

Title: Preparation, Storage and Use of Stock Standard Solutions		Copy No: ##
SOP No.: 6.03/1.5/S	Effective Date: September 19, 2013	Location: ###

QSM Approval: _____

Preparation, Storage and Use of Stock Standard Solutions

1. Introduction

This procedure provides instructions on the preparation, use and storage of standard solutions for the Ion Analysis Lab of the Particulate Characterization Unit, Analysis and Air Quality Section. This procedure is recommended for use only by or under the supervision of analysts experienced in the use of ion chromatography and in the interpretation of the resulting ion chromatograms.

2. Procedures

- 2.1. Single stock solutions are prepared from labelled acids/salts by designated personnel.
 - 2.1.1 Standard solutions are labelled with ID, concentration, preparation and expiry dates and analyst's initials.
 - 2.1.2 The date, preparation procedure and the name of the analyst are recorded in **Stock Solutions Logbook** (Lab 145).
- 2.2. Mixed standard solutions are prepared from labelled stock solutions and/or certified reference material by designated personnel.
 - 2.2.1 Standard solutions are labelled with ID, method name, preparation and expiry dates and analyst's initials.
 - 2.2.2 The date, preparation procedure and the name of the analyst are recorded in **Instrument/Analyst Logbook** (Lab 145).
- 2.3. All standard solutions are stored in the refrigerator at $4\pm 2^{\circ}\text{C}$, in labelled containers (Consult SOP 2.6/*.*S).
- 2.4. Prior to use, make sure that the standard solutions are allowed to warm up to ambient temperature.
- 2.5. Outdated standard solutions are disposed of in compliance with all pertinent legislation.

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Page:

1 of 6

Title: Preparation, Storage and Use of Stock Standard Solutions		Copy No: ##
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3. Single Standard Solutions

3.1. Unless otherwise indicated, it is intended that all reagents are analytical grade, where such specifications are available; otherwise, use the best available grade.

3.2. All standard stock solutions are prepared gravimetrically from pure compounds in 50-mL volumetric flasks in high purity deionised water (19.04/*.*S)

3.2.1 Inorganic stocks should be prepared as described in Table 1.

Table 1. Preparation of inorganic stock solutions.

Ion	Reagent	Amount (g)	Conc. (mg/L)	Preparation Frequency
Fluoride	NaF	1.1052	10,000	Bi-annually
Chloride	NaCl (<i>dried at 105°C for 1 h</i>)	0.8243	10,000	Bi-annually
Nitrite	NaNO ₂	0.7498	10,000	Annually
Nitrate	KNO ₃	0.8153	10,000	Annually
Sulphate	K ₂ SO ₄ (<i>dried at 105°C for 1 h</i>)	0.9070	10,000	Bi-annually
Bromide	NaBr (<i>dried at 150°C for 6 h</i>)	0.6431	10,000	Bi-annually
Phosphate	Na ₂ HPO ₄	0.7473	10,000	Annually
Ammonium	NH ₄ Cl	1.4842	10,000	Annually

3.2.2 Single stocks of organic acids and carbohydrates should be prepared as described in Table 2.

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Page:

2 of 6

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Table 2. Preparation of organic acid and carbohydrate stock solutions.

Ion/Analyte	Reagent	Amount (g)	Conc. (mg/L)	Preparation Frequency
Acetate	CH ₃ COONa	0.7004	10,000	Annually
Formate	HCOONa	0.7554	10,000	Annually
Propionate	C ₂ H ₅ COONa	0.0657	10,000	Annually
Methanesulfonate	CH ₃ SO ₃ Na	0.0621	10,000	Annually
Oxalate	H ₂ C ₂ O ₄ *2H ₂ O	0.7159	10,000	Annually
Levoglucosan	Levoglucosan	0.0500	1000	Annually
Mannosan	Mannosan	0.0500	1000	Annually
Galactosan	Galactosan	0.0500	1000	Annually
Arabitol	D-(+)-arabitol	0.0500	1000	Annually
Mannitol	D-mannitol	0.0500	1000	Annually
Mannose	D-(+)-mannose	0.0500	1000	Semi-annually
Glucose	D-(+)-glucose	0.0500	1000	Semi-annually
Galactose	D-(+)-galactose	0.0500	1000	Semi-annually
Fructose	D-(+)-fructose	0.0500	1000	Semi-annually

3.2.3 All single stocks should be verified by Ion Chromatography (IC) methods (6.03/*.*M, 6.05/*.*M, or 6.12/*.*M), using certified standards or standard reference materials, whenever possible.

3.2.4 If the ratio of response (peak area or corrected peak area) of the analyzed standard (stock vs. reference) at the same concentration (usually at 2 mg/L) is larger than ± 5%, new standard solution is prepared.

3.2.5 The results are recorded in **Standards Check Logbook** (Lab 145).

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Page:
3 of 6

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4. Mixed Standard Solutions

- 4.1. Mixed standard solutions are prepared by further dilution of the single standard stock solutions to achieve the necessary concentrations as described in the corresponding method(s).
- 4.2. After preparation, all mixed standards are transferred to the labelled plastic bottles and verified by IC method they are prepared for, using old mixes or standard reference materials, whenever possible.
- 4.3. If the ratio of response (peak areas or corrected peak areas) of the analyzed mixed standard (new stock vs. old stock or reference standard) at the same concentration (usually at the middle instrument calibration level) is larger than $\pm 5\%$, new mixed standard solution is prepared.
- 4.4. The results are recorded in **Standards Check Logbook** (Lab 145).

5. Instrument Calibration Standards

- 5.1. Instrument calibration standards are prepared by further dilution of mixed standard solutions to achieve the necessary concentrations as described in the corresponding method(s).

6. Control Check Standards

- 6.1. Control check standards used to verify calibration accuracy are prepared from stock solutions purchased from certified suppliers or prepared from different sources than calibration standards as described in the corresponding method(s).

7. Applicable Methods and SOPs

- | | |
|-------------|---|
| 6.03/*.*/*M | “Determination of Anions and Cations on Multi (2) - Ion Chromatography System” |
| 6.05/*.*/*M | “Determination of Gaseous and Particulate Inorganic Air Pollutants by Ion Chromatography” |
| 6.12/*.*/*M | “Determination of Levoglucosan and other Carbohydrates in Atmospheric Aerosols by Ion Chromatography with Pulsed Amperometric Detection (IC-PAD)” |
| 2.01/*.*/*S | “Gravimetric Measurements” |

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Page:

4 of 6

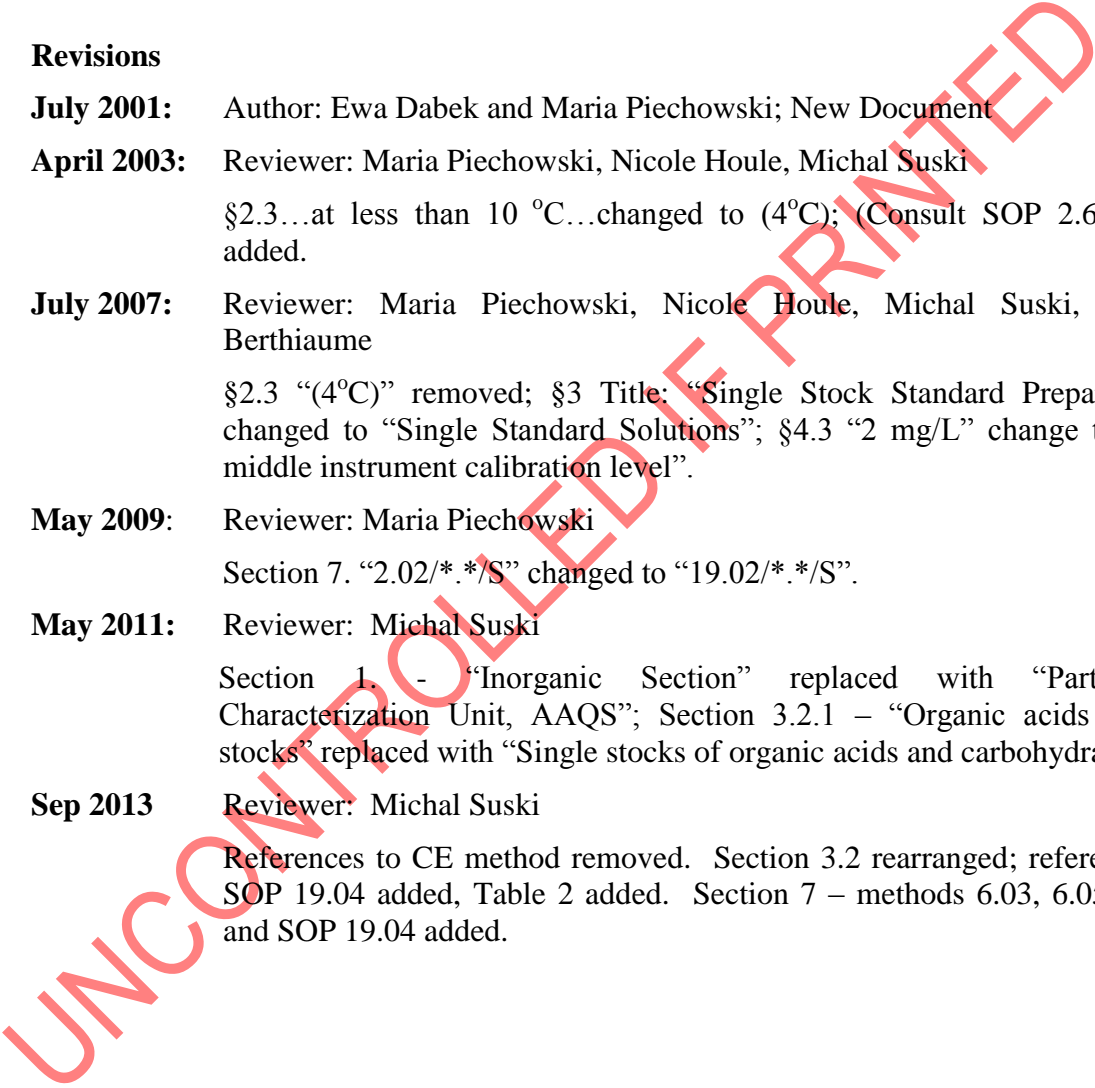


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- 2.06/*.*/*S “Laboratory Refrigerators and Freezers”
- 6.02/*.*/*S “Labware Cleaning”
- 19.02/*.*/*S “Volumetric Measurement - Micropipettes and Bottle-Top Dispensers”
- 19.04/*.*/*S “AAQS water purification system”

8. Revisions

- July 2001:** Author: Ewa Dabek and Maria Piechowski; New Document
- April 2003:** Reviewer: Maria Piechowski, Nicole Houle, Michal Suski
 §2.3...at less than 10 °C...changed to (4°C); (Consult SOP 2.6/*.*/*S) added.
- July 2007:** Reviewer: Maria Piechowski, Nicole Houle, Michal Suski, Alicia Berthiaume
 §2.3 “(4°C)” removed; §3 Title: “Single Stock Standard Preparation” changed to “Single Standard Solutions”; §4.3 “2 mg/L” change to “the middle instrument calibration level”.
- May 2009:** Reviewer: Maria Piechowski
 Section 7. “2.02/*.*/*S” changed to “19.02/*.*/*S”.
- May 2011:** Reviewer: Michal Suski
 Section 1. - “Inorganic Section” replaced with “Particulate Characterization Unit, AAQS”; Section 3.2.1 – “Organic acids single stocks” replaced with “Single stocks of organic acids and carbohydrates”.
- Sep 2013** Reviewer: Michal Suski
 References to CE method removed. Section 3.2 rearranged; reference to SOP 19.04 added, Table 2 added. Section 7 – methods 6.03, 6.05, 6.12 and SOP 19.04 added.



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Page:

6 of 6