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## **SOP for Muffle Furnace Baking of Sodium Sulfate, Glass wool, Sodium Chloride and Sand**

Access to this SOP shall be available within the laboratory for reference purposes; the official copy of this SOP resides on the official Georgia EPD website at <https://epd.georgia.gov/about-us/epd-laboratory-operations>. Printed copies of this SOP will contain a watermark indicating the copy is an uncontrolled copy.

### **1 Scope and Application**

- 1.1 This SOP will detail the procedure on how to properly bake sodium sulfate, glass wool, sodium chloride (salt) and sand to eliminate any possible organic contaminants.

### **2 Definitions**

- 2.1 Refer to Section 3 and Section 4 of the Georgia EPD Laboratory Quality Assurance Manual for Quality Control definitions.

### **3 Interferences**

- 3.1 Organic interferences may come from the manufacturing process which may inhibit or interfere with the extraction of many of the analytical EPA methods performed in the EPD Organics Laboratory involving Drinking Water, Surface Water and Soil/Sludge samples.

### **4 Safety**

- 4.1 Refer to Georgia EPD Laboratory Chemical Hygiene Plan, online revision.

## **5 Apparatus and Equipment**

- 5.1 Muffle Furnace – Capable of reaching and maintaining a temperature at or equal to 450°C – Thermo Scientific Thermolyne F30420C or equivalent.
- 5.2 Glass baking dishes – Capable of handling temperatures greater than or equal to 450°C.
- 5.3 Glass pestle
- 5.4 Glass funnel
- 5.5 Scissors
- 5.6 Stainless steel spoons
- 5.7 Stainless steel scoops
- 5.8 Stainless steel sieves
- 5.9 High temperature safety gloves. Capable of handling temperatures to 1000 °C
- 5.10 Glass bottle – Capable of holding 2.5 kg of Sodium Chloride, Sodium Sulfate or Sand
- 5.11 Heavy duty aluminum foil

## **6 Reagents**

- 6.1 Sodium Sulfate, Na<sub>2</sub>SO<sub>4</sub> – Pesticide grade, granular, anhydrous. Fisherbrand or equivalent.
- 6.2 Sodium chloride (NaCl) – ACS grade or equivalent
- 6.3 Glass wool – Pyrex 3950 8 µm porosity or equivalent
- 6.4 Sand – Pesticide grade or equivalent

## **7 Sample Collection**

- 7.1 Not Applicable

## **8 Calibrations**

- 8.1 Not Applicable

## **9 Quality Control**

- 9.1 Not Applicable

## **10 Procedure**

- 10.1 Baking Sodium Sulfate:
  - 10.1.1 Obtain a clean baking dish that will hold 2.5 kg of sodium sulfate.

- 10.1.2 Pour the 2.5 kg of sodium sulfate into the baking dish and spread evenly with a clean stainless steel spoon. Record the manufacturer of the sodium sulfate, the lot # of the sodium sulfate, the volume of sodium sulfate being baked.
- 10.1.3 Place the baking dish with the sodium sulfate into the muffle furnace. Record the start time.
- 10.1.4 Turn on the muffle furnace and set the temperature to 450°C.
- 10.1.5 Note: Muffle Furnace #01 requires about 1 hour to reach 450°C. Check temperature of muffle furnace after 1 hour to make sure that it has reached required temperature.
- 10.1.6 After 5 hours from start time, turn off the muffle furnace and record the end time. Allow it to cool before removing the baking dish (overnight works best). Once the muffle furnace has cooled for a while remove the glass baking dish with high heat safety gloves and place on a cooling rack.
- 10.1.7 Cover the warm sodium sulfate with aluminum foil and allow the temperature of the sodium sulfate to equilibrate to the temperature of the room.
- 10.1.8 Once cooled, if needed use the pestle to break up any large chunks of sodium sulfate.
- 10.1.9 If needed pour some of the baked sodium sulfate into a mesh sieve to break up smaller chunks of sodium sulfate. Make sure to catch the baked sodium sulfate in a clean glass baking dish.
- 10.1.10 Transfer the baked sodium sulfate to a clean 2.5 kg amber glass bottle. It may be necessary to use the funnel for this.
- 10.1.11 Label the freshly baked sodium sulfate with all the necessary information.  
Baked Sodium Sulfate  
Date opened:  
Date baked:  
Manufacturer:  
Lot #:  
Initials:    Date:
- 10.2 Baking Sodium Chloride:
- 10.2.1 Obtain a clean baking dish that will hold 2.5 kg of sodium chloride.
- 10.2.2 Pour the 2.5 kg of sodium chloride into the baking dish and spread evenly with a stainless steel spoon. Record the manufacturer of the sodium chloride, the lot # of the sodium chloride, the volume of sodium chloride being baked.
- 10.2.3 Place the baking dish with the sodium chloride into the muffle furnace. Record the start time.
- 10.2.4 Turn on the muffle furnace and set the temperature to 450°C.

- 10.2.5 **Note:** Muffle Furnace #01 requires about 1 hour to reach 450°C. Check temperature of muffle furnace after 1 hour to make sure that it has reached required temperature.
- 10.2.6 Place the baking dish with the sodium chloride into the muffle furnace and bake for 5 hours. Record the start time.
- 10.2.7 After 5 hours from the start time, turn off the muffle furnace and allow it to cool before removing the baking dish (overnight work best). Once the muffle furnace has cooled for a while remove the glass baking dish with high heat safety gloves and place on a cooling rack. Record the end time
- 10.2.8 Cover the warm sodium chloride with aluminum foil and allow the temperature of the sodium chloride to equilibrate to the temperature of the room.
- 10.2.9 Once cool, if needed use the pestle to break up any large chunks of sodium chloride.
- 10.2.10 If needed pour some of the baked sodium chloride into a mesh sieve to break up smaller chunks of sodium chloride. Make sure to catch the baked sodium chloride in a clean glass baking dish.
- 10.2.11 Transfer the baked sodium chloride to a clean 2.5 kg amber glass bottle. It may be necessary to use the funnel for this.
- 10.2.12 Label the freshly baked sodium chloride with all the necessary information.  
Baked Sodium Chloride  
Date opened:  
Date baked:  
Manufacturer:  
Lot #:  
Initials:    Date:
- 10.3 Baking Glass wool:
- 10.3.1 Obtain a clean baking dish that will hold cut pieces of glass wool.
- 10.3.2 Take a clean pair of scissors and cut the glass wool into 1 inch plugs. Fill the glass baking dish with as much glass wool to fill the baking dish to about 1 inch above the rim. Record the manufacturer of the glass wool, the lot # of the glass wool, the approximate volume or weight of glass wool being baked.
- 10.3.3 Place the baking dish with the glass wool into the muffle furnace and set the temperature to 450°C. Record the start time.
- 10.3.4 **Note:** Muffle Furnace #01 requires about 1 hour to reach 450°C. Check temperature of the muffle furnace after 1 hour to make sure that it has reached required temperature.
- 10.3.5 After 5 hours from the start time, turn off the muffle furnace and allow it to cool before removing the baking dish (overnight works best). Once the muffle furnace

has cooled for a while remove the glass baking dish with high heat safety gloves and place on a cooling rack. Record the end time.

- 10.3.6 Cover the warm glass wool with aluminum foil and allow to the temperature of the glass wool to equilibrate to the temperature of the room.
- 10.3.7 Transfer the baked glass wool to a 2.5 kg amber glass bottle.
- 10.3.8 Label the freshly baked glass wool with all the necessary information.

Baked Glass Wool

Date opened:

Date baked:

Manufacturer:

Lot #:

Initials:   Date:

10.4 Baking Sand:

- 10.4.1 Obtain a clean baking dish that will hold 2.5 kg of sand.
- 10.4.2 Pour the 2.5 kg of sand into the baking dish and spread evenly with a stainless steel spoon. Record the manufacturer of the sand, the lot # of the sand, the volume of sand being baked.
- 10.4.3 Place the baking dish with the sand into the muffle furnace and set the temperature to 450°C. Record the start time.
- 10.4.4 **Note:** Muffle Furnace #01 requires about 1 hour to reach 450°C. Check temperature of muffle furnace after 1 hour to make sure that it has reached required temperature.
- 10.4.5 After 5 hours from the start time, turn off the muffle furnace and allow it to cool before removing the baking dish (overnight works best). Once the muffle furnace has cooled for a while remove the glass baking dish with high heat safety gloves and place on a cooling rack. Record the end time
- 10.4.6 Cover the warm sand with aluminum foil and allow the temperature of the sand to equilibrate to the temperature of the room.
- 10.4.7 Once cool, if needed use the pestle to break up any large chunks of sand.
- 10.4.8 If needed pour some of the baked sand into a mesh sieve to break up smaller chunks of sand. Make sure to catch the baked sand in a clean glass baking dish.
- 10.4.9 Transfer the baked sand to a clean 2.5 kg amber glass bottle. It may be necessary to use the funnel for this.
- 10.4.10 Label the freshly baked sand with all the necessary information.

Baked Sand

Date opened:

Date baked:

Manufacturer:

Lot #:

Initials:    Date:

**11      Calculations**

11.1    Not Applicable

**12      Waste Management**

12.1    See GA EPD Laboratory SOP-EPD Laboratory Waste Management Standard  
Operating procedures, SOP 6-015, online revision.

**13      References**

- 13.1    EPA/600/4-88-039 - EPA Method 504.1, Revision 1.1, 1995, EPA Method 507, Revision 2.1, 1995, EPA Method 508, Revision 3.1, 1995, EPA Method 515.4, Revision 1.0, 2000, 531.2, Revision 1.0, 2001, EPA Method 547, 1990, EPA Method 548.1, Revision 1.0, 1992, EPA Method 549.2, Revision 1.0, 1997, EPA Method 550.1, 1990, EPA Method 551.1 Revision 1.0, 1995, EPA Method 552.2 Revision 1.0, 1995
- 13.2    GA EPD Laboratory SOP –EPD - SOP 1-002, online revision, EPD - SOP 1-019, online revision, EPD - SOP 1-020, online revision, EPD - SOP 1-050, online revision, EPD - SOP 1-022, online revision, EPD - SOP 1-023, online revision, EPD - SOP 1-026, online revision, EPD - SOP 1-023, online revision, EPD - SOP 1-025, online revision, EPD - SOP 1-027, online revision, EPD - SOP 1-008, online revision.
- 13.3    GA EPD Laboratory SOP- EPD Laboratory Waste Management SOP, SOP 6-015, online revision.
- 13.4    Manual for the Certification of Laboratories Analyzing Drinking Water, EPA/815-R-05-004, January 2005

**14      Reporting Limits (RLs), Precision and Accuracy Criteria, and Quality Control Approach**

14.1    Not Applicable

**15      Associated LabWorks Test Codes**

15.1    Not Applicable