

Spectrophotometric determination of nitrite ion

SCOPE AND FIELD OF APPLIATION: The present method is used for the determination of nitrite ion in seawaters, surface water and in waste waters. The determination is carried out without previous treatment of the sample (i.e. filtration or conservation). Nitrite concentrations from 0,002 to 0,6 N/l can be measured.

PRINCIPLE: The method is based on the reaction of nitrite ions with sulfanylamide in acidic medium and the diazo compound obtained further reacts with diamine yielding in an azo color. The nitrite ion concentration is determined by measuring the absorbance of the azo color at 540-545 nm.

The values of uncertainty components of volumetric ware and spectrophotometric equipment are taken according to our experience, experiments carried out in our lab and data from equipment manufactures. The users of these examples are advised to use these data only as the first approximation and to substitute these uncertainty estimates by their own data that corresponds to the actual situation in their labs.

Preparation of nitrite ion stock solution

54.3 mg of sodium nitrite (mNaNO₂) was weighed, dissolved in distilled water and then transferred to a 100 ml volumetric flask (V_{100_1}) and made up to the mark with distilled water.

Preparation of nitrite ion standard solution*

10 ml of nitrite ion stock solution (V₁₀) was transferred to a 100 ml volumetric flask (V_{100_2}) and made up to the mark with distilled water.

Preparation of calibration standard solutions

First a series of calibration standard solution containing 0.2, 0.7, 1.0, 1.2, 1.4, 1.6 ml of nitrite ion standard solution (V_{1_st}, V_{2_st}, V_{3_st}, V_{4_st}, V_{5_st}, V_{6_st}) were prepared in 50 ml volumetric flasks (V_{50_1}, V_{50_2}, V_{50_3}, V_{50_4}, V_{50_5}, V_{50_6}). The flasks were then made up to the mark with distilled water. Then 25 ml of each solution (V_{25_1}, V_{25_2}, V_{25_3}, V_{25_4}, V_{25_5}, V_{25_6}) is measured with graduated cylinder. 0.5 ml of sulphanylamide (V_{sul_1}, V_{sul_2}, V_{sul_3}, V_{sul_4}, V_{sul_5}, V_{sul_6}) is added to each graduated cylinder and after the solutions have been left to stand for 3 minutes, 0.5 ml of diamine (V_{diam_1}, V_{diam_2}, V_{diam_3}, V_{diam_4}, V_{diam_5}, V_{diam_6}) is added to each graduated cylinder. The absorbances of these solutions are then measured spectrophotometrically using cells with 5 mm optical path length.

Preparation of the sample

25 ml of sample are measured with a graduated cylinder (V₂₅), then 0.5 ml of sulphanylamide (V_{sul}) is added and the solution is allowed to stand for 3 minutes. After that 0.5 ml of diamine (V_{diam}) is added additionally. The absorbance of the sample solution is then measured spectrophotometrically using cells with 5 mm optical path length.

This example corresponds to "normal" samples that are neither very problematic nor too easy. For problematic samples the uncertainty may be significantly (several times!) higher! Please see the paper L.Sooväli, E.-I. Rõõm, A. Kütt, I. Kaljurand, I. Leito. Accred. Qual.Assur. 2006.

Model Equation:

{The main equation}

$$C_{\text{NO}_3} = ((A_{\text{sample}} - b_0) * (V_{25} + V_{\text{sul}} + V_{\text{diam}}) * 1000) / (b_1 * 26);$$

{For the determination 25 ml of sample is measured with a graduated cylinder, 0.5 ml of sulphanylamide is added. The solution is left to stand

for 3 minutes and then 0.5 ml of diamine is added. The absorbance of the sample solution is measured spectrophotometrically at 540.10 nm

using cells with 5 mm path length.}

$$V_{25} = V_{25_cal} + V_{25_rep} + V_{25_tem};$$

$$V_{25_tem} = V_{25_cal} \cdot \Delta t \cdot y;$$

$$V_{sul} = V_{sul_cal} + V_{sul_rep} + V_{sul_tem};$$

$$V_{diam} = V_{diam_cal} + V_{diam_rep} + V_{diam_tem};$$

{The regression equations for finding the slope (b_1) and intercept (b_0) of the calibration line}

$$\Sigma CA = C_1 \cdot A_1 + C_2 \cdot A_2 + C_3 \cdot A_3 + C_4 \cdot A_4 + C_5 \cdot A_5 + C_6 \cdot A_6;$$

$$\text{AvgC} = (C_1 + C_2 + C_3 + C_4 + C_5 + C_6) / n;$$

$$\text{AvgA} = (A_1 + A_2 + A_3 + A_4 + A_5 + A_6) / n;$$

$$\Sigma CC = C_1 \cdot C_1 + C_2 \cdot C_2 + C_3 \cdot C_3 + C_4 \cdot C_4 + C_5 \cdot C_5 + C_6 \cdot C_6;$$

$$b_1 = (\Sigma CA - n \cdot \text{AvgC} \cdot \text{AvgA}) / (\Sigma CC - n \cdot \text{AvgC} \cdot \text{AvgC});$$

$$b_0 = \text{AvgA} - b_1 \cdot \text{AvgC};$$

{Uncertainties of absorbances}

It is assumed that the sample absorbance has 6 uncertainty components:

- repeatability uncertainty (included in $A_{\text{sample_rep}}$)
- uncertainty due to drift ($A_{\text{sample_drift}}$) (mostly chemical drift is important in this particular case);
- uncertainty due to calibration graph nonlinearity ($A_{\text{sample_nonlin}}$)
- uncertainty due to calibration graph nonlinearity ($A_{\text{sample_interf}}$)
- uncertainty due to calibration graph nonlinearity ($A_{\text{sample_mismatch}}$)
- uncertainty due to rounding of the reading ($A_{\text{sample_round}}$) (The photometer used in this example has three decimal places)

Some of these components may introduce zero uncertainty. Their quantification is described in the "List of quantities" section.

The absorbance of blank is not subtracted but all the measurements are made against blank}

$$A_{\text{sample}} = A_{\text{sample_rep}} + A_{\text{sample_drift}} + A_{\text{sample_nonlin}} + A_{\text{sample_interf}} + A_{\text{sample_mismatch}} + A_{\text{sample_round}};$$

{Absorbances of calibration standard solutions}

$$A_1 = A_{1\text{rep}} + A_{1\text{drift}} + A_{1\text{round}};$$

$$A_2 = A_{2\text{rep}} + A_{2\text{drift}} + A_{2\text{round}};$$

$$A_3 = A_{3\text{rep}} + A_{3\text{drift}} + A_{3\text{round}};$$

$$A_4 = A_{4\text{rep}} + A_{4\text{drift}} + A_{4\text{round}};$$

$$A_5 = A_{5\text{rep}} + A_{5\text{drift}} + A_{5\text{round}};$$

$$A_6 = A_{6\text{rep}} + A_{6\text{drift}} + A_{6\text{round}};$$

{Preparation of calibration standard solutions in 25 ml graduated cylinders. 0.2 to 1.6 ml of the nitrite standard solution is transferred to 50 ml volumetric

flasks and filled up to the mark. Then 25 ml of each solution are measured with a graduated cylinder and 0.5 ml of sulphanylamide are

added to each graduated cylinder. After 3 minutes 0.5 ml of diamine solution is added to the cylinders. The absorbances of the solutions are measured at 540.10 nm using cells with optical pathlength 5 cm.}

$$C_1=(V_{1_st} * C_{standard} *(V_{25_1}+V_{sul_1}+V_{diam_1})) / (V_{50_1} * 26);$$

$$C_2=(V_{2_st} * C_{standard} *(V_{25_2}+V_{sul_2}+V_{diam_2})) / (V_{50_2} * 26);$$

$$C_3=(V_{3_st} * C_{standard} *(V_{25_3}+V_{sul_3}+V_{diam_3})) / (V_{50_3} * 26);$$

$$C_4=(V_{4_st} * C_{standard} *(V_{25_4}+V_{sul_4}+V_{diam_4})) / (V_{50_4} * 26);$$

$$C_5=(V_{5_st} * C_{standard} *(V_{25_5}+V_{sul_5}+V_{diam_5})) / (V_{50_5} * 26);$$

$$C_6=(V_{6_st} * C_{standard} *(V_{25_6}+V_{sul_6}+V_{diam_6})) / (V_{50_6} * 26);$$

{Uncertainties of the volumes graduated cylinders used for the preparation of calibration standard solutions}

$$V_{25_1}=V_{1_25_cal}+V_{1_25_rep}+V_{25_1_tem};$$

$$V_{25_2}=V_{2_25_cal}+V_{2_25_rep}+V_{25_2_tem};$$

$$V_{25_3}=V_{3_25_cal}+V_{3_25_rep}+V_{25_3_tem};$$

$$V_{25_4}=V_{4_25_cal}+V_{4_25_rep}+V_{25_4_tem};$$

$$V_{25_5}=V_{5_25_cal}+V_{5_25_rep}+V_{25_5_tem};$$

$$V_{25_6}=V_{6_25_cal}+V_{6_25_rep}+V_{25_6_tem};$$

$$V_{25_1_tem}=V_{1_25_cal} * \Delta t * y;$$

$$V_{25_2_tem}=V_{2_25_cal} * \Delta t * y;$$

$$V_{25_3_tem}=V_{3_25_cal} * \Delta t * y;$$

$$V_{25_4_tem}=V_{4_25_cal} * \Delta t * y;$$

$$V_{25_5_tem}=V_{5_25_cal} * \Delta t * y;$$

$$V_{25_6_tem}=V_{6_25_cal} * \Delta t * y;$$

{Uncertainties of the volumes of pipettes used for transferring 0.5 ml of sulphanylamide solution to calibration standard solutions}

$$V_{sul_1}=V_{sul_1_cal}+V_{sul_1_rep}+V_{sul_1_tem};$$

$$V_{sul_2}=V_{sul_2_cal}+V_{sul_2_rep}+V_{sul_2_tem};$$

$$V_{sul_3}=V_{sul_3_cal}+V_{sul_3_rep}+V_{sul_3_tem};$$

$$V_{sul_4}=V_{sul_4_cal}+V_{sul_4_rep}+V_{sul_4_tem};$$

$$V_{sul_5}=V_{sul_5_cal}+V_{sul_5_rep}+V_{sul_5_tem};$$

$$V_{sul_6}=V_{sul_6_cal}+V_{sul_6_rep}+V_{sul_6_tem};$$

{Uncertainties of the volumes of pipettes used for transferring 0.5 ml of diamine solution to calibration standard solutions}

$$V_{diam_1}=V_{diam_1_cal}+V_{diam_1_rep}+V_{diam_1_tem};$$

$$V_{diam_2}=V_{diam_2_cal}+V_{diam_2_rep}+V_{diam_2_tem};$$

$$V_{\text{diam}_3} = V_{\text{diam}_3_{\text{cal}}} + V_{\text{diam}_3_{\text{rep}}} + V_{\text{diam}_3_{\text{tem}}};$$

$$V_{\text{diam}_4} = V_{\text{diam}_4_{\text{cal}}} + V_{\text{diam}_4_{\text{rep}}} + V_{\text{diam}_4_{\text{tem}}};$$

$$V_{\text{diam}_5} = V_{\text{diam}_5_{\text{cal}}} + V_{\text{diam}_5_{\text{rep}}} + V_{\text{diam}_5_{\text{tem}}};$$

$$V_{\text{diam}_6} = V_{\text{diam}_6_{\text{cal}}} + V_{\text{diam}_6_{\text{rep}}} + V_{\text{diam}_6_{\text{tem}}};$$

{Uncertainties of the volumes of nitrite standard solution transferred to 50 ml volumetric flasks}

$$V_{1_{\text{st}}} = V_{1_{\text{st}}_{\text{cal}}} + V_{1_{\text{st}}_{\text{rep}}} + V_{1_{\text{st}}_{\text{tem}}};$$

$$V_{2_{\text{st}}} = V_{2_{\text{st}}_{\text{cal}}} + V_{2_{\text{st}}_{\text{rep}}} + V_{2_{\text{st}}_{\text{tem}}};$$

$$V_{3_{\text{st}}} = V_{3_{\text{st}}_{\text{cal}}} + V_{3_{\text{st}}_{\text{rep}}} + V_{3_{\text{st}}_{\text{tem}}};$$

$$V_{4_{\text{st}}} = V_{4_{\text{st}}_{\text{cal}}} + V_{4_{\text{st}}_{\text{rep}}} + V_{4_{\text{st}}_{\text{tem}}};$$

$$V_{5_{\text{st}}} = V_{5_{\text{st}}_{\text{cal}}} + V_{5_{\text{st}}_{\text{rep}}} + V_{5_{\text{st}}_{\text{tem}}};$$

$$V_{6_{\text{st}}} = V_{6_{\text{st}}_{\text{cal}}} + V_{6_{\text{st}}_{\text{rep}}} + V_{6_{\text{st}}_{\text{tem}}};$$

{Uncertainties of the volumes of 50 ml volumetric flasks}

$$V_{50_1} = V_{50_1_{\text{cal}}} + V_{50_1_{\text{rep}}} + V_{50_1_{\text{tem}}};$$

$$V_{50_2} = V_{50_2_{\text{cal}}} + V_{50_2_{\text{rep}}} + V_{50_2_{\text{tem}}};$$

$$V_{50_3} = V_{50_3_{\text{cal}}} + V_{50_3_{\text{rep}}} + V_{50_3_{\text{tem}}};$$

$$V_{50_4} = V_{50_4_{\text{cal}}} + V_{50_4_{\text{rep}}} + V_{50_4_{\text{tem}}};$$

$$V_{50_5} = V_{50_5_{\text{cal}}} + V_{50_5_{\text{rep}}} + V_{50_5_{\text{tem}}};$$

$$V_{50_6} = V_{50_6_{\text{cal}}} + V_{50_6_{\text{rep}}} + V_{50_6_{\text{tem}}};$$

{Temperature uncertainty components of the 50 ml volumetric flasks where the calibration standard solutions were made}

$$V_{50_1_{\text{tem}}} = V_{50_1_{\text{cal}}} \cdot \Delta t \cdot y;$$

$$V_{50_2_{\text{tem}}} = V_{50_2_{\text{cal}}} \cdot \Delta t \cdot y;$$

$$V_{50_3_{\text{tem}}} = V_{50_3_{\text{cal}}} \cdot \Delta t \cdot y;$$

$$V_{50_4_{\text{tem}}} = V_{50_4_{\text{cal}}} \cdot \Delta t \cdot y;$$

$$V_{50_5_{\text{tem}}} = V_{50_5_{\text{cal}}} \cdot \Delta t \cdot y;$$

$$V_{50_6_{\text{tem}}} = V_{50_6_{\text{cal}}} \cdot \Delta t \cdot y;$$

{Nitrite ion stock solution. Prepared from sodium nitrite.}

$$C_{\text{stock}} = (m_{\text{NaNO}_2} \cdot M_{\text{N}}) / (M_{\text{NaNO}_2} \cdot V_{100_1});$$

{Uncertainty of weighing

It is assumed that weighing has 3 uncertainty components (on the example of m_{NaNO_2}):

- repeatability of weighing (included in $m_{\text{NaNO}_2_{\text{rep}}}$)
- drift of the balance ($m_{\text{NaNO}_2_{\text{drift}}}$)
- uncertainty due to rounding of the reading ($m_{\text{NaNO}_2_{\text{round}}}$)

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$$m_{\text{NaNO}_2} = m_{\text{NaNO}_2_{\text{rep}}} + m_{\text{NaNO}_2_{\text{drift}}} + m_{\text{NaNO}_2_{\text{round}}};$$

$$V_{100_1} = V_{100_1_{\text{cal}}} + V_{100_1_{\text{rep}}} + V_{100_1_{\text{tem}}};$$

$$V_{100_1_{\text{tem}}} = V_{100_1_{\text{cal}}} \cdot \Delta t \cdot y;$$

{Nitrite ion standard solution. Prepared from nitrite ion stock solution. The standard solution is further used for the preparation of the calibration standard solutions}

$$C_{\text{standard}} = (C_{\text{stock}} \cdot V_{10}) / (V_{100_2});$$

$$V_{100_2} = V_{100_2_{\text{cal}}} + V_{100_2_{\text{rep}}} + V_{100_2_{\text{tem}}};$$

$$V_{100_2_{\text{tem}}} = V_{100_2_{\text{cal}}} \cdot \Delta t \cdot y;$$

$$V_{10} = V_{10_{\text{cal}}} + V_{10_{\text{rep}}} + V_{10_{\text{tem}}};$$

List of Quantities:

Quantity	Unit	Definition
C_{NO_3}	mg/l	Concentration of nitrite in the sample solution
A_{sample}	AU	Absorbance of the sample solution
b_0	AU	Intercept of calibration line
V_{25}	ml	Volume of the sample graduated cylinder
V_{sul}	ml	Volume of the sulphanylamide solution added to the sample
V_{diam}	ml	Volume of the diamine solution added to the sample
b_1	AU/(mg/ml)	Slope of calibration line
$V_{25_{\text{cal}}}$	ml	Calibration uncertainty of the sample graduated cylinder
$V_{25_{\text{rep}}}$	ml	Uncertainty of measuring 25 ml of sample with the graduated cylinder
$V_{25_{\text{tem}}}$	ml	Temperature uncertainty of the volume of sample graduated cylinder
Δt	°C	Difference of the actual laboratory temperature from 20 degrees centigrade
y	1/°C	The coefficient of volume expansion of water
$V_{\text{sul}_{\text{cal}}}$	ml	Calibration uncertainty of the pipette with which 0.5 ml of sulphanylamide solution was added
$V_{\text{sul}_{\text{rep}}}$	ml	Repeatability uncertainty of the pipette with which 0.5 ml of sulphanylamide solution was added
$V_{\text{sul}_{\text{tem}}}$	ml	Temperature uncertainty of the pipette with which 0.5 ml of sulphanylamide solution was added
$V_{\text{diam}_{\text{cal}}}$	ml	Calibration uncertainty of the pipette with which 0.5 ml of diamine solution was added
$V_{\text{diam}_{\text{rep}}}$	ml	Repeatability uncertainty of the pipette with which 0.5 ml of diamine solution was added
$V_{\text{diam}_{\text{tem}}}$	ml	Temperature uncertainty of the pipette with which 0.5 ml of diamine solution was added
ΣCA	AU*mg/l	Interim quantity for regression analysis
C_1	mg/ml	Concentration of the 1. nitrite calibration standard solution
A_1	AU	Absorbance of the 1. nitrite calibration standard solution

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Quantity	Unit	Definition
C_2	mg/ml	Concentration of the 2. nitrite calibration standard solution
A_2	AU	Absorbance of the 2. nitrite calibration standard solution
C_3	mg/ml	Concentration of the 3. nitrite calibration standard solution
A_3	AU	Absorbance of the 3. nitrite calibration standard solution
C_4	mg/ml	Concentration of the 4. nitrite calibration standard solution
A_4	AU	Absorbance of the 4. nitrite calibration standard solution
C_5	mg/ml	Concentration of the 5. nitrite calibration standard solution
A_5	AU	Absorbance of the 5. nitrite calibration standard solution
C_6	mg/ml	Concentration of the 6. nitrite calibration standard solution
A_6	AU	Absorbance of the 6. nitrite calibration standard solution
AvgC	mg/ml	Interim quantity for regression statistics calculation
n	unitless	Number of points on the calibration line
AvgA	AU	Interim quantity for regression statistics calculation
ΣCC	mg ² /l ²	Interim quantity for regression statistics calculation
$A_{\text{sample_rep}}$	AU	Value and repeatability uncertainty component of the absorbance of the sample solution
$A_{\text{sample_drift}}$	AU	Drift uncertainty component of the absorbance of the sample solution
$A_{\text{sample_nonlin}}$		
$A_{\text{sample_interf}}$		
$A_{\text{sample_mismatch}}$		
$A_{\text{sample_round}}$	AU	Rounding uncertainty component of the absorbance of the sample solution
$A_{1\text{rep}}$	AU	Value and repeatability component of the absorbance of the 1. nitrite calibration standard solution
$A_{1\text{drift}}$	AU	Drift uncertainty component of the absorbance of the 1. nitrite calibration standard solution
$A_{1\text{round}}$	AU	Rounding uncertainty component of the absorbance of the 1. nitrite calibration standard solution
$A_{2\text{rep}}$	AU	Value and repeatability component of the absorbance of the 2. nitrite calibration standard solution
$A_{2\text{drift}}$	AU	Drift uncertainty component of the absorbance of the 2. nitrite calibration standard solution
$A_{2\text{round}}$	AU	Rounding uncertainty component of the absorbance of the 2. nitrite calibration standard solution
$A_{3\text{rep}}$	AU	Value and repeatability component of the absorbance of the 3. nitrite calibration standard solution
$A_{3\text{drift}}$	AU	Drift uncertainty component of the absorbance of the 3. nitrite calibration standard solution
$A_{3\text{round}}$	AU	Rounding uncertainty component of the absorbance of the 3. nitrite calibration standard solution
$A_{4\text{rep}}$	AU	Value and repeatability component of the absorbance of the 4. nitrite calibration standard solution

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Quantity	Unit	Definition
$A_{4\text{drift}}$	AU	Drift uncertainty component of the absorbance of the 4. nitrite calibration standard solution
$A_{4\text{round}}$	AU	Rounding uncertainty component of the absorbance of the 4. nitrite calibration standard solution
$A_{5\text{rep}}$	AU	Value and repeatability component of the absorbance of the 5. nitrite calibration standard solution
$A_{5\text{drift}}$	AU	Drift uncertainty component of the absorbance of the 5. nitrite calibration standard solution
$A_{5\text{round}}$	AU	Rounding uncertainty component of the absorbance of the 5. nitrite calibration standard solution
$A_{6\text{rep}}$	AU	Value and repeatability component of the absorbance of the 6. nitrite calibration standard solution
$A_{6\text{drift}}$	AU	Drift uncertainty component of the absorbance of the 6. nitrite calibration standard solution
$A_{6\text{round}}$	AU	Rounding uncertainty component of the absorbance of the 6. nitrite calibration standard solution
V_{1_st}	ml	Volume of the nitrite standard solution taken for preparing the 1. nitrite calibration standard solution in 50 ml volumetric flask
C_{standard}	mg/ml	Concentration of the nitrite standard solution
V_{25_1}	ml	Volume of the 1. nitrite calibration solution taken for measurement
$V_{\text{sul_1}}$	ml	Volume of sulphanylamide added to the 1. graduated cylinder
$V_{\text{diam_1}}$	ml	Volume of diamine added to the 1. graduated cylinder
V_{50_1}	ml	Volume of the 50 ml volumetric flask where the 1. nitrite calibration standard solution was made
V_{2_st}	ml	Volume of the nitrite standard solution taken for preparing the 2. nitrite calibration standard solution in 50 ml volumetric flask
V_{25_2}	ml	Volume of the 2. nitrite calibration solution taken for measurement
$V_{\text{sul_2}}$	ml	Volume of sulphanylamide added to the 2. graduated cylinder
$V_{\text{diam_2}}$	ml	Volume of diamine added to the 2. graduated cylinder
V_{50_2}	ml	Volume of the 50 ml volumetric flask where the 2. nitrite calibration standard solution was made
V_{3_st}	ml	Volume of the nitrite standard solution taken for preparing the 3. nitrite calibration standard solution in 50 ml volumetric flask
V_{25_3}	ml	Volume of the 3. nitrite calibration solution taken for measurement
$V_{\text{sul_3}}$	ml	Volume of sulphanylamide added to the 3. graduated cylinder
$V_{\text{diam_3}}$	ml	Volume of diamine added to the 3. graduated cylinder
V_{50_3}	ml	Volume of the 50 ml volumetric flask where the 3. nitrite calibration standard solution was made
V_{4_st}	ml	Volume of the nitrite standard solution taken for preparing the 4. nitrite calibration standard solution in 50 ml volumetric flask
V_{25_4}	ml	Volume of the 4. nitrite calibration solution taken for measurement
$V_{\text{sul_4}}$	ml	Volume of sulphanylamide added to the 4. graduated cylinder

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Quantity	Unit	Definition
V_{diam_4}	ml	Volume of diamine added to the 4. graduated cylinder
V_{50_4}	ml	Volume of the 50 ml volumetric flask where the 4. nitrite calibration standard solution was made
$V_{5_{\text{st}}}$	ml	Volume of the nitrite standard solution taken for preparing the 5. nitrite calibration standard solution in 50 ml volumetric flask
V_{25_5}	ml	Volume of the 5. nitrite calibration solution taken for measurement
V_{sul_5}	ml	Volume of sulphanylamide added to the 5. graduated cylinder
V_{diam_5}	ml	Volume of diamine added to the 5. graduated cylinder
V_{50_5}	ml	Volume of the 50 ml volumetric flask where the 5. nitrite calibration standard solution was made
$V_{6_{\text{st}}}$	ml	Volume of the nitrite standard solution taken for preparing the 6. nitrite calibration standard solution in 50 ml volumetric flask
V_{25_6}	ml	Volume of the 6. nitrite calibration solution taken for measurement
V_{sul_6}	ml	Volume of sulphanylamide added to the 6. graduated cylinder
V_{diam_6}	ml	Volume of diamine added to the 6. graduated cylinder
V_{50_6}	ml	Volume of the 50 ml volumetric flask where the 6. nitrite calibration standard solution was made
$V_{1_{25_{\text{cal}}}}$	ml	Calibration uncertainty of the 1. graduated cylinder
$V_{1_{25_{\text{rep}}}}$	ml	Uncertainty of measuring 25 ml of 1. nitrite calibration standard solution with 1. graduated cylinder
$V_{25_{1_{\text{tem}}}}$	ml	Temperature uncertainty of the volume of 1. graduated cylinder
$V_{2_{25_{\text{cal}}}}$	ml	Calibration uncertainty of the 2. graduated cylinder
$V_{2_{25_{\text{rep}}}}$	ml	Uncertainty of measuring 25 ml of 2. nitrite calibration standard solution with 2. graduated cylinder
$V_{25_{2_{\text{tem}}}}$	ml	Temperature uncertainty of the volume of 2. graduated cylinder
$V_{3_{25_{\text{cal}}}}$	ml	Calibration uncertainty of the 3. graduated cylinder
$V_{3_{25_{\text{rep}}}}$	ml	Uncertainty of measuring 25 ml of 3. nitrite calibration standard solution with 3. graduated cylinder
$V_{25_{3_{\text{tem}}}}$	ml	Temperature uncertainty of the volume of 3. graduated cylinder
$V_{4_{25_{\text{cal}}}}$	ml	Calibration uncertainty of the 4. graduated cylinder
$V_{4_{25_{\text{rep}}}}$	ml	Uncertainty of measuring 25 ml of 4. nitrite calibration standard solution with 4. graduated cylinder
$V_{25_{4_{\text{tem}}}}$	ml	Temperature uncertainty of the volume of 4. graduated cylinder
$V_{5_{25_{\text{cal}}}}$	ml	Calibration uncertainty of the 5. graduated cylinder
$V_{5_{25_{\text{rep}}}}$	ml	Uncertainty of measuring 25 ml of 5. nitrite calibration standard solution with 5. graduated cylinder
$V_{25_{5_{\text{tem}}}}$	ml	Temperature uncertainty of the volume of 5. graduated cylinder
$V_{6_{25_{\text{cal}}}}$	ml	Calibration uncertainty of the 6. graduated cylinder
$V_{6_{25_{\text{rep}}}}$	ml	Uncertainty of measuring 25 ml of 6. nitrite calibration standard solution with 6. graduated cylinder
$V_{25_{6_{\text{tem}}}}$	ml	Temperature uncertainty of the volume of 6. graduated cylinder

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Quantity	Unit	Definition
$V_{sul_1_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 1. graduated cylinder
$V_{sul_1_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 1. graduated cylinder
$V_{sul_1_tem}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 1. graduated cylinder
$V_{sul_2_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 2. graduated cylinder
$V_{sul_2_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 2. graduated cylinder
$V_{sul_2_tem}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 2. graduated cylinder
$V_{sul_3_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 3. graduated cylinder
$V_{sul_3_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 3. graduated cylinder
$V_{sul_3_tem}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 3. graduated cylinder
$V_{sul_4_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 4. graduated cylinder
$V_{sul_4_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 4. graduated cylinder
$V_{sul_4_tem}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 4. graduated cylinder
$V_{sul_5_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 5. graduated cylinder
$V_{sul_5_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 5. graduated cylinder
$V_{sul_5_tem}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 5. graduated cylinder
$V_{sul_6_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 6. graduated cylinder
$V_{sul_6_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 6. graduated cylinder
$V_{sul_6_tem}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of sulphanylamide to the 6. graduated cylinder
$V_{diam_1_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 1. graduated cylinder
$V_{diam_1_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 1. graduated cylinder
$V_{diam_1_tem}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 1. graduated cylinder
$V_{diam_2_cal}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 2. graduated cylinder

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Spectrophotometric determination of nitrite ion

Quantity	Unit	Definition
$V_{\text{diam}_2\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 2. graduated cylinder
$V_{\text{diam}_2\text{tem}}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 2. graduated cylinder
$V_{\text{diam}_3\text{cal}}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 3. graduated cylinder
$V_{\text{diam}_3\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 3. graduated cylinder
$V_{\text{diam}_3\text{tem}}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 3. graduated cylinder
$V_{\text{diam}_4\text{cal}}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 4. graduated cylinder
$V_{\text{diam}_4\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 4. graduated cylinder
$V_{\text{diam}_4\text{tem}}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 4. graduated cylinder
$V_{\text{diam}_5\text{cal}}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 5. graduated cylinder
$V_{\text{diam}_5\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 5. graduated cylinder
$V_{\text{diam}_5\text{tem}}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 5. graduated cylinder
$V_{\text{diam}_6\text{cal}}$	ml	Volume and calibration uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 6. graduated cylinder
$V_{\text{diam}_6\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 6. graduated cylinder
$V_{\text{diam}_6\text{tem}}$	ml	Temperature uncertainty component of the pipette used to transfer 0.5 ml of diamine to the 6. graduated cylinder
$V_{1\text{st}\text{cal}}$	ml	Volume and the calibration uncertainty component of the pipette used to transfer the nitrite standard solution to the 1. 50 ml volumetric flask
$V_{1\text{st}\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer the nitrite standard solution to the 1. 50 ml volumetric flask
$V_{1\text{st}\text{tem}}$	ml	Temperature uncertainty component of the pipette used to transfer the nitrite standard solution to the 1. 50 ml volumetric flask
$V_{2\text{st}\text{cal}}$	ml	Volume and the calibration uncertainty component of the pipette used to transfer the nitrite standard solution to the 2. 50 ml volumetric flask
$V_{2\text{st}\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer the nitrite standard solution to the 2. 50 ml volumetric flask
$V_{2\text{st}\text{tem}}$	ml	Temperature uncertainty component of the pipette used to transfer the nitrite standard solution to the 2. 50 ml volumetric flask
$V_{3\text{st}\text{cal}}$	ml	Volume and the calibration uncertainty component of the pipette used to transfer the nitrite standard solution to the 3. 50 ml volumetric flask
$V_{3\text{st}\text{rep}}$	ml	Repeatability uncertainty component of the pipette used to transfer the nitrite standard solution to the 3. 50 ml volumetric flask

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Spectrophotometric determination of nitrite ion

Quantity	Unit	Definition
$V_{3_st_tem}$	ml	Temperature uncertainty component of the pipette used to transfer the nitrite standard solution to the 3. 50 ml volumetric flask
$V_{4_st_cal}$	ml	Volume and the calibration uncertainty component of the pipette used to transfer the nitrite standard solution to the 4. 50 ml volumetric flask
$V_{4_st_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer the nitrite standard solution to the 4. 50 ml volumetric flask
$V_{4_st_tem}$	ml	Temperature uncertainty component of the pipette used to transfer the nitrite standard solution to the 4. 50 ml volumetric flask
$V_{5_st_cal}$	ml	Volume and the calibration uncertainty component of the pipette used to transfer the nitrite standard solution to the 5. 50 ml volumetric flask
$V_{5_st_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer the nitrite standard solution to the 5. 50 ml volumetric flask
$V_{5_st_tem}$	ml	Temperature uncertainty component of the pipette used to transfer the nitrite standard solution to the 5. 50 ml volumetric flask
$V_{6_st_cal}$	ml	Volume and the calibration uncertainty component of the pipette used to transfer the nitrite standard solution to the 6. 50 ml volumetric flask
$V_{6_st_rep}$	ml	Repeatability uncertainty component of the pipette used to transfer the nitrite standard solution to the 6. 50 ml volumetric flask
$V_{6_st_tem}$	ml	Temperature uncertainty component of the pipette used to transfer the nitrite standard solution to the 6. 50 ml volumetric flask
$V_{50_1_cal}$	ml	Value and the calibration uncertainty component of the volume of the 1. 50 ml volumetric flask
$V_{50_1_rep}$	ml	Repeatability uncertainty component of the volume of the 1. 50 ml volumetric flask
$V_{50_1_tem}$	ml	Temperature uncertainty component of the volume of the 1. 50 ml volumetric flask
$V_{50_2_cal}$	ml	Value and the calibration uncertainty component of the volume of the 2. 50 ml volumetric flask
$V_{50_2_rep}$	ml	Repeatability uncertainty component of the volume of the 2. 50 ml volumetric flask
$V_{50_2_tem}$	ml	Temperature uncertainty component of the volume of the 2. 50 ml volumetric flask
$V_{50_3_cal}$	ml	Value and the calibration uncertainty component of the volume of the 3. 50 ml volumetric flask
$V_{50_3_rep}$	ml	Repeatability uncertainty component of the volume of the 3. 50 ml volumetric flask
$V_{50_3_tem}$	ml	Temperature uncertainty component of the volume of the 3. 50 ml volumetric flask
$V_{50_4_cal}$	ml	Value and the calibration uncertainty component of the volume of the 4. 50 ml volumetric flask
$V_{50_4_rep}$	ml	Repeatability uncertainty component of the volume of the 4. 50 ml volumetric flask
$V_{50_4_tem}$	ml	Temperature uncertainty component of the volume of the 4. 50 ml volumetric flask

Spectrophotometric determination of nitrite ion

Quantity	Unit	Definition
$V_{50_5_cal}$	ml	Value and the calibration uncertainty component of the volume of the 5. 50 ml volumetric flask
$V_{50_5_rep}$	ml	Repeatability uncertainty component of the volume of the 5. 50 ml volumetric flask
$V_{50_5_tem}$	ml	Temperature uncertainty component of the volume of the 5. 50 ml volumetric flask
$V_{50_6_cal}$	ml	Value and the calibration uncertainty component of the volume of the 6. 50 ml volumetric flask
$V_{50_6_rep}$	ml	Repeatability uncertainty component of the volume of the 6. 50 ml volumetric flask
$V_{50_6_tem}$	ml	Temperature uncertainty component of the volume of the 6. 50 ml volumetric flask
C_{stock}	mg/ml	Concentration of nitrite ion stock solution
m_{NaNO_2}	mg	Weight of $NaNO_2$ used for nitrite ion stock solution preparation
M_N	g/mol	Molar mass of nitrogen
M_{NaNO_2}	g/mol	Molar mass of sodium nitrite
V_{100_1}	ml	Volume of the 100 volumetric flask where the nitrite ion stock solution was made
$m_{NaNO_2_rep}$	mg	Value and repeatability uncertainty component of the weight of sodium nitrite used for nitrite ion stock solution preparation
$m_{NaNO_2_drift}$	mg	Drift uncertainty component of the weight of sodium nitrite used for nitrite ion stock solution preparation
$m_{NaNO_2_round}$	mg	Rounding uncertainty component of the weight of sodium nitrite used for nitrite ion stock solution preparation
$V_{100_1_cal}$	ml	Value and the calibration uncertainty component of the volume of 100 ml volumetric flask used for nitrite ion stock solution preparation
$V_{100_1_rep}$	ml	Repeatability uncertainty component of the volume of 100 ml volumetric flask used for nitrite ion stock solution preparation
$V_{100_1_tem}$	ml	Temperature uncertainty component of the volume of 100 ml volumetric flask used for nitrite ion stock solution preparation
V_{10}	ml	Volume of nitrite stock solution taken for the preparation of of nitrite ion standard solution
V_{100_2}	ml	Volume of the 100 volumetric flask where the nitrite ion standard solution was made
$V_{100_2_cal}$	ml	Value and the calibration uncertainty component of the volume of 100 ml volumetric flask used for nitrite ion standard solution preparation
$V_{100_2_rep}$	ml	Repeatability uncertainty component of the volume of 100 ml volumetric flask used for nitrite ion standard solution preparation
$V_{100_2_tem}$	ml	Temperature uncertainty component of the volume of 100 ml volumetric flask used for nitrite ion standard solution preparation
V_{10_cal}	ml	Volume and calibration uncertainty component of the 10 ml pipette used to transfer 10 ml of nitrite stock solution to the 100 ml volumetric flask
V_{10_rep}	ml	Repeatability uncertainty component of the 10 ml pipette used to transfer 10 ml of nitrite stock solution to the 100 ml volumetric flask

Spectrophotometric determination of nitrite ion

Quantity	Unit	Definition
V_{10_tem}	ml	Temperature uncertainty component of the 10 ml pipette used to transfer 10 ml of nitrite stock solution to the 100 ml volumetric flask

C_{NO_3} : Result

A_{sample} : Interim Result

b_0 : Interim Result

V_{25} : Interim Result

V_{sul} : Interim Result

V_{diam} : Interim Result

b_1 : Interim Result

V_{25_cal} : Type B rectangular distribution
Value: 25.0 ml
Halfwidth of Limits: 0.5 ml

V_{25_rep} : Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.06 ml

This uncertainty correspond more or less to the value ± 2 drop

V_{25_tem} : Interim Result

Δt : Type B rectangular distribution
Value: 0 °C
Halfwidth of Limits: 4 °C

y : Type B rectangular distribution
Value: 0.00021 1/°C
Halfwidth of Limits: 0 1/°C

V_{sul_cal} : Type B normal distribution
Value: 0.5 ml
Expanded Uncertainty: 0.001541 ml
Coverage Factor: 1

V_{sul_rep} : Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.004874 ml
Coverage Factor: 1

Estimate of uncertainty due to repeatability of the volume of the sulphonylamide solution is taken 0.4% of the volume of the pipette

V_{sul_tem} : Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.00012 ml
Coverage Factor: 1

V_{diam_cal} : Type B normal distribution
Value: 0.5 ml
Expanded Uncertainty: 0.001541 ml
Coverage Factor: 1

V_{diam_rep}: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.004874 ml
 Coverage Factor: 1

Estimate of uncertainty due to repeatability of the volume of diamine solution is taken 0.4% of the volume of the pipette

V_{diam_tem}: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.00012 ml
 Coverage Factor: 1

ΣCA: Interim Result

C₁: Interim Result

A₁: Interim Result

C₂: Interim Result

A₂: Interim Result

C₃: Interim Result

A₃: Interim Result

C₄: Interim Result

A₄: Interim Result

C₅: Interim Result

A₅: Interim Result

C₆: Interim Result

A₆: Interim Result

AvgC: Interim Result

n: Type B rectangular distribution
 Value: 6 unitless
 Halfwidth of Limits: 0 unitless

AvgA: Interim Result

ΣCC: Interim Result

A_{sample_rep}: Type A summarized
 Mean: 0.99569 AU
 Standard Uncertainty: 0.014533195 AU
 Degrees of Freedom: 9

determined experimentally from 10 parallel measurements

A_{sample_drift}: Type B rectangular distribution
 Value: 0 AU
 Halfwidth of Limits: 0.05 AU

Here only the chemical drift is taken into account, because intrinsic drift is significantly lower. The uncertainty estimate corresponds to the worst case.

A_{sample_nonlin}: Type B rectangular distribution
 Value: 0
 Halfwidth of Limits: .009

This uncertainty component is estimated as the largest residual of the calibration line

A_{sample_interf}: Type B rectangular distribution
 Value: 0
 Halfwidth of Limits: 0

The determination is carried out at 540-545 nm using a complex with very intense color. Under these conditions it is safe to assume that interference from other components of the sample is negligible

A_{sample_mismatch}: Type B rectangular distribution
 Value: 0
 Halfwidth of Limits: 0

The calibration solutions are processed the same way as the sample solution. This uncertainty component can be considered negligible.

A_{sample_round}: Type B normal distribution
 Value: 0 AU
 Expanded Uncertainty: 0.000005 AU
 Coverage Factor: 1

A_{1rep}: Type B normal distribution
 Value: 0.15621 AU
 Expanded Uncertainty: 0.001521255 AU
 Coverage Factor: 1

A_{1drift}: Type B normal distribution
 Value: 0 AU
 Expanded Uncertainty: 0.000437516 AU
 Coverage Factor: 1

A_{1round}: Type B normal distribution
 Value: 0 AU
 Expanded Uncertainty: 0.000005 AU
 Coverage Factor: 1

A_{2rep}: Type B normal distribution
 Value: 0.55078 AU
 Expanded Uncertainty: 0.00763709 AU
 Coverage Factor: 1

A_{2drift}: Type B normal distribution
 Value: 0 AU
 Expanded Uncertainty: 0.000279688 AU
 Coverage Factor: 1

A_{2round}: Type B normal distribution
 Value: 0 AU
 Expanded Uncertainty: 0.000005 AU
 Coverage Factor: 1

A_{3rep}: Type B normal distribution
 Value: 0.76408 AU
 Expanded Uncertainty: 0.01094324 AU
 Coverage Factor: 1

Spectrophotometric determination of nitrite ion

A_{3drift}	Type B normal distribution Value: 0 AU Expanded Uncertainty: 0.000194368 AU Coverage Factor: 1
A_{3round}	Type B normal distribution Value: 0 AU Expanded Uncertainty: 0.000005 AU Coverage Factor: 1
A_{4rep}	Type B normal distribution Value: 0.92726 AU Expanded Uncertainty: 0.01347253 AU Coverage Factor: 1
A_{4drift}	Type B normal distribution Value: 0 AU Expanded Uncertainty: 0.000129096 AU Coverage Factor: 1
A_{4round}	Type B normal distribution Value: 0 AU Expanded Uncertainty: 0.000005 AU Coverage Factor: 1
A_{5rep}	Type B normal distribution Value: 1.0786 AU Expanded Uncertainty: 0.0158183 AU Coverage Factor: 1
A_{5drift}	Type B normal distribution Value: 0 AU Expanded Uncertainty: 0.00006856 AU Coverage Factor: 1
A_{5round}	Type B normal distribution Value: 0 AU Expanded Uncertainty: 0.000005 AU Coverage Factor: 1
A_{6rep}	Type B normal distribution Value: 1.2307 AU Expanded Uncertainty: 0.01817585 AU Coverage Factor: 1
A_{6drift}	Type B normal distribution Value: 0 AU Expanded Uncertainty: $7.72 \cdot 10^{-6}$ AU Coverage Factor: 1
A_{6round}	Type B normal distribution Value: 0 AU Expanded Uncertainty: 0.00005 AU Coverage Factor: 1
V_{1_st}	Interim Result
C_{standard}	Interim Result
V_{25_1}	Interim Result

Spectrophotometric determination of nitrite ion

V_{sul_1}	Interim Result
V_{diam_1}	Interim Result
V_{50_1}	Interim Result
V_{2_st}	Interim Result
V_{25_2}	Interim Result
V_{sul_2}	Interim Result
V_{diam_2}	Interim Result
V_{50_2}	Interim Result
V_{3_st}	Interim Result
V_{25_3}	Interim Result
V_{sul_3}	Interim Result
V_{diam_3}	Interim Result
V_{50_3}	Interim Result
V_{4_st}	Interim Result
V_{25_4}	Interim Result
V_{sul_4}	Interim Result
V_{diam_4}	Interim Result
V_{50_4}	Interim Result
V_{5_st}	Interim Result
V_{25_5}	Interim Result
V_{sul_5}	Interim Result
V_{diam_5}	Interim Result
V_{50_5}	Interim Result
V_{6_st}	Interim Result
V_{25_6}	Interim Result
V_{sul_6}	Interim Result
V_{diam_6}	Interim Result
V_{50_6}	Interim Result
$V_{1_25_cal}$	Type B rectangular distribution Value: 25 ml Halfwidth of Limits: 0.5 ml
$V_{1_25_rep}$	Type B rectangular distribution Value: 0 ml Halfwidth of Limits: 0.06 ml
This uncertainty corresponds more or less to ± 2 drops	
$V_{25_1_tem}$	Interim Result

Spectrophotometric determination of nitrite ion

$V_{2_25_cal}$: Type B rectangular distribution
Value: 25 ml
Halfwidth of Limits: 0.5 ml

$V_{2_25_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.06 ml

This uncertainty corresponds more or less to ± 2 drops

$V_{25_2_tem}$: Interim Result

$V_{3_25_cal}$: Type B rectangular distribution
Value: 25 ml
Halfwidth of Limits: 0.5 ml

$V_{3_25_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.06 ml

This uncertainty corresponds more or less to ± 2 drops

$V_{25_3_tem}$: Interim Result

$V_{4_25_cal}$: Type B rectangular distribution
Value: 25 ml
Halfwidth of Limits: 0.5 ml

$V_{4_25_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.06 ml

This uncertainty corresponds more or less to ± 2 drops

$V_{25_4_tem}$: Interim Result

$V_{5_25_cal}$: Type B rectangular distribution
Value: 25 ml
Halfwidth of Limits: 0.5 ml

$V_{5_25_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.06 ml

This uncertainty corresponds more or less to ± 2 drops

$V_{25_5_tem}$: Interim Result

$V_{6_25_cal}$: Type B rectangular distribution
Value: 25 ml
Halfwidth of Limits: 0.5 ml

$V_{6_25_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.06 ml

This uncertainty corresponds more or less to ± 2 drops

$V_{25_6_tem}$: Interim Result

Spectrophotometric determination of nitrite ion

$V_{sul_1_cal}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.001079 ml
 Coverage Factor: 1

$V_{sul_1_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.003412 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{sul_1_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000358 ml
 Coverage Factor: 1

$V_{sul_2_cal}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.001079 ml
 Coverage Factor: 1

$V_{sul_2_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.003412 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{sul_2_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000358 ml
 Coverage Factor: 1

$V_{sul_3_cal}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.001079 ml
 Coverage Factor: 1

$V_{sul_3_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.003412 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{sul_3_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000358 ml
 Coverage Factor: 1

$V_{sul_4_cal}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.001079 ml
 Coverage Factor: 1

Spectrophotometric determination of nitrite ion

$V_{sul_4_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.003412 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{sul_4_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000358 ml
 Coverage Factor: 1

$V_{sul_5_cal}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.001079 ml
 Coverage Factor: 1

$V_{sul_5_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.003412 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{sul_5_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000358 ml
 Coverage Factor: 1

$V_{sul_6_cal}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.001079 ml
 Coverage Factor: 1

$V_{sul_6_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.003412 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{sul_6_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000358 ml
 Coverage Factor: 1

$V_{diam_1_cal}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.000872 ml
 Coverage Factor: 1

$V_{diam_1_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.002759 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{\text{diam}_1\text{tem}}$: Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.000357 ml
Coverage Factor: 1

$V_{\text{diam}_2\text{cal}}$: Type B normal distribution
Value: 0.5 ml
Expanded Uncertainty: 0.000872 ml
Coverage Factor: 1

$V_{\text{diam}_2\text{rep}}$: Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.002759 ml
Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{\text{diam}_2\text{tem}}$: Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.000357 ml
Coverage Factor: 1

$V_{\text{diam}_3\text{cal}}$: Type B normal distribution
Value: 0.5 ml
Expanded Uncertainty: 0.000872 ml
Coverage Factor: 1

$V_{\text{diam}_3\text{rep}}$: Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.002759 ml
Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{\text{diam}_3\text{tem}}$: Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.000357 ml
Coverage Factor: 1

$V_{\text{diam}_4\text{cal}}$: Type B normal distribution
Value: 0.5 ml
Expanded Uncertainty: 0.000872 ml
Coverage Factor: 1

$V_{\text{diam}_4\text{rep}}$: Type B normal distribution
Value: 0 ml
Expanded Uncertainty: 0.002759 ml
Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

Spectrophotometric determination of nitrite ion

$V_{\text{diam}_4\text{tem}}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000357 ml
 Coverage Factor: 1

$V_{\text{diam}_5\text{cal}}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.000872 ml
 Coverage Factor: 1

$V_{\text{diam}_5\text{rep}}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.002759 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{\text{diam}_5\text{tem}}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000357 ml
 Coverage Factor: 1

$V_{\text{diam}_6\text{cal}}$: Type B normal distribution
 Value: 0.5 ml
 Expanded Uncertainty: 0.000872 ml
 Coverage Factor: 1

$V_{\text{diam}_6\text{rep}}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.002759 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{\text{diam}_6\text{tem}}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000357 ml
 Coverage Factor: 1

$V_{1\text{st}_\text{cal}}$: Type B normal distribution
 Value: 0.2 ml
 Expanded Uncertainty: 0.001541 ml
 Coverage Factor: 1

$V_{1\text{st}_\text{rep}}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.004874 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{1\text{st}_\text{tem}}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.00012 ml
 Coverage Factor: 1

Spectrophotometric determination of nitrite ion

$V_{2_st_cal}$: Type B normal distribution
 Value: 0.7 ml
 Expanded Uncertainty: 0.001541 ml
 Coverage Factor: 1

$V_{2_st_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.004874 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{2_st_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.00012 ml
 Coverage Factor: 1

$V_{3_st_cal}$: Type B normal distribution
 Value: 1 ml
 Expanded Uncertainty: 0.001541 ml
 Coverage Factor: 1

$V_{3_st_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.004874 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{3_st_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.00012 ml
 Coverage Factor: 1

$V_{4_st_cal}$: Type B normal distribution
 Value: 1.2 ml
 Expanded Uncertainty: 0.004952 ml
 Coverage Factor: 1

$V_{4_st_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.001566 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{4_st_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000242 ml
 Coverage Factor: 1

$V_{5_st_cal}$: Type B normal distribution
 Value: 1.4 ml
 Expanded Uncertainty: 0.004952 ml
 Coverage Factor: 1

Spectrophotometric determination of nitrite ion

$V_{5_st_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.001566 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{5_st_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000242 ml
 Coverage Factor: 1

$V_{6_st_cal}$: Type B normal distribution
 Value: 1.6 ml
 Expanded Uncertainty: 0.004952 ml
 Coverage Factor: 1

$V_{6_st_rep}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.001566 ml
 Coverage Factor: 1

Estimate due to repeatability of the volume of the nitrite standard standard solution is taken 0.4% of the volume of the pipette

$V_{6_st_tem}$: Type B normal distribution
 Value: 0 ml
 Expanded Uncertainty: 0.000242 ml
 Coverage Factor: 1

$V_{50_1_cal}$: Type B rectangular distribution
 Value: 50 ml
 Halfwidth of Limits: 0.09 ml

$V_{50_1_rep}$: Type B rectangular distribution
 Value: 0 ml
 Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the value ± 3 drops

$V_{50_1_tem}$: Interim Result

$V_{50_2_cal}$: Type B rectangular distribution
 Value: 50 ml
 Halfwidth of Limits: 0.09 ml

$V_{50_2_rep}$: Type B rectangular distribution
 Value: 0 ml
 Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the value ± 3 drops

$V_{50_2_tem}$: Interim Result

$V_{50_3_cal}$: Type B rectangular distribution
 Value: 50 ml
 Halfwidth of Limits: 0.09 ml

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$V_{50_3_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the value ± 3 drops

$V_{50_3_tem}$: Interim Result

$V_{50_4_cal}$: Type B rectangular distribution
Value: 50 ml
Halfwidth of Limits: 0.09 ml

$V_{50_4_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the value ± 3 drops

$V_{50_4_tem}$: Interim Result

$V_{50_5_cal}$: Type B rectangular distribution
Value: 50 ml
Halfwidth of Limits: 0.09 ml

$V_{50_5_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the value ± 3 drops

$V_{50_5_tem}$: Interim Result

$V_{50_6_cal}$: Type B rectangular distribution
Value: 50 ml
Halfwidth of Limits: 0.09 ml

$V_{50_6_rep}$: Type B rectangular distribution
Value: 0 ml
Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the value ± 3 drops

$V_{50_6_tem}$: Interim Result

C_{stock} : Interim Result

m_{NaNO_2} : Interim Result

M_N : Type B rectangular distribution
Value: 14 g/mol
Halfwidth of Limits: 0 g/mol

M_{NaNO_2} : Type B rectangular distribution
Value: 69 g/mol
Halfwidth of Limits: 0 g/mol

V_{100_1} : Interim Result

Spectrophotometric determination of nitrite ion

$m_{\text{NaNO}_2\text{rep}}$	Type B normal distribution Value: 54.3 mg Expanded Uncertainty: 0.4 mg Coverage Factor: 1
$m_{\text{NaNO}_2\text{drift}}$	Type B normal distribution Value: 0 mg Expanded Uncertainty: $4.75595 \cdot 10^{-5}$ mg Coverage Factor: 1
$m_{\text{NaNO}_2\text{round}}$	Type B normal distribution Value: 0 mg Expanded Uncertainty: 0.05 mg Coverage Factor: 1
$V_{100_1\text{cal}}$	Type B rectangular distribution Value: 100 ml Halfwidth of Limits: 0.15 ml
$V_{100_1\text{rep}}$	Type B rectangular distribution Value: 0 ml Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the uncertainty ± 3 drops

$V_{100_1\text{tem}}$	Interim Result
V_{10}	Interim Result
V_{100_2}	Interim Result
$V_{100_2\text{cal}}$	Type B rectangular distribution Value: 100 ml Halfwidth of Limits: 0.15 ml
$V_{100_2\text{rep}}$	Type B rectangular distribution Value: 0 ml Halfwidth of Limits: 0.09 ml

This uncertainty corresponds more or less to the uncertainty ± 3 drops

$V_{100_2\text{tem}}$	Interim Result
$V_{10\text{cal}}$	Type B normal distribution Value: 10 ml Expanded Uncertainty: 0.002163 ml Coverage Factor: 1
$V_{10\text{rep}}$	Type B normal distribution Value: 0 ml Expanded Uncertainty: 0.006808 ml Coverage Factor: 1

Estimate of uncertainty due to repeatability of volume of the nitrite ion standard solution is taken as 0.4% of the volum of the pipette

$V_{10\text{tem}}$	Type B normal distribution Value: 0 ml Expanded Uncertainty: 0.001208 ml Coverage Factor: 1
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Spectrophotometric determination of nitrite ion

Uncertainty Budget:

Quantity	Value	Standard Uncertainty	Distribution	Sensitivity Coefficient	Uncertainty Contribution	Index
V_{25_cal}	25.000 ml	0.289 ml	rectangular	0.011	0.0032 mg/l	9.0 %
V_{25_rep}	0.0 ml	0.0346 ml	rectangular	0.011	0.00038 mg/l	0.1 %
Δt	0.0 °C	2.31 °C	rectangular	$-64 \cdot 10^{-6}$	-0.00015 mg/l	0.0 %
y	0.00021 1/°C	0.0 1/°C	rectangular	0.0	0.0 mg/l	0.0 %
V_{sul_cal}	0.50000 ml	0.00154 ml	normal	0.011	$17 \cdot 10^{-6}$ mg/l	0.0 %
V_{sul_rep}	0.0 ml	0.00487 ml	normal	0.011	$53 \cdot 10^{-6}$ mg/l	0.0 %
V_{sul_tem}	0.0 ml	0.000120 ml	normal	0.011	$1.3 \cdot 10^{-6}$ mg/l	0.0 %
V_{diam_cal}	0.50000 ml	0.00154 ml	normal	0.011	$17 \cdot 10^{-6}$ mg/l	0.0 %
V_{diam_rep}	0.0 ml	0.00487 ml	normal	0.011	$53 \cdot 10^{-6}$ mg/l	0.0 %
V_{diam_tem}	0.0 ml	0.000120 ml	normal	0.011	$1.3 \cdot 10^{-6}$ mg/l	0.0 %
n	6.0 unitless	0.0 unitless	rectangular	0.0	0.0 mg/l	0.0 %
A_{sample_rep}	0.9957 AU	0.0145 AU	normal	0.29	0.0042 mg/l	15.7 %
A_{sample_drift}	0.0 AU	0.0289 AU	rectangular	0.29	0.0083 mg/l	62.1 %
A_{sample_nonlin}	0.0	0.00520	rectangular	0.29	0.0015 mg/l	2.0 %
A_{sample_interf}	0.0	0.0	rectangular	0.0	0.0 mg/l	0.0 %
$A_{sample_mismatch}$	0.0	0.0	rectangular	0.0	0.0 mg/l	0.0 %
A_{sample_round}	0.0 AU	$5.00 \cdot 10^{-6}$ AU	normal	0.29	$1.4 \cdot 10^{-6}$ mg/l	0.0 %
A_{1rep}	0.15621 AU	0.00152 AU	normal	0.0023	$3.5 \cdot 10^{-6}$ mg/l	0.0 %
A_{1drift}	0.0 AU	0.000438 AU	normal	0.0023	$1.0 \cdot 10^{-6}$ mg/l	0.0 %
A_{1round}	0.0 AU	$5.00 \cdot 10^{-6}$ AU	normal	0.0023	$12 \cdot 10^{-9}$ mg/l	0.0 %
A_{2rep}	0.55078 AU	0.00764 AU	normal	-0.028	-0.00022 mg/l	0.0 %
A_{2drift}	0.0 AU	0.000280 AU	normal	-0.028	$-8.0 \cdot 10^{-6}$ mg/l	0.0 %
A_{2round}	0.0 AU	$5.00 \cdot 10^{-6}$ AU	normal	-0.028	$-140 \cdot 10^{-9}$ mg/l	0.0 %
A_{3rep}	0.7641 AU	0.0109 AU	normal	-0.047	-0.00051 mg/l	0.2 %
A_{3drift}	0.0 AU	0.000194 AU	normal	-0.047	$-9.1 \cdot 10^{-6}$ mg/l	0.0 %
A_{3round}	0.0 AU	$5.00 \cdot 10^{-6}$ AU	normal	-0.047	$-230 \cdot 10^{-9}$ mg/l	0.0 %
A_{4rep}	0.9273 AU	0.0135 AU	normal	-0.059	-0.00080 mg/l	0.6 %
A_{4drift}	0.0 AU	0.000129 AU	normal	-0.059	$-7.6 \cdot 10^{-6}$ mg/l	0.0 %
A_{4round}	0.0 AU	$5.00 \cdot 10^{-6}$ AU	normal	-0.059	$-300 \cdot 10^{-9}$ mg/l	0.0 %
A_{5rep}	1.0786 AU	0.0158 AU	normal	-0.072	-0.0011 mg/l	1.2 %
A_{5drift}	0.0 AU	$68.6 \cdot 10^{-6}$ AU	normal	-0.072	$-4.9 \cdot 10^{-6}$ mg/l	0.0 %
A_{5round}	0.0 AU	$5.00 \cdot 10^{-6}$ AU	normal	-0.072	$-360 \cdot 10^{-9}$ mg/l	0.0 %
A_{6rep}	1.2307 AU	0.0182 AU	normal	-0.084	-0.0015 mg/l	2.1 %
A_{6drift}	0.0 AU	$7.72 \cdot 10^{-6}$ AU	normal	-0.084	$-650 \cdot 10^{-9}$ mg/l	0.0 %
A_{6round}	0.0 AU	$50.0 \cdot 10^{-6}$ AU	normal	-0.084	$-4.2 \cdot 10^{-6}$ mg/l	0.0 %
$V_{1_25_cal}$	25.000 ml	0.289 ml	rectangular	$-12 \cdot 10^{-6}$	$-3.5 \cdot 10^{-6}$ mg/l	0.0 %

Spectrophotometric determination of nitrite ion

Quantity	Value	Standard Uncertainty	Distribution	Sensitivity Coefficient	Uncertainty Contribution	Index
V _{1_25_rep}	0.0 ml	0.0346 ml	rectangular	-12·10 ⁻⁶	-420·10 ⁻⁹ mg/l	0.0 %
V _{2_25_cal}	25.000 ml	0.289 ml	rectangular	0.00057	0.00017 mg/l	0.0 %
V _{2_25_rep}	0.0 ml	0.0346 ml	rectangular	0.00057	20·10 ⁻⁶ mg/l	0.0 %
V _{3_25_cal}	25.000 ml	0.289 ml	rectangular	0.0014	0.00040 mg/l	0.1 %
V _{3_25_rep}	0.0 ml	0.0346 ml	rectangular	0.0014	49·10 ⁻⁶ mg/l	0.0 %
V _{4_25_cal}	25.000 ml	0.289 ml	rectangular	0.0021	0.00060 mg/l	0.3 %
V _{4_25_rep}	0.0 ml	0.0346 ml	rectangular	0.0021	72·10 ⁻⁶ mg/l	0.0 %
V _{5_25_cal}	25.000 ml	0.289 ml	rectangular	0.0029	0.00085 mg/l	0.7 %
V _{5_25_rep}	0.0 ml	0.0346 ml	rectangular	0.0029	0.00010 mg/l	0.0 %
V _{6_25_cal}	25.000 ml	0.289 ml	rectangular	0.0040	0.0011 mg/l	1.2 %
V _{6_25_rep}	0.0 ml	0.0346 ml	rectangular	0.0040	0.00014 mg/l	0.0 %
V _{sul_1_cal}	0.50000 ml	0.00108 ml	normal	-12·10 ⁻⁶	-13·10 ⁻⁹ mg/l	0.0 %
V _{sul_1_rep}	0.0 ml	0.00341 ml	normal	-12·10 ⁻⁶	-42·10 ⁻⁹ mg/l	0.0 %
V _{sul_1_tem}	0.0 ml	0.000358 ml	normal	-12·10 ⁻⁶	-4.4·10 ⁻⁹ mg/l	0.0 %
V _{sul_2_cal}	0.50000 ml	0.00108 ml	normal	0.00057	620·10 ⁻⁹ mg/l	0.0 %
V _{sul_2_rep}	0.0 ml	0.00341 ml	normal	0.00057	2.0·10 ⁻⁶ mg/l	0.0 %
V _{sul_2_tem}	0.0 ml	0.000358 ml	normal	0.00057	200·10 ⁻⁹ mg/l	0.0 %
V _{sul_3_cal}	0.50000 ml	0.00108 ml	normal	0.0014	1.5·10 ⁻⁶ mg/l	0.0 %
V _{sul_3_rep}	0.0 ml	0.00341 ml	normal	0.0014	4.8·10 ⁻⁶ mg/l	0.0 %
V _{sul_3_tem}	0.0 ml	0.000358 ml	normal	0.0014	500·10 ⁻⁹ mg/l	0.0 %
V _{sul_4_cal}	0.50000 ml	0.00108 ml	normal	0.0021	2.3·10 ⁻⁶ mg/l	0.0 %
V _{sul_4_rep}	0.0 ml	0.00341 ml	normal	0.0021	7.1·10 ⁻⁶ mg/l	0.0 %
V _{sul_4_tem}	0.0 ml	0.000358 ml	normal	0.0021	750·10 ⁻⁹ mg/l	0.0 %
V _{sul_5_cal}	0.50000 ml	0.00108 ml	normal	0.0029	3.2·10 ⁻⁶ mg/l	0.0 %
V _{sul_5_rep}	0.0 ml	0.00341 ml	normal	0.0029	10·10 ⁻⁶ mg/l	0.0 %
V _{sul_5_tem}	0.0 ml	0.000358 ml	normal	0.0029	1.1·10 ⁻⁶ mg/l	0.0 %
V _{sul_6_cal}	0.50000 ml	0.00108 ml	normal	0.0040	4.3·10 ⁻⁶ mg/l	0.0 %
V _{sul_6_rep}	0.0 ml	0.00341 ml	normal	0.0040	13·10 ⁻⁶ mg/l	0.0 %
V _{sul_6_tem}	0.0 ml	0.000358 ml	normal	0.0040	1.4·10 ⁻⁶ mg/l	0.0 %
V _{diam_1_cal}	0.500000 ml	0.000872 ml	normal	-12·10 ⁻⁶	-11·10 ⁻⁹ mg/l	0.0 %
V _{diam_1_rep}	0.0 ml	0.00276 ml	normal	-12·10 ⁻⁶	-34·10 ⁻⁹ mg/l	0.0 %
V _{diam_1_tem}	0.0 ml	0.000357 ml	normal	-12·10 ⁻⁶	-4.4·10 ⁻⁹ mg/l	0.0 %
V _{diam_2_cal}	0.500000 ml	0.000872 ml	normal	0.00057	500·10 ⁻⁹ mg/l	0.0 %
V _{diam_2_rep}	0.0 ml	0.00276 ml	normal	0.00057	1.6·10 ⁻⁶ mg/l	0.0 %
V _{diam_2_tem}	0.0 ml	0.000357 ml	normal	0.00057	200·10 ⁻⁹ mg/l	0.0 %
V _{diam_3_cal}	0.500000 ml	0.000872 ml	normal	0.0014	1.2·10 ⁻⁶ mg/l	0.0 %
V _{diam_3_rep}	0.0 ml	0.00276 ml	normal	0.0014	3.9·10 ⁻⁶ mg/l	0.0 %

Spectrophotometric determination of nitrite ion

Quantity	Value	Standard Uncertainty	Distribution	Sensitivity Coefficient	Uncertainty Contribution	Index
V _{diam_3_tem}	0.0 ml	0.000357 ml	normal	0.0014	500·10 ⁻⁹ mg/l	0.0 %
V _{diam_4_cal}	0.500000 ml	0.000872 ml	normal	0.0021	1.8·10 ⁻⁶ mg/l	0.0 %
V _{diam_4_rep}	0.0 ml	0.00276 ml	normal	0.0021	5.8·10 ⁻⁶ mg/l	0.0 %
V _{diam_4_tem}	0.0 ml	0.000357 ml	normal	0.0021	750·10 ⁻⁹ mg/l	0.0 %
V _{diam_5_cal}	0.500000 ml	0.000872 ml	normal	0.0029	2.6·10 ⁻⁶ mg/l	0.0 %
V _{diam_5_rep}	0.0 ml	0.00276 ml	normal	0.0029	8.1·10 ⁻⁶ mg/l	0.0 %
V _{diam_5_tem}	0.0 ml	0.000357 ml	normal	0.0029	1.1·10 ⁻⁶ mg/l	0.0 %
V _{diam_6_cal}	0.500000 ml	0.000872 ml	normal	0.0040	3.4·10 ⁻⁶ mg/l	0.0 %
V _{diam_6_rep}	0.0 ml	0.00276 ml	normal	0.0040	11·10 ⁻⁶ mg/l	0.0 %
V _{diam_6_tem}	0.0 ml	0.000357 ml	normal	0.0040	1.4·10 ⁻⁶ mg/l	0.0 %
V _{1_st_cal}	0.20000 ml	0.00154 ml	normal	-0.0016	-2.5·10 ⁻⁶ mg/l	0.0 %
V _{1_st_rep}	0.0 ml	0.00487 ml	normal	-0.0016	-7.8·10 ⁻⁶ mg/l	0.0 %
V _{1_st_tem}	0.0 ml	0.000120 ml	normal	-0.0016	-190·10 ⁻⁹ mg/l	0.0 %
V _{2_st_cal}	0.70000 ml	0.00154 ml	normal	0.021	33·10 ⁻⁶ mg/l	0.0 %
V _{2_st_rep}	0.0 ml	0.00487 ml	normal	0.021	0.00010 mg/l	0.0 %
V _{2_st_tem}	0.0 ml	0.000120 ml	normal	0.021	2.6·10 ⁻⁶ mg/l	0.0 %
V _{3_st_cal}	1.00000 ml	0.00154 ml	normal	0.036	56·10 ⁻⁶ mg/l	0.0 %
V _{3_st_rep}	0.0 ml	0.00487 ml	normal	0.036	0.00018 mg/l	0.0 %
V _{3_st_tem}	0.0 ml	0.000120 ml	normal	0.036	4.4·10 ⁻⁶ mg/l	0.0 %
V _{4_st_cal}	1.20000 ml	0.00495 ml	normal	0.045	0.00022 mg/l	0.0 %
V _{4_st_rep}	0.0 ml	0.00157 ml	normal	0.045	71·10 ⁻⁶ mg/l	0.0 %
V _{4_st_tem}	0.0 ml	0.000242 ml	normal	0.045	11·10 ⁻⁶ mg/l	0.0 %
V _{5_st_cal}	1.40000 ml	0.00495 ml	normal	0.055	0.00027 mg/l	0.0 %
V _{5_st_rep}	0.0 ml	0.00157 ml	normal	0.055	86·10 ⁻⁶ mg/l	0.0 %
V _{5_st_tem}	0.0 ml	0.000242 ml	normal	0.055	13·10 ⁻⁶ mg/l	0.0 %
V _{6_st_cal}	1.60000 ml	0.00495 ml	normal	0.064	0.00032 mg/l	0.0 %
V _{6_st_rep}	0.0 ml	0.00157 ml	normal	0.064	0.00010 mg/l	0.0 %
V _{6_st_tem}	0.0 ml	0.000242 ml	normal	0.064	16·10 ⁻⁶ mg/l	0.0 %
V _{50_1_cal}	50.0000 ml	0.0520 ml	rectangular	6.4·10 ⁻⁶	330·10 ⁻⁹ mg/l	0.0 %
V _{50_1_rep}	0.0 ml	0.0520 ml	rectangular	6.4·10 ⁻⁶	330·10 ⁻⁹ mg/l	0.0 %
V _{50_2_cal}	50.0000 ml	0.0520 ml	rectangular	-0.00030	-15·10 ⁻⁶ mg/l	0.0 %
V _{50_2_rep}	0.0 ml	0.0520 ml	rectangular	-0.00030	-15·10 ⁻⁶ mg/l	0.0 %
V _{50_3_cal}	50.0000 ml	0.0520 ml	rectangular	-0.00073	-38·10 ⁻⁶ mg/l	0.0 %
V _{50_3_rep}	0.0 ml	0.0520 ml	rectangular	-0.00073	-38·10 ⁻⁶ mg/l	0.0 %
V _{50_4_cal}	50.0000 ml	0.0520 ml	rectangular	-0.0011	-56·10 ⁻⁶ mg/l	0.0 %
V _{50_4_rep}	0.0 ml	0.0520 ml	rectangular	-0.0011	-56·10 ⁻⁶ mg/l	0.0 %
V _{50_5_cal}	50.0000 ml	0.0520 ml	rectangular	-0.0015	-80·10 ⁻⁶ mg/l	0.0 %

Spectrophotometric determination of nitrite ion

Quantity	Value	Standard Uncertainty	Distribution	Sensitivity Coefficient	Uncertainty Contribution	Index
$V_{50_5_rep}$	0.0 ml	0.0520 ml	rectangular	-0.0015	$-80 \cdot 10^{-6}$ mg/l	0.0 %
$V_{50_6_cal}$	50.0000 ml	0.0520 ml	rectangular	-0.0021	-0.00011 mg/l	0.0 %
$V_{50_6_rep}$	0.0 ml	0.0520 ml	rectangular	-0.0021	-0.00011 mg/l	0.0 %
M_N	14.0 g/mol	0.0 g/mol	rectangular	0.0	0.0 mg/l	0.0 %
M_{NaNO_2}	69.0 g/mol	0.0 g/mol	rectangular	0.0	0.0 mg/l	0.0 %
$m_{NaNO_2_rep}$	54.300 mg	0.400 mg	normal	0.0052	0.0021 mg/l	4.0 %
$m_{NaNO_2_drift}$	0.0 mg	$47.6 \cdot 10^{-6}$ mg	normal	0.0052	$250 \cdot 10^{-9}$ mg/l	0.0 %
$m_{NaNO_2_round}$	0.0 mg	0.0500 mg	normal	0.0052	0.00026 mg/l	0.0 %
$V_{100_1_cal}$	100.0000 ml	0.0866 ml	rectangular	-0.0028	-0.00025 mg/l	0.0 %
$V_{100_1_rep}$	0.0 ml	0.0520 ml	rectangular	-0.0028	-0.00015 mg/l	0.0 %
$V_{100_2_cal}$	100.0000 ml	0.0866 ml	rectangular	-0.0028	-0.00025 mg/l	0.0 %
$V_{100_2_rep}$	0.0 ml	0.0520 ml	rectangular	-0.0028	-0.00015 mg/l	0.0 %
V_{10_cal}	10.00000 ml	0.00216 ml	normal	0.028	$62 \cdot 10^{-6}$ mg/l	0.0 %
V_{10_rep}	0.0 ml	0.00681 ml	normal	0.028	0.00019 mg/l	0.0 %
V_{10_tem}	0.0 ml	0.00121 ml	normal	0.028	$34 \cdot 10^{-6}$ mg/l	0.0 %
C_{NO_3}	0.2848 mg/l	0.0105 mg/l				

Result: Quantity: C_{NO_3}
Value: 0.285 mg/l
Expanded Uncertainty: ± 0.021 mg/l
Coverage Factor: 2.00
Coverage: manual