

PHOSPHORIMETRIC DETERMINATION OF URANIUM IN WATER

INTRODUCTION

The presence of uranium in water causes radiological pollution as all uranium radionuclides decay by both alpha and gamma emissions. Chemical aspects of uranium toxicity include mainly nephritis and other renal diseases. Mentioned harmful features affect on humans even in low concentrations thus requiring sensitive analysis methods.

LUMEX Instruments developed accurate and sensitive method of phosphorimetric determination of uranium in water using FLUORAT®-02-4M analyzer. The method became the National standard for Uranium in water determination; the benefit of the method is that it doesn't require expensive instrumentation and tedious sample preparation.

MEASUREMENT RANGE

Measurement range, µg/L (ppb)	Directives & standards for drinking water	MAC (MPL), µg/L
2 – 1 000 (natural, drinking, and waste water)	WHO Guidelines for drinking water quality (2011)	30
	Drinking Water Directive 98/83/EC	–
	US EPA National Primary Drinking Water Regulations	30
	GB 23727-2009	50
	AERB permissible limit for uranium in drinking water (2004)	60
	Brazil Portaria No 2914/2011, Anexo VII	30

Samples with higher uranium content should be diluted prior to analysis.

The influence of the sample matrix is excluded by using the method of standard addition

METHOD

To determine uranium in water, the phosphorescence intensity of uranyl-ions ($\lambda=530$ nm) excited by ultraviolet radiation is measured. Sodium polysilicate (pH=8–10) is added to enhance luminescence intensity. Interfering influence caused by luminescence is eliminated by using the special mode of FLUORAT®-02-4M with a time gap between excitation impulse and photons counting.

When phosphorescence intensity is measured the result is displayed as uranium content in water presented in µg/L.

Sample should be preserved by adding concentrated nitric acid; after that **sample can be stored for 1 month**.

HIGHLIGHTS OF LUMEX INSTRUMENTS PHOSPHORIMETRIC METHOD

- Affordable price for instrument and reagents.
- Detection limit is lower than uranium content in uncontaminated natural and drinking water samples.
- Compact instrument with small footprint and robust case – field analysis is possible.
- Easy-operating: no sample heating and drying, no oxidizing agents required.

EQUIPMENT AND REAGENTS

The following equipment and reagents are used for measuring:

- FLUORAT®-02-4M analyzer with FLUORATE software
- Lumex Instruments optical filters *
- Uranium ion standard solution in diluted nitric acid (1000 µg/mL)
- Bidistilled or deionized water
- Sodium hydroxide, p.a.
- Nitric acid, supra pur
- Colloidal Silicon Dioxide, p.a. *
- PTFE vessel with screwed cap *
- PTFE or polypropylene vials *

* - included in Lumex Instruments "Uranium in water" set, order code 300002498

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To get more specific information, please contact the representative by sales@lumexinstruments.com