1. Scope and Application

1.1 The scope of this SOP is train researchers...

1.2 The applications of this SOP are for...

2. Summary of Method

2.1 This SOP does this...

Contents

3. Acknowledgements

4. Estimated Time

4.1 This procedure requires XX minutes...

5. Definitions

5.1 Term1: is...

6. Notable Biases and Interferences

7. Health and Safety

7.1 Describe the risk...

Safety and Personnnel Protective Equipment

8. Personnel & Training Responsibilities

8.1 Researchers training is required before this the procedures in this method can be used...

8.2 Researchers using this SOP should be trained for the following SOPs:

- SOP01 Laboratory Safety
- SOP02 Field Safety

9. Required Materials and Apparati

9.1 Item 1 w/catalog number!

9.2 Item 2

10. Reagents and Standards

11. Consumables

11.1 Biases and interferences can come from...

- Sample Cone

- Skimmer Cone
- peristaltic pumps
- bonnet and quartz stuff
- Pump Oil

12. Sample Collection, Preservation, and Storage

13. Procedure

Set up

13.1 Option versus Dilution gas

13.2 Check tubing, replace drain tubing Monthly.

13.3 Check gas supply regulators pressures

Gas	Pressure	Reorder #
Argon Oxygen	100 psi	??

13.4 Turn on chiller

13.5 Open argon valve

13.6 Connect drain and sample tubes to peristaltic pump and clamp.

13.7 Connect internal standard, should be diluted to 1 ppm or 1μ/mL.

13.8 Check Settings, nebulizer, post rotate yes!

13.9 Turn on circulate water

13.10 Startup Configuration

13.11 Instrument set up – various tests done that should be checked.

13.12 Tuning solutions... Peripump, .5 uL solution.. internal standard concdetration will be... speed to 0.3 because the tube stretches out. Stabilizes to 30s, acquisition speed... probe rinse...

13.13 Check Default Standard Setting

13.14 P/A solutions

13.15 Turn on Plasma Mode

13.16 Enable Configure Ignition Sequence is checked for liquid samples

13.17 Check meters
IF/Backing Pressure Analyzer Pressure Water Redirected Power Forced Power

13.18

Creating a Method

Using Batch Templates

13.19 Batch Template

Queue Window

13.20 Skip Warm-up

13.21 check for bubble moving into pump in tube

13.22 Autotuning solutions – DI water?

13.23 Check autoscale on 'Real Time Display'

13.24 Check Mainframe – performance report, record rsd ¡6 %... check counts... oxides...cerium (mass 140/156) ¡ 2 double charges (mass 70 mass 40...) ¡ 3, high matrix. check resolution axis around 7. peak width about 10%, .65 - .8, 6.9 ....

Running a Batch

13.25 Prepare ...

13.26

14. Maintenance

Cleaning Nebulizer

14.1 Soak components in 5% nitric acid. Do not sonicate the nebularizer.

14.2 Neebulizer should be tight.

14.3 Replace jacket

Pump Oil

14.4 Replace pump oil every 3-4 months. Pump oil will break down and be the final resting place for all ions.

14.5

Checking Torch

14.6 Open cover

14.7 Shield can get ugly and needs to be replaced.

14.8 Don't seem to worry about finger prints on the outside.

14.9 Replace tab and torch bonnet stuff yearly

Sample and Skimmer Cone

14.10 Use software to "maintenance" and torch is moved.

14.11 Check and potentially Replace cones... depends on sample matrix, often a recently replaced cone are not stable.

14.12 Unscrew ring (use tool if needed)

14.13 Clean with sonicator, ¡?1% citronox dilute.

14.14 Use skimmer cone tool and unscrew it.

14.15 Be careful of the graphite o-ring

14.16 To replace, finger tighten skimmer cone.

14.17 Do not use skimmer cone tool until it's been finger threaded.

14.18 Replace sample cone

14.19 Initialize to put torch back in.

14.20 Close cover

Lenses

14.21 Using 3mm allen wrench...

14.22 Do not touch lens with hands w/o gloves

14.23 Loosen and pull them out.

14.24 Omega lens...

14.25 Cleaned as part of the PM (preventative maintance).

14.26 Can check lens test via software.

15. Data Analysis and Calculations

16. QC/QA Criteria

Tuning

Pulse versus Analog Mode

16.1 With low concentrations, versus high concetration.

16.2 Using P/A solution

17. Trouble Shooting

18. References

18.1 APHA, AWWA. WEF. (2012) Standard Methods for examination of water and wastewater. 22nd American Public Health Association (Eds.). Washington. 1360 pp. (2014).

https://crustal.usgs.gov/laboratories/icpms/intro.html