ADA Carbon Solutions

"On-site determination of the quality of commercial sorbents for the removal of mercury from combustion and process gas streams."

How to Evaluate Mercury Sorbent?

Ash?

Moisture?

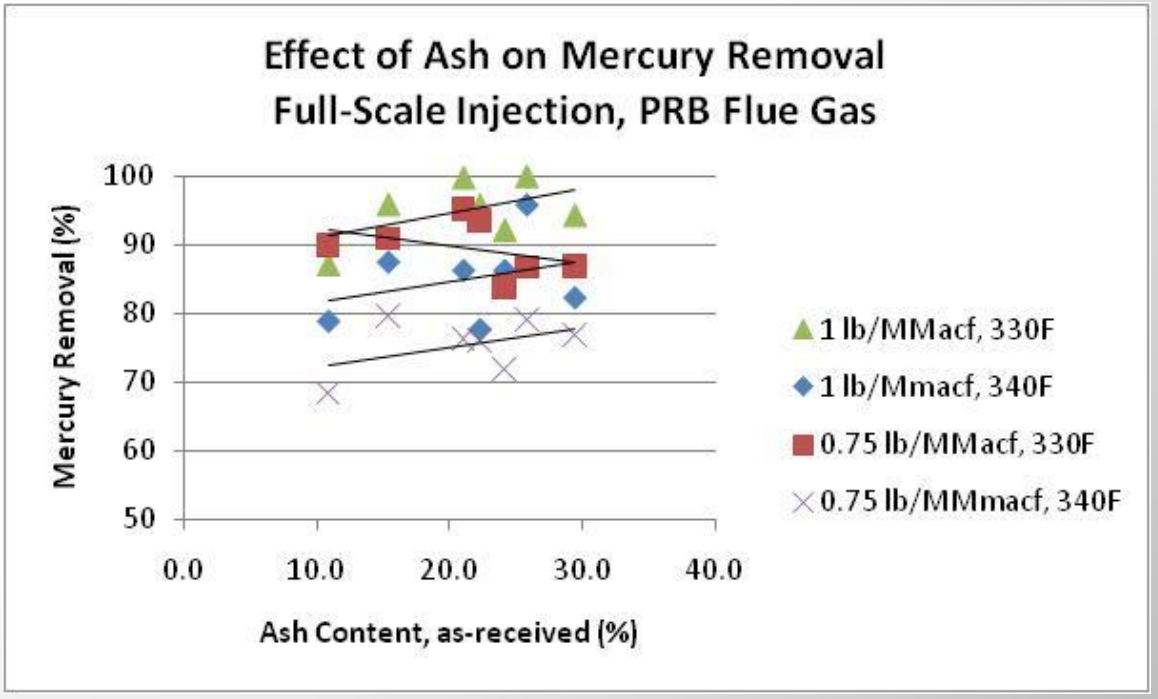
Tannin Value?

Iodine Number?

Methylene Blue?

Molasses Number?

Ash (Mineral Content)

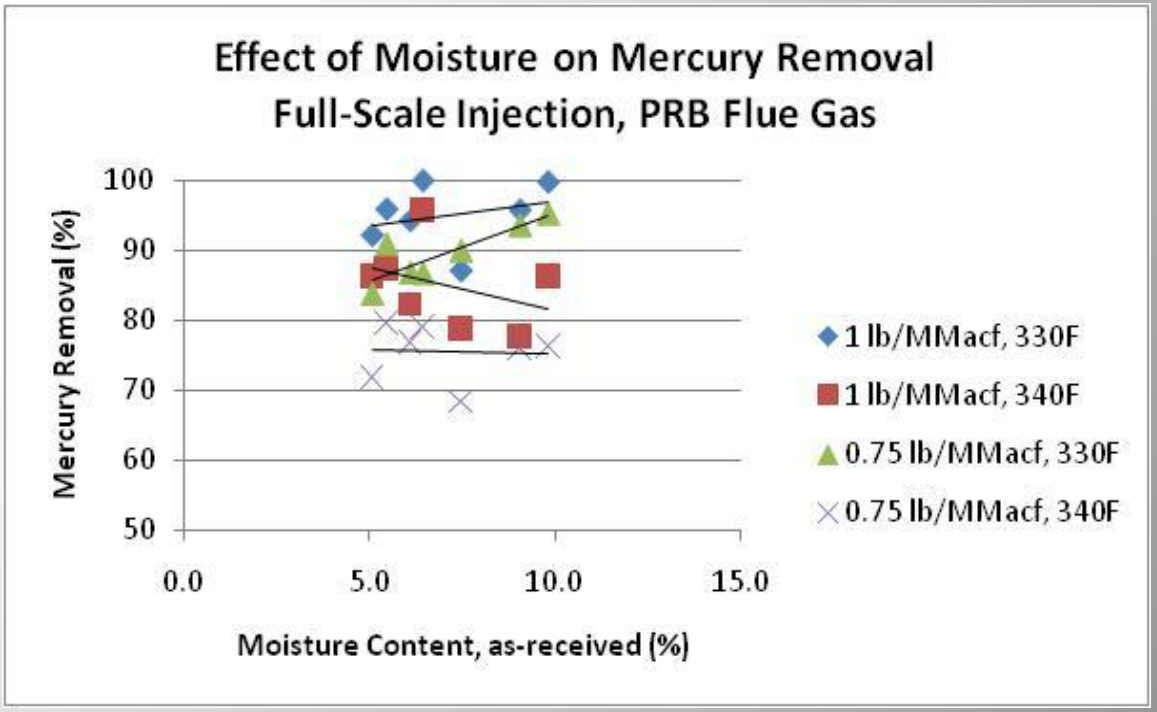


1. Activated carbon and the mineral content is the flue gas mercury sorbent
2. Mineral component is not added as a diluent
3. Activated carbon mineral sorbents may contain 10% silicates
4. Higher mineral content in sorbent provides reduced LOI in recovered fly ash
5. Mineral content may provide acid gas, dioxin and furan sorption

Mineral Content Is Not Directly Proportional to Mercury Removal

Moisture

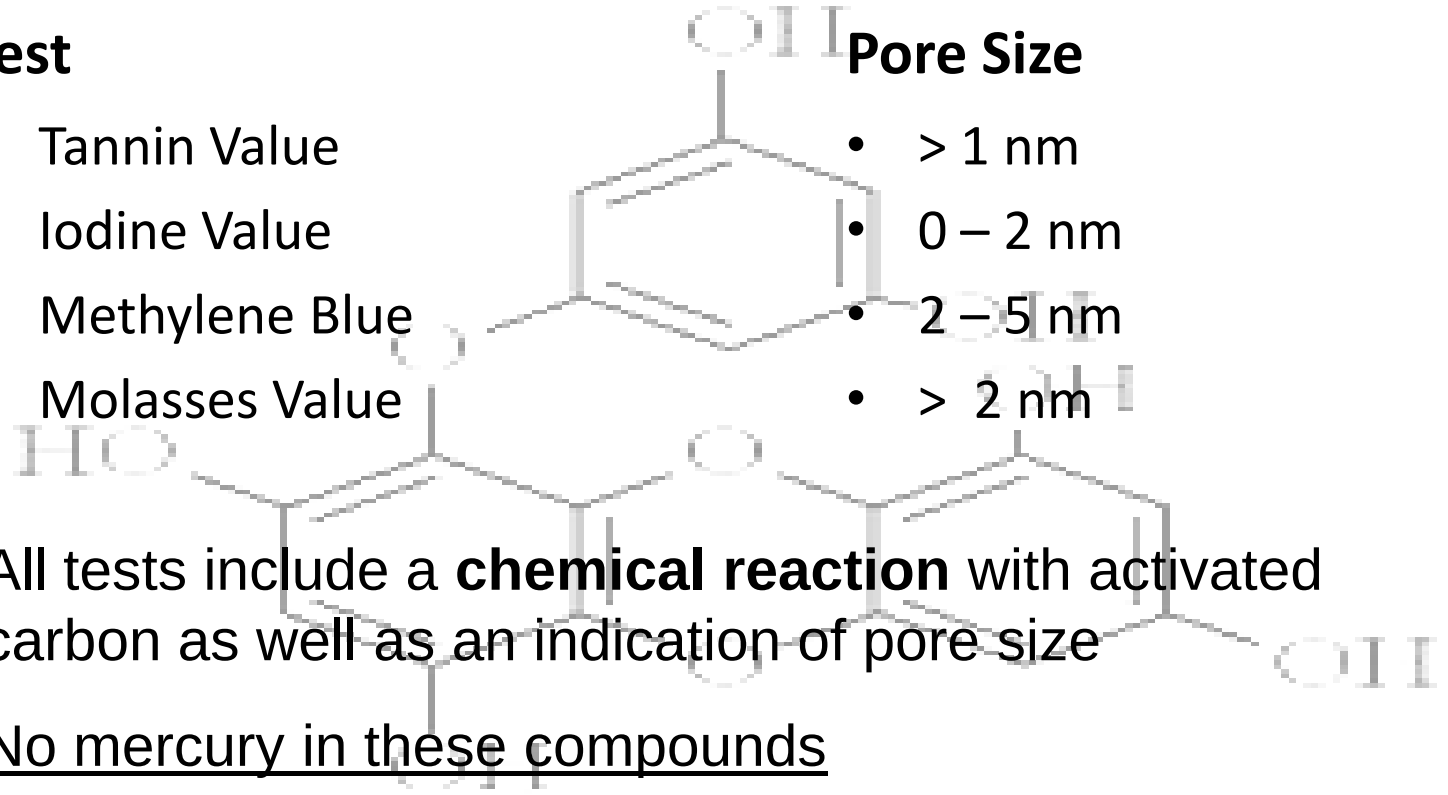
1. Full scale testing
2. Pound per Pound sorbent injection
3. Moisture content between 5% and 10% produced effective mercury capture



Moisture Content Is Not Directly Proportional to Mercury Removal

Measurement of Pore Size

Test	Pore Size
• Tannin Value	• > 1 nm
• Iodine Value	• 0 – 2 nm
• Methylene Blue	• 2 – 5 nm
• Molasses Value	• > 2 nm



All tests include a **chemical reaction** with activated carbon as well as an indication of pore size

No mercury in these compounds

Surrogate Pore Size Measurements Are Not Reliable Methods For Predicting Mercury Removal

Problem ???

Ash?

Moisture?

Tannin Value?

Iodine Number?

Methylene Blue?

Molasses Number?

- Variables
  - ✓ Coal Type
  - ✓ Chloride Content
  - ✓ Temperature
  - ✓ SO_3/SO_2 Ratio and Content
  - ✓ Capture Time
  - ✓ NO_x Content
  - ✓ PM Removal
  - ✓ ??????????

Solutions

Option 1 – Full Scale Plant Test

PROS

- Test with actual conditions
- Highest predictive capability for mercury removal in a specific environment
- Quantitative & Qualitative

CONS

- Expensive
- Requires on site CEMS capability
- Time consuming
- Requires production scale quantities and often presents challenges for sorbent to sorbent comparisons (changing variables)

Most Predictive Approach but Time Consuming and Expensive

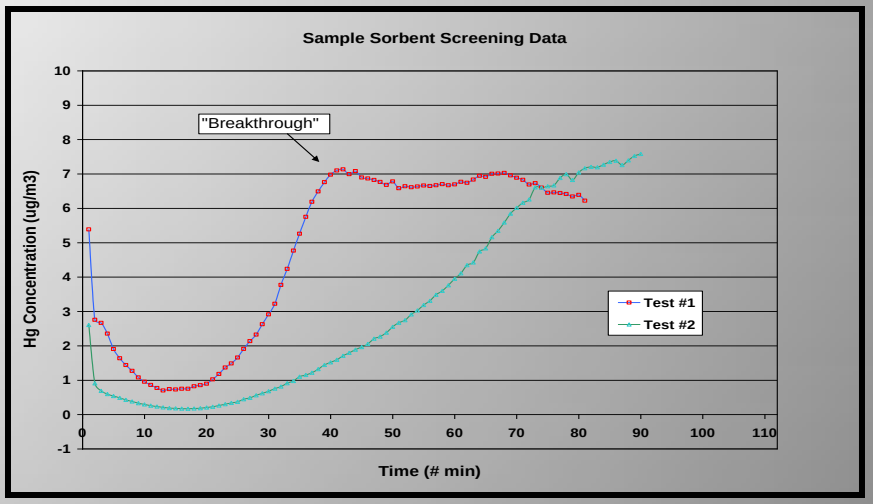
Option 2 – Sorbent Screening Device

PROS

- Uses actual flue gas
- Allows most sorbent to sorbent comparison under same or similar conditions
- Can be run over a period of days
- Can use sample quantities of carbon sorbent
- Removal curve can provide insight into sorbent behavior; minimum achieved, time to breakthrough, etc.

CONS

- Moderately expensive
- Requires time for setup, actual testing and removal of test equipment(5-7 days depending on number of sorbents to be tested)
- Not practical as a QC tool



Best Approach to Compare Sorbent Performance Under Actual Flue Gas Conditions

Option 3 – Mercury Number

DESCRIPTION

- Fixed bed test using vapor phase mercury capture
- ADA-ES and ACS have collaborated to further improve and refine this test that can provide more meaningful predictive mercury removal data
- Field reliability testing scheduled for first quarter

ADVANTAGES

- ✓ Can apply in lab environment under controlled conditions or apply in the field with actual flue gas
- ✓ Most efficient and lowest cost
- ✓ Portable and practical as a lab/QC test
- ✓ Can quickly get meaningful data
- ✓ Can enhance rapid proto-typing and optimization efforts

A Better Measurement of Sorbent Value in Use

Thank You EUEC

- Thank You Contributors
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The Mercury Experts