

## Arsenic

M68

0.02 - 0.6 mg/L As

Silver Diethyldithiocarbamate

### Instrument specific information

The test can be performed on the following devices. In addition, the required cuvette and the absorption range of the photometer are indicated.

Instrument Type	Cuvette	$\lambda$	Measuring Range
SpectroDirect, XD 7000, XD 7500	□ 20 mm	507 nm	0.02 - 0.6 mg/L As

### Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
for chemicals see manual, reagents at specialized chemistry dealer		

### Application List

- Drinking Water Treatment
- Raw Water Treatment

### Preparation

The following reagents need to be purchased:

1. 40 % Sulfuric Acid p.a. ( $\text{H}_2\text{SO}_4$ , CAS-Number: 7664-93-6)
2. 8.33 g Potassium Iodide (KI, CAS-Number: 7681-11-0) in 50 ml of deionised water  
Note: stored in a dark bottle it can be used for 1 week
3. 4.0 g Tin(II)-chloride-Dihydrate ( $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ , CAS-Number: 10025-69-1) in 10 ml Hydrochloric Acid 25 % (HCl, CAS-Number: 7647-01-0)
4. 2.0 g Zinc (Zn, CAS-Number: 7440-66-6, particle size about: 0.3-1.5 mm)
5. Absorption solution:  
Dissolve 0.25 g Silver diethyldithiocarbamate ( $\text{C}_5\text{H}_{10}\text{AgNS}_2$ , CAS-Number: 1470-61-7) and 0.02 g Brucine ( $\text{C}_{23}\text{H}_{26}\text{N}_2\text{O}_4$ , CAS-Number: 357-57-3) in 100 ml 1-Methyl-2-pyrrolidone p.a. (As < 10 ppb, Sb < 10 ppb,  $\text{C}_5\text{H}_9\text{NO}$  CAS-Number: 872-50-4) and store in a dark bottle.  
If it is not possible to dissolve completely, stir for min. 1 hour and filtrate to get a clear solution.



## Notes

1. Appropriate safety precautions and good laboratory technique must be used during the whole procedure.
2. Reagents are to be obtained from chemical retailers. Notes on the disposal and handling of reagents can be found on the respective safety data sheets.
3. Only use completely dry glass vessels.
4. Use of a rectangular cell, 20 mm layer depth (Order No.: 60 10 50). Positioning: Insert the cell to the left in the cell holder.
5. Store Silver diethyldithiocarbamate at 4 °C.
6. Stored in the dark at max. 20 °C, the absorption solution can be kept for about 1 week.



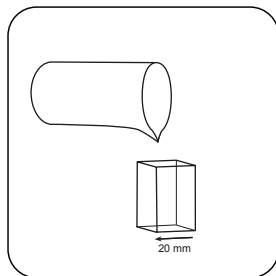
## Determination of Arsenic (III, IV)

Select the method on the device.

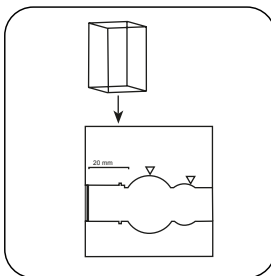
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500

### Sample preparation: Adhere to reaction times exactly!

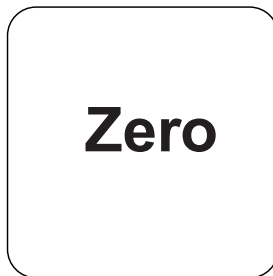
1. Build up the **dry** reaction equipment in the outlet (toxic steam!).
2. Use a pipette to put **50 mL sample** into a 100 mL conical flask (NS 29/32).
3. Add **30 mL of sulphuric acid, 2.0 mL of potassium iodide solution and 0.3 mL of Zinc (II) chloride solution** to the sample.
4. Close the flask with the plug seal, invert and leave to stand for **15 minutes**.
5. Weigh **2.0 g Zinc** and prepare.
6. Fill the absorption tube with exactly **5.0 mL absorption solution**. (Use a volumetric pipette).
7. After 15 minutes reaction time, place the prepared amount of zinc in the Erlenmeyer flask and **immediately close** it with the prepared absorption tube.
8. Arsenic hydrogen development (**strong!**) starts. **60 minutes** Wait for reaction time.



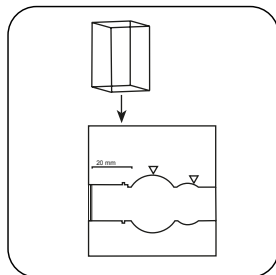
Fill **20 mm vial** with **deionised water**.



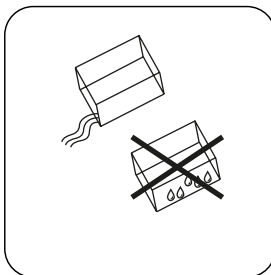
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



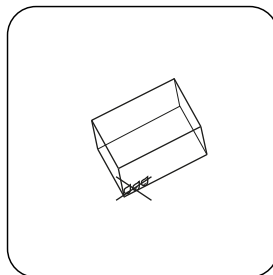
Press the **ZERO** button.



Remove **vial** from the sample chamber.

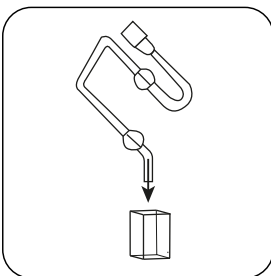


Empty vial.

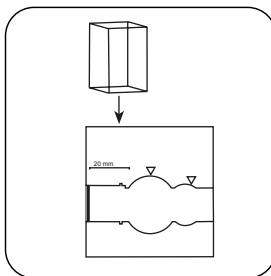


Dry the vial thoroughly.

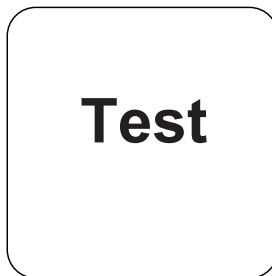
For devices that require **no ZERO measurement**, start here.



Fill 20 mm vial with the coloured absorption solution.

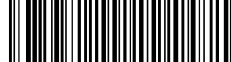


Place **sample vial** in the sample chamber. • Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.

The result in mg/L Arsenic appears on the display.



## Chemical Method

Silver Diethyldithiocarbamate

## Appendix

### Calibration function for 3rd-party photometers

$$\text{Conc.} = a + b \cdot \text{Abs} + c \cdot \text{Abs}^2 + d \cdot \text{Abs}^3 + e \cdot \text{Abs}^4 + f \cdot \text{Abs}^5$$

	□ 20 mm
a	$-6.96705 \cdot 10^{+0}$
b	$4.41627 \cdot 10^{+2}$
c	
d	
e	
f	

## Interferences

### Persistent Interferences

1. Antimony, selenium, and tellurium react in the same way as arsenic.
2. Thiosulfate interferes with the test.

### Bibliography

G. Ackermann, J. Köthe: Fresenius Z. Anal. Chem. 323 (1986), 135

### Derived from

DIN EN 26595

ISO 6595