Guidelines for Hach BioTector B7000 Series with TN Module in Applications with Ammonia/Urea Rich Samples Like Standard Municipal Wastewater Influent

Introduction

When BioTector B7000 series with TN module is used in applications with high ammonia (NH_4^+) or urea content, customers often find ~25% too low reading of its TN concentration. In practice, it has been demonstrated that the following measures have led to significant improvement in performance:

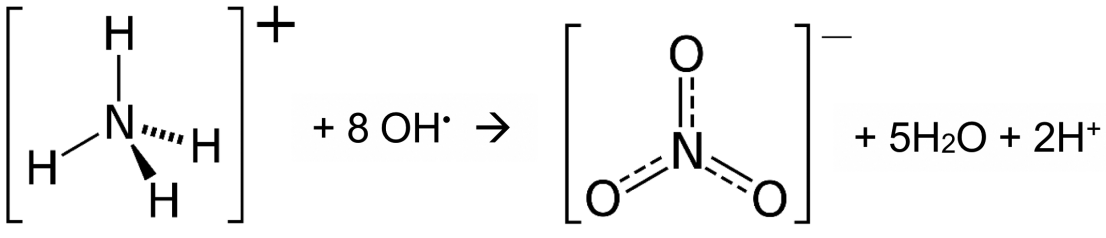
- Prolongation of BioTector oxidation time to 600 s (This will prolong the cycle time by 5 min).
- Span-calibration of the instrument with mixed standards containing 50% ammonium and 50% nitrate, instead of pure nitrate standards.

Background

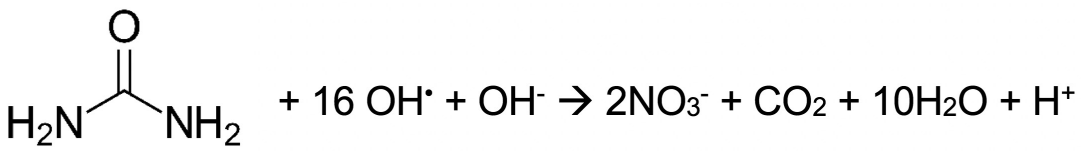
High ammonia and urea content is typically found in influent wastewater from municipal sewage or food production. During the wastewater treatment process ammonia and urea-nitrogen are converted into nitrate and N_2. Therefore, high ammonia content is usually not found in effluent wastewater.

Chemically speaking, nitrogen has its lowest oxidation number (-III) in ammonia and urea, which means, that it is in its most reduced form. During BioTector base oxidation, all nitrogen is oxidised to nitrate (NO_3^-, see reaction equation below) before it is quantified via UV-absorption. In nitrate, nitrogen is in its highest oxidation number (+V), which means, that it is in its most oxidised form. The transformation from ammonia/urea to nitrate requires hence a lot of oxidation power.

In applications with ammonia rich water, the standard oxidation time in BioTectors with TN module (300s) is not sufficient to fully oxidise all ammonia. Therefore, it is recommended to prolong the oxidation time to 600s. Also in such applications, it is advisable to use mixed standards for calibration, containing 50% ammonium and 50% nitrate, instead of pure nitrate standards. Amtax calibration solutions can be used for this purpose. (e.g., BCF1011: 10 mg/L NH_4-N; BCF1012: 50 mg/L NH_4-N; BCF1013: 500 mg/L NH_4-N).



ammonia *hydroxyl radical* *nitrate*



urea *hydroxyl radical* *nitrate*

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