

Aquatic Plant (BCR 060)

Category: Environmental
Technique: CAA

Summary

This technical note will describe the analysis of the Institute for Reference Materials and Measurement's Aquatic Plant CRM (BCR 060), on the Hydra IIc Mercury Analyzer. This method utilized the moisture control system as described in Teledyne Leeman Labs Application Note – AN1701 ([Viewable Here](#)), to enhance the performance of the Hydra IIc in standard direct combustion mode for total mercury determination in this matrix.

Sample pretreatment and the generation of wastes associated with wet chemistry are eliminated when using the Hydra IIc mercury analyzer in standard combustion mode for the determination of total mercury in this SRM.

Weighed samples are introduced into the analyzer using an automated sequence and the unattended analysis of each individual sample was completed in ~6.0 minutes.

Direct analysis of mercury content by Thermal Decomposition is described in methods USEPA 7473 and ASTM 6722 and 7623.

Instrumentation

Hydra IIc CVAA Combustion Analyzer, Envoy software version 2.2, quartz boats (calibration), nickel boats (samples), analytical balance, disposable spatulas, pipette and tips, labware/reagents for calibration standard preparation.

Method Parameters

| | °C | Seconds | Other |
|-----------------------|-----|---------|------------|
| Drying | 300 | 45 | |
| Catalyst | 600 | 30 | |
| Decomposition* | 800 | 120 | |
| Oxygen Flow | | | 350 ml/min |
| Integration | | 100 | |
| Amalgamator | 700 | 40 | |

* A controlled increase to Decomposition Temperature was used. Add or edit the Temperature Ramp startup.ini file line to: "TempRamp 60".

Calibration

Aqueous standards were prepared in 1% HNO₃ acid for mercury stability.

| | |
|--------------------|--------------------------------------|
| Low Concentration | Blank, 0.1, 0.5, 1, 2, 5, 10, 20 ng |
| High Concentration | 50, 100, 200, 400, 600, 800, 1000 ng |

Sample Weight

Sample weight average was ~0.035 g.

Procedure

1. Homogenize the sample in the container
2. Tare boat(s) and add sample(s) into boat(s)
3. Load boats onto the sample boat shuttle
4. Run Hydra IIc in standard mode using an automated sequence

Results

| | ng/g | |
|----------------------------|----------------------|-----------------|
| Coal Fly Ash SRM 1005 ng/g | 996.98 | 99.2 % Recovery |
| BCR 060 | 335.45 | |
| BCR 060 | 345.67 | |
| BCR 060 | 336.68 | |
| BCR 060 | 351.61 | |
| BCR 060 | 329.49 | |
| BCR 060 | 351.04 | |
| BCR 060 | 348.20 | |
| Avg | 342.59 ± 6.42 @ 95 % | |
| STDEV | 8.67 | |
| MDL | 16.85 @ 95 % | |
| Min | 329.49 | |
| Max | 351.61 | |
| Coal Fly Ash SRM 1005 ng/g | 985.28 | 98.0 % Recovery |

Conclusion

The QC recoveries of 98 to 99.2% demonstrate that the system is in control and stable. The certified value for BCR 060 is 340 ± 40 ng/g.

With the addition of the moisture control system, the Hydra IIc in standard mode is an ideal system for determination of mercury in Aquatic Plant (BCR 060).