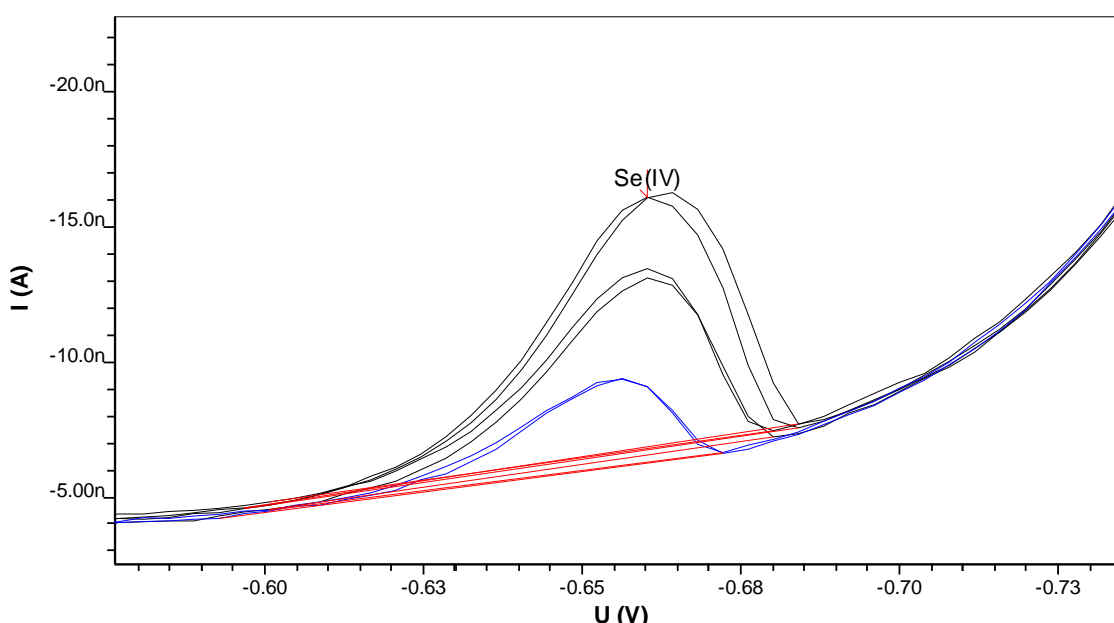


# Total selenium in drinking water after reduction of Se(VI) to Se(IV) with the 909 UV Digester



The concentration of Se(IV) can be determined by cathodic stripping voltammetry (CSV) in ammonium sulfate electrolyte in the presence of Cu. To determine the total selenium concentration, Se(VI) has to be reduced to Se(IV).

With the 909 UV Digester, this reduction can be done nearly reagent free. Only the pH has to be adjusted to 7–9. In this way, also speciation between Se(IV) and Se(VI) is possible. Direct measurement of the sample gives the Se(IV) content; after sample preparation, the total amount of Se is determined.

## Results

Se(total) in drinking water

1.1 µg/L

# Method description

## Sample

Drinking water

\*e.g., Merck suprapur®, Sigma-Aldrich TraceSelect® or equivalent.

## Instruments

797 VA Computrace & 909 UV Digester



## Solutions

EDTA solution      c(EDTA) = 0.1 mol/L

## Analysis

Measuring solution      10 mL irradiated drinking water  
 + 3.3 g (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>  
 + 1 mL EDTA solution  
 + 0.1 mL Cu standard stock solution  
 → pH adjusted to 2.2 with H<sub>2</sub>SO<sub>4</sub>

## Sample preparation

To reduce Se(VI) to Se(IV), 10 mL drinking water (pH 7 – 9) are pipetted into the 12 mL quartz sample vessels. The sample holder with the 12 quartz sample vessels is placed in the 909 UV Digester and irradiated at 90 °C for 60 min.

## Parameters 797 VA Computrace

Working electrode	HMDE
Stirrer speed	2000 rpm
Mode	DP
Purge time	300 s
Deposition potential	-0.4 V
Deposition time	30 s
Equilibration time	10 s
Start potential	-0.45 V
End potential	-0.85 V
Pulse amplitude	0.05 V
Pulse time	0.04 s
Voltage step	0.004 V
Voltage step time	0.1 s
Sweep rate	0.04 V/s
Peak potential Se(IV)	-0.66 V

## Parameters 909 UV Digester

Temperature	90 °C
Irradiation time	60 min

## Electrodes

Multi-Mode Electrode pro	6.1246.120
Silanized capillaries	6.1226.050
Ag/AgCl/KCl (3 mol/L) reference electrode. Bridge electrolyte c(KCl) = 3 mol/L	6.0728.020 6.1245.010
Separate Pt rod electrode	6.0343.000

## Reagents

(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	Ammonium sulfate, for trace analysis*, 99.9999%
Cu standard stock solution	β(Cu(II)) = 1 g/L
EDTA	Ethylenediaminetetraacetic acid disodium salt dihydrate, 99%
H <sub>2</sub> SO <sub>4</sub>	Sulfuric acid, for trace analysis*, ≥ 95%

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