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EZ6000 Arsenic Analyser

Method and reagent sheets

01/2022, Edition 1.01

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1. Legal information

Manufacturer: AppliTek NV/SA

Distributor: Hach Lange GmbH

The translation of the manual is approved by the manufacturer.

2. Analytical specifications

Please refer also to the respective technical datasheet at Hach Support Online.

Arsenic (III) - All specifications				
Analysis method	Anodic Stripping Voltammetry using a gold electrode			
Parameter	As (III)			
Cycle time	15 minutes			
Limit of Detection (LOD)	≤ 1 µg/L			
Precision/Repeatability	Better than 5% full scale range for standard test solutions			
Cleaning	Automatic; frequency freely programmable			
Calibration	Automatic, 2-point; frequency freely programmable			
Validation	Automatic; frequency freely programmable			
Interferences	Copper in µg/L levels, Iodide (I^-), organic matter, various metals in mg/L levels may interfere. Fats, oil, proteins, surfactants and tar. Interference of organic compounds cannot be eliminated by digestion, because digestion changes the oxidation state.			
Measuring ranges	**% of range - Dilution**		**Low range (µg/L)**	**High range (µg/L)**
	0	**standard range**	**1**	**20**

3. Analysis method

Summary

The determination of the arsenic concentration in water is determined based on Anodic Stripping Voltammetry (ASV).

Analysis steps

The analysis vessel is filled with sample. The buffer solution is added and the voltametric run for arsenic is started. With the obtained value, the arsenic concentration is calculated. After analysis, the analysis vessel is rinsed with demineralized water.

Calibration

The calibration procedure measures a REF1 As(III) solution (REF Blank – Channel 9) and a REF2 As(III) solution (REF As – Channel 10) to adapt the offset and slope factors.

The calibration is performed in the MAIN method.

4. Reagents

⚠ CAUTION	
⚠	Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Read the safety data sheet from the supplier before bottles are filled or reagents are prepared. For laboratory use only. Make the hazard information known in accordance with the local regulations of the user.

⚠ CAUTION	
⚠	Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

4.1 Reagent overview and consumption

In the tables below, the products that are needed to prepare the reagents are listed. The product name, the formula, the molecular weight, the CAS No., and the amount needed to prepare 1 liter of the reagents is given. Check the consumption of the reagents (28 days) to adapt the volumes needed.

Product	Consumption	Consumption/28 days A rata 1 analysis/15 min	Recommended containers
H_2SO_4 solution	~ 1.5 mL * 2	~ 8.1 L	Plastic – 10 L
Buffer solution	~ 0.5 mL	~ 1.4 L	Plastic – 2.5 L
REF1 solution	~ 20 mL/analysis	/	Plastic – 1 L
REF2 solution	~ 20 mL/analysis	/	Plastic – 1 L

4.2 DI-water overview and consumption

	Rinse water (mL/analysis) Type I	Rinse water (mL/activation) Type I	Total (mL/analysis)	Consumption/28 days A rata 1 analysis / 15 min
0	**16.5 mL**	**4.5 mL**	**16.5 mL**	**~ 45 L**

Remark

The indicated volumes are an estimation of the consumption for rinse and dilution water, based on a standard operating procedure, as defined in the specifications of the EZ analyser. Please be aware that, depending on the sample matrix, the rinse water volumes might increase.

4.3 Storage and quality of chemicals

Quality of chemicals

All chemicals should be of Reagent grade, ACS grade or better (*). The use of pro analysis chemicals is recommended. Poor quality of the reagents can affect the analyser performance.

(*) Analytical Reagent (AR), Guaranteed Reagent (GR), UNIVAR, AnalaR, Premium Reagent (PR), ReagentCertified ACS reagent, ACS Plus reagent, puriss p.a. ACS reagent, ReagentPlus®, TraceCERT®, Suprapur®, Ultrapur®, or better are also possible.

Beware of the purity of the products. Traces of the following common elements may cause deterioration of the measurement: Zn, Pb, Cu, Fe, Mn, etc. It is advisable to test the reagents on purity by use of ICP-MS or similar methods.

Quality of water

Reagent grade, de-ionized water must be used to prepare the chemical solutions and for rinse purposes. The water cannot contain dissolved gasses (air) or microorganism. Boil the water shortly before use and cool down to ambient temperature.

Preparation of reagents

Use vessels of Teflon, PE or PP for the preparation of the reagents. Clean the vessels before use: 3 times with de-ionized water, 3 times with a 0.01M Nitric acid (HNO_3) solution and again 3 times with de-ionized water.

Storage of Reagents

While operating the instrument, keep in mind the reagent requirements as stated in the reagent overview, the chapters below and/or in the data sheet of the instrument.

⚠ CAUTION	
⚠	For longer-term storage: Store the reagents cold; Store the reagents in the dark; If applicable: Store the reagents in a fridge during operation

⚠ CAUTION	
⚠	Refresh the reagents after one month (unless stated differently in the chapters below). Do not mix old reagents with freshly prepared reagents. Remove old reagents from the container before adding freshly prepared reagents.

4.4 H_2SO_4 solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Sulfuric acid 96%	H_2SO_4	98.08	7664-93-9	112 mL

Preparation

Prepare a 2M solution of sulfuric acid (H_2SO_4). Dilute 112 mL of sulfuric acid (H_2SO_4 96%) in 700 mL of de-ionized water using a volumetric flask of 1000 mL. Mix and add de-ionized water up to the grade mark.

4.5 Buffer solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Sulfamic acid (≥99.5)	NH_2SO_3H	97.10	5329-14-6	50 g
Citric acid monohydrate	$C_5H_8O_7 * H_2O$	192.12	5949-29-1	50 g
Potassium chloride	KCl	74.55	7447-40-7	20 g

Preparation

Dilute 50 g of sulfamic acid, 50 g of citric acid and 20 g of potassium chloride in 500 mL of de-ionized water using a volumetric flask of 1000 mL. Mix and add de-ionized water up to the grade mark.

4.6 Rinse solution

Preparation

Use de-ionized water.

4.7 Calibration solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Arsenic stock solution 1000 mg/L As(III)	As_2O_3 in HNO_3	/	/	/
Nitric acid 65%	HNO_3	63.01	7697-37-2	0.5 mL

Preparation

20 µg/L As(III) standard solution – REF2

Prepare a standard solution of 20 µg/L As(III). Add 0.5 mL nitric acid (HNO_3, 65%) to 800 mL of oxygen free de-ionized water, using a volumetric flask of 1000 mL. Take accurately 20 µl of the 1000 mg/L As(III) stock solution and add to the solution. Fill up to 1 litre with de-ionized water.

0 µg/L As(III) standard solution – REF1

Prepare a standard solution of 0 µg/L As(III). Add 0.5 mL nitric acid (HNO_3, 65%) in 800 mL of oxygen free de-ionized water, using a volumetric flask of 1000 mL. Fill up to 1 litre with de-ionized water.

Change Information	
Date: 14/01/2022	Previous version: V3 to V1.01
Reason for Change	
- Addition of water consumption - Addition of information reagents	
Description of Change	
- Addition of estimated consumption of water for rinse and dilution (chapter 4.2) - Addition of extra information regarding storage and quality of reagents (chapter 4.3) - Change $C_5H_8O_7$. H_2O to $C_5H_8O_7$ * H_2O (chapter 4.5)	