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KENTUCKY LABORATORY CERTIFICATION PROGRAM

Kentucky KPDES Permit Defined Total Nitrogen (Nitrogen_{total}) Determination

Kentucky Division of Water Permitting Section has defined Nitrogen (total) as a state-defined parameter in 401 KAR 10:031 and individual permits. Kentucky wastewater laboratories seeking certification for Nitrogen (total) to meet KPDES permit defined parameter may utilize the following scenarios:

Nitrogen (total) is defined as the sum of Total Kjeldahl Nitrogen, nitrate and nitrite.

$$[\text{Nitrogen}_{\text{total}}] = [\text{TKN}] + [\text{NO}_3^-] + [\text{NO}_2^-]$$

Laboratories may select any one of the following three options:

Option #1. Analyze TKN, nitrate and nitrite using EPA and KY approved wastewater methods listed in 40 CFR 136. Add the results (using the same units) to obtain Nitrogen (total) as follows:

$$[\text{Nitrogen}_{\text{total}}] = [\text{TKN}] + [\text{NO}_3^-] + [\text{NO}_2^-]$$

Laboratories utilizing Option #1 must submit the following to DOW:

Method	PT	IDC	MDL	SOP	EPA Method ¹	Regional ATP Request ²
TKN	X	X	X	X	N/A	N/A
[NO ₃ ⁻]	X	X	X	X	N/A	N/A
[NO ₂ ⁻]	X	X	X	X	N/A	N/A

1. Analytical method written using EPA standard format.

2. Regional ATP Request to DOW following procedure specified in 40 CFR 136.5.

X = Required.

N/A = Not applicable.

Option #2. Analyze TKN, nitrate/nitrite using EPA and KY approved wastewater methods listed in 40 CFR 136. Add the results (using the same units) to obtain Nitrogen (total) as follows:

$$[\text{Nitrogen}_{\text{total}}] = [\text{TKN}] + [\text{NO}_3^-]/[\text{NO}_2^-]$$



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Laboratories utilizing Option #2 must submit the following to DOW:

Method	PT	IDC	MDL	SOP	EPA Method ¹	Regional ATP Request ²
TKN	X	X	X	X	N/A	N/A
[NO ₃ ⁻ + NO ₂ ⁻]	X	X	X	X	N/A	N/A

- Analytical method written using EPA standard format.
 - Regional ATP Request to DOW following procedure specified in 40 CFR 136.5.
- X = Required.
N/A = Not applicable.

Option #3. Utilize Hach Method TNT plus 880 (10242) simplified method (s-TKN) for the measurement of total Kjeldahl nitrogen (TKN) and Hach method Nitrate/Nitrite (10206). Nitrate/Nitrite (10206) is included in TNT plus 880 (10242) (Figure 1).

s-TKN is defined as $\text{TKN} = [\text{Nitrogen}_{\text{total}}] - [\text{NO}_3^- / \text{NO}_2^-]$

And by substitution,

$$[\text{Nitrogen}_{\text{total}}] = [\text{TKN}] + [\text{NO}_3^- / \text{NO}_2^-]$$

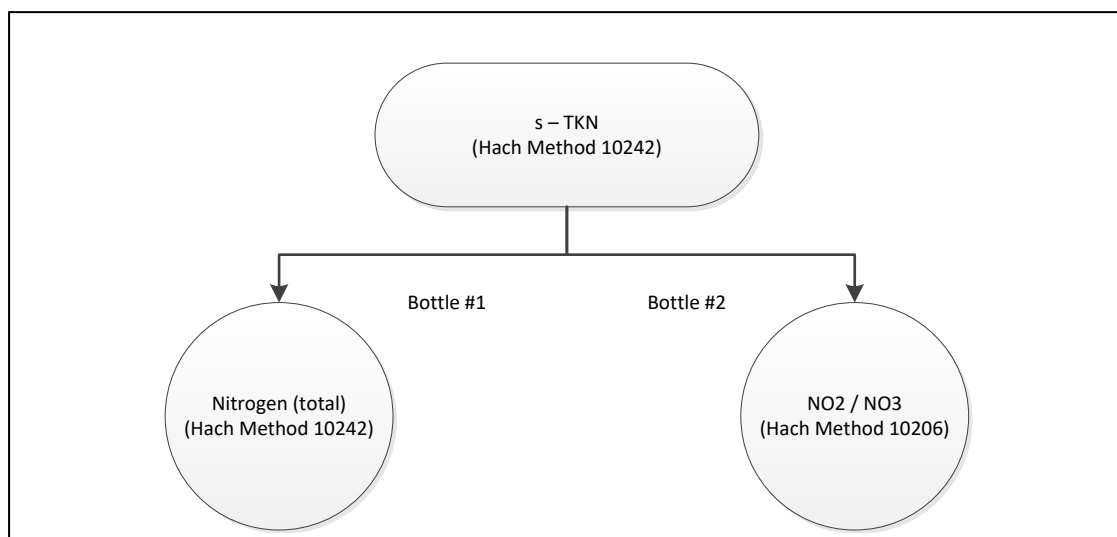


Figure 1: Hach Method TNT plus 880 for use in determining Nitrogen (total) and Nitrate/Nitrite. Laboratories utilizing Option #3 must submit the following to DOW:



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Method	PT	IDC	MDL	SOP	EPA Method ¹	Regional ATP Request ²
s-TKN (Hach 10242)	X	X	X	X	X	X
[NO ₃ ⁻ + NO ₂ ⁻] (Hach 10206)	X	X	X	X	X	X

1. Analytical method written using EPA standard format.
2. Regional ATP Request to DOW following procedure specified in 40 CFR 136.5.

s-TKN Method Quality Assurance/Quality Control (QA/QC) Requirements

QA/QC Parameter	Analyte(s)	Frequency	Acceptance Criteria
Batch	All analytes	Once per day or up to 20 samples	N/A
Blank	Combined or both TKN & NO ₃ /NO ₂ individually	One per batch	< MRL
Standard	Combined or both TKN & NO ₃ /NO ₂ individually	One per batch	Manufacturers recoveries, but not to exceed 80-120% Rec
Sample Spike	Combined or both TKN & NO ₃ /NO ₂ individually	One per batch	80-120% Rec
Sample Spike Duplicate	Combined or both TKN & NO ₃ /NO ₂ individually	One per batch	80-120% Rec and ≤20% RPD
QCS	Combined or both TKN & NO ₃ /NO ₂ individually	One per batch or at least quarterly	Manufacturers recoveries, but not to exceed 80-120% Rec
Control Charts (Standard, QCS)	Combined or both TKN & NO ₃ /NO ₂ individually	Establish control charts with warning limits (± 2 sigma) and control limits (± 3 sigma)	Update control charts after each set of samples – must be within control limits