

Easy Measurement For Optimizing Water Treatment

The Zetasizer Nano particle characterization system from [Malvern Instruments](#) [1] has become an essential tool at a U.S. water treatment production facility by monitoring the zeta potential of raw water in order to optimize the concentration of alum added as a flocculating agent.

According to the company, zeta potential values are key to monitoring and maintaining optimum conditions in the plant, and the Zetasizer Nano has proven that it makes measuring both easy and operator independent.

Impurities in wastewater are primarily anionic, and cationic additives have been developed for their neutralization. By optimizing the addition of additive and the amount of additive used, treatment costs can be reduced.

The appearance of turbid water is due to the presence of suspended particles. By controlling the effective charge of these contaminating particles, removal efficiency can be improved, and the effective charge can be quantified through zeta potential measurement.

At close-to-neutral charges, particles flocculate and sediment leaving the water clear. Zeta potential measurements, therefore, can provide a tool for quantifying the optimum concentration of additive required.

Studies of additive concentration vs. zeta potential and turbidity have shown that flocculant addition beyond a certain point can be counterproductive. For example in one system, when the zeta potential of the water mixture is close to zero, so too is turbidity.

At low doses of flocculating agent, the zeta potential is approximately -16 mV and turbidity is high. At 2-mV turbidity, it is at its minimum, and beyond this point, the further addition of flocculating agent reverses and increases the charge of the contaminating material, re-stabilizing it in the water, thus increasing turbidity.

The goal of the aforementioned water treatment production facility is to maintain a zeta potential of around zero. Only by measuring and monitoring the zeta potential on a control chart can operators make rational (and optimal) adjustments in the amount of alum added.

The Zetasizer Nano Series combines dynamic, static and electrophoretic light scattering in order to enable measurement of particle size and zeta potential in a single easy-to-use system. The company further explains that its unique zeta potential measurement cell consists of an electrode and folded capillary molded into a single chamber, which can be disposed of after a number of measurements.

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Links:

[1] <http://www.malvern.com/>