

Determination of Mercury in Water Samples by HG-AFS

Mercury and its compounds are highly toxic materials and can be transferred into the human body via water; the concentration of mercury in water generally is very low. With the superior sensitivity of atomic fluorescence spectrometer, direct measurement of mercury in water sample is possible.

1. Major equipment and reagents.

Mercury stabilization solutions:

Dissolve 0.5g $K_2Cr_2O_7$ in 950 mL water, add 50ml nitric acid.

Mercury standard solutions:

Prepare or commercial available mercury standard at 100ppm, diluted to 10ppb with mercury stabilization solution as above.

$KMnO_4$ solution, 50g/L.

Potassium persulfate solution, 50 g/L

$SnCl_2$ solution:

Add 100g $SnCl_2$ in 100 mL concentrated HCl, water bath to totally dissolved, add water to 1000 mL.

NaCl- NH_2OH solution, 120 g/L

AI3300 atomic fluorescence spectrometer with Hg lamp.

High pure distilled water.

High pure argon (>99.99%)

2. Method

Place 25mL water sample in a 50mL flask, add 4mL concentrated H_2SO_4 , 2.5mL $KMnO_4$ solution, and 1.0mL potassium persulfate solution, in a boiling water bath for 1 hr. Take the flask from the bath and cool it down. Before measurement, add NaCl- NH_2OH solution to the color of $KMnO_4$ until the color disappears, then add water until the total volume is 50mL. Use the final solution for measurement.

3. Instrument parameters

Carrier gas	300mL/min
Shield gas	800mL/min
HCL current	30mA
PMT voltage	360V
Integration time	6 s
Pump speed	40 r/min
Reducing reagent solution	10% $SnCl_2$ in 10% HCl (V/V)

4. Results

This method gives:

Detection limit: 0.25ppb,

Recovery rate: 98~117%

Relative standard deviation: 2~6%

