



COMMERCE SECRETARY

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**WATER POLLUTION-DETERMINATION OF NITROGEN
NITRATE-UV SPECTROPHOTOMETRIC METHOD**

*WATER CONTAMINATION: DETERMINATION OF NITROGEN
SPECTROPHOTOMETRIC METHOD ULTRAVIOLET NITRATE*

DIRECTORATE GENERAL OF NORM

PREFACE

In the elaboration of the present norm of participation of the following organisms:

- SECRETARY OF URBAN DEVELOPMENT AND ECOLOGY
General Directorate of Prevention and Control of Environmental Pollution.
- HEALTH SECRETARY

General Directorate of Environmental and Occupational Health Control.
- SECRETARIAT OF AGRICULTURE AND HYDRAULIC RESOURCES
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- NATIONAL LABORATORIES FOR INDUSTRIAL PROMOTION.
- NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO
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- MEXICAN OIL.

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1 OBJECTIVE AND FIELD OF APPLICATION

This Official Mexican Standard establishes the method for the determination of nitrate nitrogen in water, and is applicable for potable water that does not present turbidity, color and content of organic matter.

2 REFERENCES

This standard is complemented by the following current Mexican Standards:

NOM-BB-014 Classification and nominal sizes for glass utensils.

NOM-Z-001 International System of Units (SI).

3 SUMMARY

The concentration of nitrates in a water sample was determined by measuring the absorption in the ultraviolet field at 220 nm and comparing it with a calibration curve.

The relationship between absorption and concentration is linear up to a concentration of 11

$\mu\text{g} / \text{L}$. The minimum detectable is $0.01 \mu\text{g} / \text{L}$.

The method is fast and suitable for routine control tests.

4 EQUIPMENT AND EQUIPMENT

4.1 Team

4.1.1 Spectrophotometer for use at 220 nm and 275 nm with quartz cell of 1 cm or more of light passage.

4.2 Material

4.2.1 Common laboratory material.

4.2.2. Fine pore filter and membrane filter 0.45 μm .

5 REAGENTS

The reagents that are mentioned below have an analytical degree unless otherwise stated.

5.1 Nitrate mother solution

Dry potassium nitrate (KNO_3) is a stove at 378 K (105 C) for 24 hours cool in a desiccator. Weigh 0.7218 g of anhydrous potassium nitrate and dilute to 1000 cm^3 with distilled water. Preserve with 2 cm^3 of chloroform (CHCl_3);
1 $\text{cm}^3 = 100 \mu\text{g N-NO}_3$. This solution is stable for six months.

5.2 Nitrate standard solution

Dilute 50 cm^3 of nitrate stock solution to 500 cm^3 with distilled water; 1 $\text{cm}^3 = \mu\text{g N-NO}_3$.

5.3 Hydrochloric acid solution (density 1.19 g / cm^3) 1N

Dilute 83 cm^3 of concentrated hydrochloric acid (HCl) to 1000 cm^3 with distilled water.

6 CALIBRATION CURVE

6.1 Dilute the following volumes of solution and measure at 50 cm^3 , 0, 1, 3, 7, 10, 15, 20, 30 and 35 cm^3 obtaining the following values; 0, 0.2, 0.6, 1.4, 2.0, 3.0, 4.0, 6.0, and 7.0 μg of $\text{N-NO}_3 / \text{cm}^3$ (0 to 350 μg of N-NO_3).

6.2 Add 1 cm^3 of 1N HCl solution to each of the solutions in the curve and shake vigorously.

6.3 Draw the calibration curve plotting the absorptions against the corresponding

mountains.

7 INTERFERENCES

It interferes with dissolved organic matter, detergents, nitrites and hexavalent chromium. Nitrates absorb light at 220 nm, organic matter absorbs light at both 220 and 275 nm, so a second measurement at 275 nm is used to correct nitrate nitrogen values.

8 SAMPLING AND STORAGE

The samples must be representative of the conditions that exist at the point and time of sampling and that have sufficient volume to make the corresponding determinations.

In the case of wells and elevated tanks the water is allowed to flow for 5 to 10 minutes in order to dislodge the water stationed in the pipeline. The sample is then collected in glass or plastic containers and analyzed as soon as possible. In case of needing storage, maintain the temperature for a maximum of 48 hours between 275 and 278 K (2 and ° C).

9 PROCEDURE

9.1 Take 50 cm³ of clear sample, filter if necessary, first through the fine pore paper and then through the membrane filter.

9.2 Add 1 cm³ of 1N HCl solution and shake vigorously.

9.2 Do the absorption readings in the same way as the calibration curve.

9.4 Read the absorbances of the samples at 275 nm, to determine interferences due to organic matter.

10 CALCULATIONS

10.1 Correction for dissolved organic matter. Subtract twice the absorbance reading at 275 nm (A_{275}) from the absorbance reading at 220 nm (A_{220}). If the value of the reading at 275 nm is greater than 10% of the reading value at 220 nm, this method is not applicable.
 $AC = A_{220} - 2 A_{275}$

10.2 Read the concentration corresponding to the corrected observations of the samples on the calibration curve and determine the nitrogen content of nitrates in $\mu\text{g N}_{\text{NO}_3} / \text{cm}^3$.

10.3 If you have drawn the calibration curve by plotting the absorbances obtained against the corresponding μg (from 0 to 350 μg), the content in $\mu\text{g N}_{\text{NO}_3} / \text{cm}^3$ is determined by

the following formula:

$$\frac{\mu\text{g N} - \text{NO}_3}{\text{cm}^3} = C$$

Where:

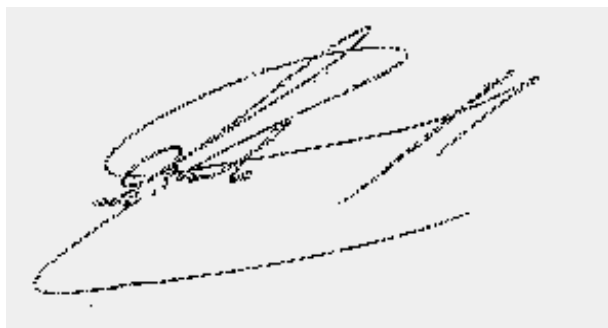
C = μg read from the curve.

V = Volume of sample in cm^3 for the analysis.

11 BIBLIOGRAPHY

Standard Methods for the Examination of Water and Waste Water. 16th Edition 1985
APHA. AWWA WPCF.

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A handwritten signature in black ink on a light gray background. The signature is stylized, with a large, sweeping 'C' at the beginning, followed by several loops and a long, horizontal stroke at the end.

LIC. CONSUELO SAEZ PUEYO