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# Determination of Manganese in Urine with GF mode in AAS

Analyzing manganese in urine using Atomic Absorption Spectroscopy (AAS) is a common method in clinical and environmental laboratories. AAS is a sensitive and reliable technique for determining the concentration of various metals, including manganese, in biological samples like urine. Here's a general outline of the procedure for manganese analysis in urine using AAS.

## Sample Preparation Procedure

For this analysis, urine samples were acidified to 1% (v/v) with nitric acid and subsequently injected directly into the graphite furnace. If the samples exhibited excessive concentration, they were subject to dilution with deionized water prior to analysis.

## Operating Conditions

- Instrumentation: Aurora Instruments Trace Series
- Injection Volume: 20 uL, manually injected
- Modifier Used: None
- Measurement Mode: Peak height

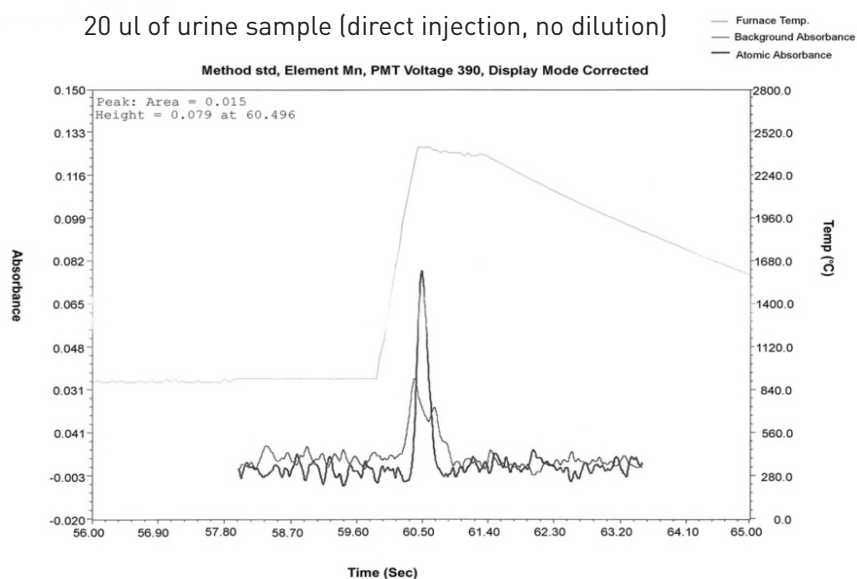
Aurora Instruments TRACE Series	
Method Name	Urine
Element Name	Manganese (Cu)
Instrument Mode	Absorbance
Display Mode	Background corrected
Manual Band Pass	0.1nm
Lamp Current	5.0mA
Wavelength	279.50nm
PMT Voltage	390.0V
Preheat Steps	0
Cooling Time	25 sec
Inject Speed	5
Furnace Profile Steps	7

Step	Final temp (°C)	Ramp time (sec)	Hold time (sec)	Gas flow (L/Min)	Plasma ON	Collect data	Integrate
1	80	0.00	1.00	1.00	Off	Off	Off
2	135	25.00	1.00	1.00	Off	Off	Off
3	900	10.00	20.00	1.00	Off	Off	Off
4	950	0.00	2.00	0.50	Off	On	Off
5	2400	0.00	1.50	0.50	Off	On	On
6	30	0.00	2.00	1.00	Off	On	Off
7	30	0.00	2.00	1.00	Off	Off	Off

## Analytical Results

Sample ID	Replicates	Standard Conc. (ng/ml)	Peak Height	Calculated Conc. (PH) (ng/ml)	% RSD (PH)
Mn std	1	0.000	0.0119	-0.0085	N/A
Mn std	1	0.500	0.0968	0.5354	N/A
Mn std	1	1.000	0.1643	0.9679	N/A
Mn std	1	1.500	0.2469	1.4970	N/A
Mn std	1	2.000	0.3267	2.0082	N/A
Urine #1	8		0.0758	0.4012	4.4980
Urine #1, spiked with 1 ng/mL Mn	8		0.2280	1.3757	4.9120

The manganese concentration in the urine sample was determined to be 0.40 ng/mL. The calculated recovery for the 1 ng/mL manganese added to the urine sample was 97.5%.



## Discussion

It was observed that acidification effectively reduced the background absorbance in many samples. Additionally, there was noticeable variation in background absorbance between different samples. Consequently, when analyzing multiple samples, the selection of an appropriate ashing temperature was crucial to minimize background interference consistently. It's important to note that the maximum recommended ashing temperature is 1000 °C, as temperatures beyond this threshold can result in analyte loss.

The recovery rate of 97.5% for the 1 ng/mL Mn spike and a relative standard deviation (RSD) of less than 5% underscore the exceptional performance of the instrument in terms of accuracy and precision, especially when dealing with such low concentrations. These results affirm that direct concentration calibrations are adequate, obviating the need for standard addition calibrations.

The analysis utilized the 279.5 nm Mn line, which closely interacts with other spectral lines. To achieve the highest sensitivity and linearity, it was imperative to employ the narrowest feasible bandpass. Opting for a bandpass greater than 0.2 nm would have compromised resolution significantly. Hence, the availability of the 0.1 nm bandpass on the Trace Series offered a substantial advantage in this context.