

Kerosene

Category: Petrochemical
Technique: CAAVHC

Summary

Determination of total mercury in kerosene (Boiling Point: 190 - 250 °C, Auto-ignition Temperature: No Data Available) can be performed using the Hydra IIc mercury analyzer in Volatile Hydrocarbon (VHC) mode. The analysis does not require sample pretreatment or wet chemistry.

This technical note will demonstrate the capabilities of the Hydra IIc in VHC mode for total mercury determination by direct combustion of kerosene. The system was also configured with an enhanced moisture control system as described in Teledyne Leeman Labs Application Note – AN1701 ([Viewable Here](#)).

A weighed sample is introduced into the Hydra IIc and the uninterrupted analysis is completed in 13 minutes. It should be noted that 5 minutes of the total time is wait time between samples, during which the furnace cools to an injection temperature that will avoid sample auto-ignition during the injection phase.

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

Instrumentation

Hydra IIc direct combustion CVAA analyzer, Envoy Software Version 2.2, quartz boats (calibration), nickel boats (samples), analytical balance, spatula, pipette and tips, diatomaceous earth, labware and reagents for aqueous standard preparation.

Method Parameters

	°C	Seconds	Other
Drying	150	60	Default @ Min. Time
Catalyst	600	30	
Decomposition	800	180	
Oxygen Flow			350 mL/min
Integration		80	
Amalgamator	600	30	

Calibration

Aqueous standards prepared in 1% HNO₃, various weights added to quartz boats for total mass in ng of Hg as listed.

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

Sample Weight

~80 mg (Max. Weight ≤ 80 mg)

Procedure

1. Add ~100 mg of diatomaceous earth to a nickel boat
2. Tare boat(s) and add sample(s) into boat(s) – max. weight of 80 mg
3. Load boats onto the sample boat shuttle
4. Run Hydra IIc in VHC mode using an automated sequence

Results

	ng/g	
Oil Standard QC 100 ng/g	98.54	98.5 % Recovery
Coal Fly Ash SRM 1005 ng/g	999.68	99.5 % Recovery
Oil Standard QC 1000 ng/g	1058.54	105.9 % Recovery
Hg in Kerosene 1	0.86	
Hg in Kerosene 2	0.54	
Hg in Kerosene 3	0.58	
Hg in Kerosene 4	0.36	
Hg in Kerosene 5	0.61	
Hg in Kerosene 6	0.25	
Hg in Kerosene 7	0.44	
Avg	0.52 ± 0.15	@ 95 %
STDEV	0.20	
MDL	0.39	@ 95 %
Min	0.25	
Max	0.86	
Spike	6.25	81 % Recovery
Oil Standard QC 100 ng/g	100.58	100.6 % Recovery

Conclusion

The QC recoveries demonstrate that the system is in control and stable. The calculated MDL for this analytical system under these condition is ≤ 0.39 ng/g, therefore all the kerosene values would be < a typical LOQ.

The spike consisted of 77 mg kerosene and 6 mg of 100 ng/g oil standard. At a 100% recovery value, the ng/g value would have been 7.68 with a weight corrected value (0.083 g) of 0.48 ng/g contribution from Kerosene and 7.2 ng/g from the oil standard.

The Hydra IIc in VHC mode is an ideal system to precisely determine the concentration of Hg in light to heavy petroleum distillates.