussions

The medium sizes of the zinc and graphite were 11.391 and 19.597 µm, respectively (figure 1 and 2). The results showed the different width of the particle size distribution.

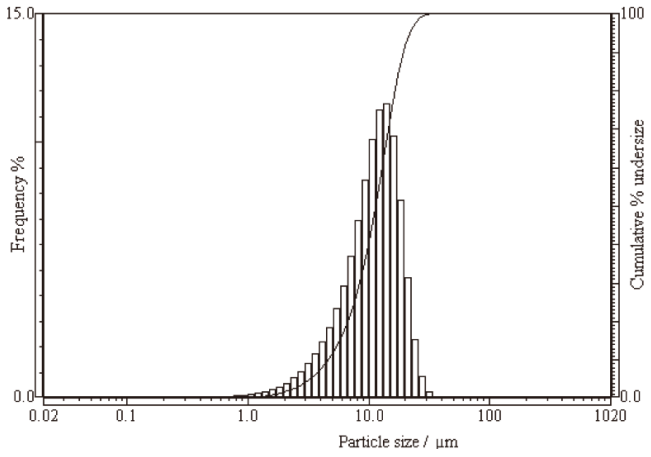


Figure 1. Measurement result of zinc metal powder

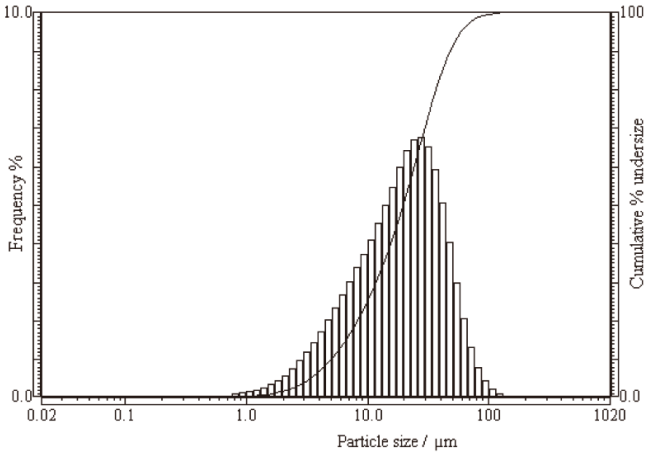


Figure 2. Measurement result of graphite powder

## Conclusion

Appropriately selecting not only the dispersion medium, but also the setting of a measurement like the use of ultrasound, the operators can optimize the measurement conditions of the particle size by laser diffraction method. The best conditions for particle sizing depend on the samples' features. It is desirable that a variety of options are available for the particle sizing by the laser diffraction method to be able to analyze many kinds of samples.

## Related products


Figure 3. Laser Scattering Particle Size Distribution Analyzer Partica LA-960V2 (Link)