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# **EZ3018 Sulphide Analyser**

Method and reagent sheets

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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.

Fluoride - All specifications				
<b>Analysis method</b>	Discontinuous, direct measurement by combined ion-selective electrode			
<b>Parameter</b>	Sulphide			
<b>Cycle time</b>	Standard measurement cycle time: 5 minutes			
<b>Limit of detection (LOD)</b>	≤ 1 mg/L			
<b>Precision/Repeatability</b>	Better than 3% full scale range for standard test solutions			
<b>Cleaning</b>	Automatic; frequency freely programmable			
<b>Calibration</b>	Automatic, 2-point; frequency freely programmable			
<b>Validation</b>	Automatic; frequency freely programmable			
<b>Interferences</b>	Ions like Silver [(Ag) <sup>+</sup> ] and Mercury [(Hg) <sup>2+</sup> ] have very high interference and can only be tolerated in very low concentrations relative to the S <sup>-</sup> ideally they should be absent. Fats, Oil, Proteins, Surfactants and Tar.			
<b>Measuring ranges</b>	<b>% of range - Dilution</b>		<b>Low range (mg/L)</b>	<b>High range (mg/L)</b>
	B	25% of standard range	1	25
	C	50% of standard range	1	50
	<b>0</b>	<b>standard range</b>	<b>1</b>	<b>100</b>

### 3. Analysis method

#### Summary

The Sulphide ( $S^{2-}$ ) concentration is determined by a discontinuous, direct measurement using an ionselective electrode.

#### Analysis steps

The analysis vessel is flushed with fresh sample. The SAO [S(ulphide) A(nti) O(xidant)] buffer solution will be added to the sample in order to assure sulphide doesn't oxidize and stays in the sample. The potential of the sample solution is measured. With the obtained value, the analyzer calculates the sulphide concentration in the sample.

#### Calibration


The calibration procedure measures a REF1  $S^{2-}$  solution (channel 9, REF1 valve) and a REF2  $S^{2-}$  solution (channel 10, REF2 valve) to adapt the slope and offset factors by means of a two-point calibration.


The calibration is performed in the MAIN method.

#### Remark

The methods cannot be started at the same time.

## 4. Reagents

<b>⚠ CAUTION</b>	
	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.

<b>⚠ CAUTION</b>	
	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 litre 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/5 min	Recommended containers
Buffer solution	~ 0.1 mL / analysis	< 1 L	Glass – 2.5 L
REF1 solution	~ 0.5 L / calibration	/	Plastic – 1 L
REF2 solution	~ 0.5 L / calibration	/	Plastic – 1 L

### 4.2 DI-water overview and consumption

	Rinse water (mL/analysis) Type I	Dilution water (mL/analysis) Type I	Total (mL/analysis)	Consumption/28 days A rata 1 analysis / 5 min
B	N.A.	N.A.	N.A.	N.A.
C	N.A.	N.A.	N.A.	N.A.
0	N.A.	N.A.	N.A.	N.A.

## 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.

### Quality of DI-water

All EZ analysers are tested with standard solutions, reagents and dilution water prepared using type I water or better as defined by ASTM D1193-91.

To achieve the specifications as stated on the data sheet, method and reagents sheet and acceptance test reports, the same water quality (or better) must be used for the preparation of the standard solutions, reagents and dilution water.

Additionally the water used for the preparation of the standard solutions for an EZ analyser must be free of the parameter or any of the interferences for the method of that EZ analyser.

### 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 Buffer solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Sodium Hydroxide	NaOH	40.00	1310-73-2	80 g
EDTA*	C <sub>10</sub> H <sub>14</sub> N <sub>2</sub> Na <sub>2</sub> O <sub>8</sub> * 2H <sub>2</sub> O	372.2	6381-92-6	67 g
Ascorbic acid	C <sub>6</sub> H <sub>8</sub> O <sub>6</sub>	176.12	50-81-7	35 g

\*ethylenediaminetetraacetic acid disodium salt dihydrate

### Preparation

Add 80 g sodium hydroxide (NaOH) and 67 g EDTA in 500 mL freshly boiled de-ionized water and dissolve completely. Be careful this solution becomes hot. Let the solution cool down completely. Add 35 g ascorbic acid (C<sub>6</sub>H<sub>8</sub>O<sub>6</sub>) to 250 mL freshly boiled de-ionized water and dissolve completely. Mix the 2 solution together in a volumetric flask of 1000 mL. Fill up to the mark grade with freshly boiled de-ionized water.

**The buffer solution should be colourless to yellow. If the colour of the solution is brown, it cannot be used. Replace the solution every 2 weeks to guarantee optimal analysis results. Store this solution in a dark bottle.**

## 4.5 Calibration solution

Due to limited stability of sulphide in aqueous solutions, it is recommended to use freshly prepared stock and standard solutions for each calibration. The standard solutions (REF1 and REF2) must be used immediately after preparation. The stock solution is stable for at least one day after preparation when stored on a cool ( $\pm 4^{\circ}\text{C}$ ), dark place.

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Sodium sulfide nonahydrate	Na <sub>2</sub> S * 9H <sub>2</sub> O	240.18	1313-84-4	74.92 g

### Preparation

#### 10000 mg/L Sulphide stock solution

Prepare a stock solution of 10000 mg/L Sulphide: Dissolve accurately 74.92 g sodium sulphide nonahydrate (Na<sub>2</sub>S \* 9H<sub>2</sub>O) in 500 mL freshly boiled de-ionized water using a volumetric flask of 1000 mL. Fill up to 1 litre with de-ionized water.

**S<sup>2-</sup> standard solution – REF2**

Prepare a standard solution for calibration according to the following table: take accurately 500 mL of the buffer solution and transfer into a volumetric flask of 1000 mL. Add x mL of the 10000 mg/L S<sup>2-</sup> stock solution and add freshly boiled de-ionized water up to the mark grade.

	Measuring range	Concentration REF2	Amount of stock solution to add to 1 litre
B	25 mg/L S <sup>2-</sup>	25 mg/L S <sup>2-</sup>	2.5 mL
C	50 mg/L S <sup>2-</sup>	50 mg/L S <sup>2-</sup>	5.0 mL
0	100 mg/L S <sup>2-</sup>	100 mg/L S <sup>2-</sup>	10.0 mL

**S<sup>2-</sup> standard solution – REF1**

Prepare a standard solution for calibration according to the following table: take accurately 500 mL of the buffer solution and transfer into a volumetric flask of 1000 mL. Add x mL of the 10000 mg/L S<sup>2-</sup> stock solution and add freshly boiled de-ionized water up to the mark grade.

	Measuring range	Concentration REF1	Amount of stock solution to add to 1 litre
B	25 mg/L S <sup>2-</sup>	2.5 mg/L S <sup>2-</sup>	0.25 mL
C	50 mg/L S <sup>2-</sup>	5 mg/L S <sup>2-</sup>	0.5 mL
0	100 mg/L S <sup>2-</sup>	10 mg/L S <sup>2-</sup>	1.0 mL

**4.6 Cleaning solution (facultative)**

The cleaning procedure should prevent any build-up of chemicals in the analyser. To obtain an effective cleaning procedure one has to test the cleaning solution and the cleaning interval for each application. Perform the selected cleaning solution and interval for a trial period, check then the effectiveness of the procedure and change if necessary.



<b>Change Information</b>	
Date: 17/01/2023	Previous version: Edition 2 to Edition 1.01
<b>Reason for Change</b>	
<ul style="list-style-type: none"><li>- Addition of water consumption</li><li>- Addition of information reagents</li></ul>	
<b>Description of Change</b>	
<ul style="list-style-type: none"><li>- Addition of estimated consumption of water for rinse and dilution (chapter 4.2)</li><li>- Addition of extra information regarding storage and quality of reagents (chapter 4.3)</li></ul>	