Aurora
ILLUMINATING SOLUTIONS

Application Notice #AA-6

Application Procedure for the Determination of Selenium in Blood Plasma

Introduction:

Selenium is extremely susceptible to sublimating out of the sample solution at relatively low temperatures due to its low melting point. Therefore, selenium is a very difficult element to analyze in atmospheric conditions. To accurately determine the selenium concentration, care must be taken in all steps of sample preparation to prevent sample volatilization from occurring.

Usually, selenium volatilization is eliminated by using a matrix modifier such as nickel (60 - 500ppm) which forms a less volatile nickel -selenium alloy, stable up to about 1300°C. When the sample is ashed most organic materials will be destroyed while the nickel-selenium alloy remains stable. Consequently, at 1300 °C when atomization of the selenium occurs, background absorbance will be minimized causing the Se signal to be enhanced.

Sample Preparation Procedure:

1. Thaw the plasma samples at room temperature for 15-20 minutes.
2. Homogenize the samples by slowly vortexing.
3. Dilute the plasma with deionized water in a 1:1 ratio directly a into microplate. (160µL plasma + 160µL water is a good volume)
4. Mix to homogenize for 2-3 minutes with a microplate mixer (Remark: the sample will be injected directly without digestion).
5. Plasma Controls should be prepared identically as above.

Standard Preparation:

The standards for the calibration curve are to be made up from a known concentration of Utak High Control # 8550 (301µg/L Se)

Standard No.	Utak High Control Volume (µL)	Water volume (µL)	Concentration (ppb)
1	16	286	20
2	40	262	50
3	80	222	100
4	120	182	150

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Operating Conditions:

Instrumentation: Aurora Trace Series GFAAS
Parameter of settings: Injection Volume - 20 µL
Modifier added: 10 µL 60 ppm Ni solution (made of $NiCl_2 \bullet 6H_2O$) in 0.05 M Hcl)

AURORA INSTRUMENTS: Trace Series GFAAS	
Method Name	plasma-se
Element Name	Se
Instrument Mode	Absorbance
Display Mode	Corrected
Manual Band Pass	0.7nm
Lamp 1 Current	8.0 mA
Lamp 2 Current	0.0 mA
Wavelength	196.00nm
PMT Voltage	481.0V
Preheat Steps	0
Cooling Time	60s
Inject Speed	5
Furnace Profile Steps	9

Step	final temp	ramp time	hold time	Gas Flow	Plasma ON	Collect Data	Integrate
1	50	0.00	2.00	1.00	Off	Off	Off
2	160	40.00	1.00	1.00	Off	Off	Off
3	300	6.00	2.00	1.00	Off	Off	Off
4	900	2.00	15.00	1.50	Off	Off	Off
5	1200	1.00	6.00	1.50	Off	Off	Off
6	1300	0.00	1.00	1.50	Off	On	Off
7	2100	0.00	1.00	0.50	Off	On	On
8	80	0.00	1.00	1.50	Off	On	Off
9	50	0.00	15.00	1.50	Off	Off	Off

Note: Normal Concentration of Selenium in Blood Plasma is expected to be in the range of 30-200ppb

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