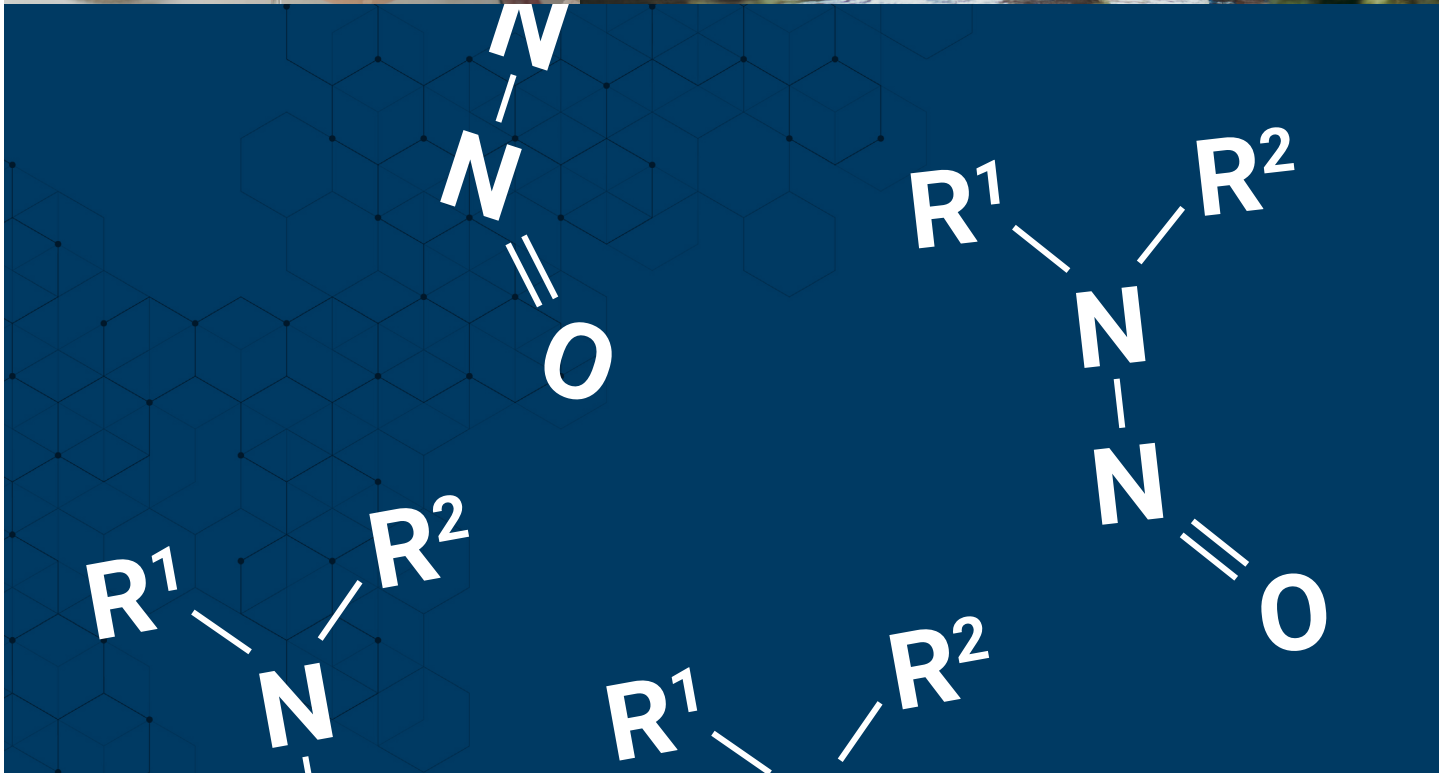
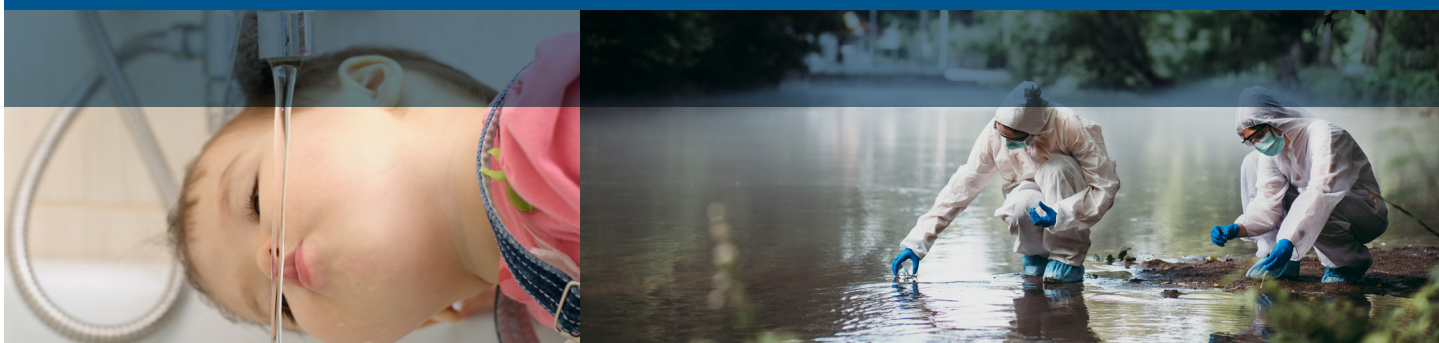


Nitrosamines Analysis in Water

Using Triple Quadrupole GC/MS/MS: Consumables workflow ordering guide



Nitrosamines are DNA-damaging, cancer-causing disinfection byproducts that form in drinking water when nitrate or other nitrogen-containing compounds in water react with chlorine or chloramine (1). N-nitrosodimethylamine (NDMA) is one of the most commonly detected nitrosamines. The WHO published a guideline value (GV) of 100 ng/L of NDMA in drinking water. This is the concentration associated with a lifetime cancer risk of 10^{-5} (2). In the United States, nitrosamines are currently not federally regulated. As a result, few water system operators test for them. California has set a public health goal for NDMA, at 3 ng/L (ppt), in drinking water, a concentration that corresponds to an estimated one-in-a-million cancer risk. The Australian Drinking water Guidelines included a value of 100 ng/L for NDMA when they were updated in 2011 (3). This update recognized the potential of nitrosamines to impact drinking water supplies.

Analysis methods

EEA-Agilent Method 521.1 is a procedure notified as equivalent in performance to analyze nitrosamines in drinking water using triple quadrupole GC/MS system (GC/TQ), as an alternative to GC/Ion Trap (GC/IT) (4). The GC/TQ method is more robust and sensitive, providing lower detection levels, better chromatographic separation, and faster run-times than the GC/IT.

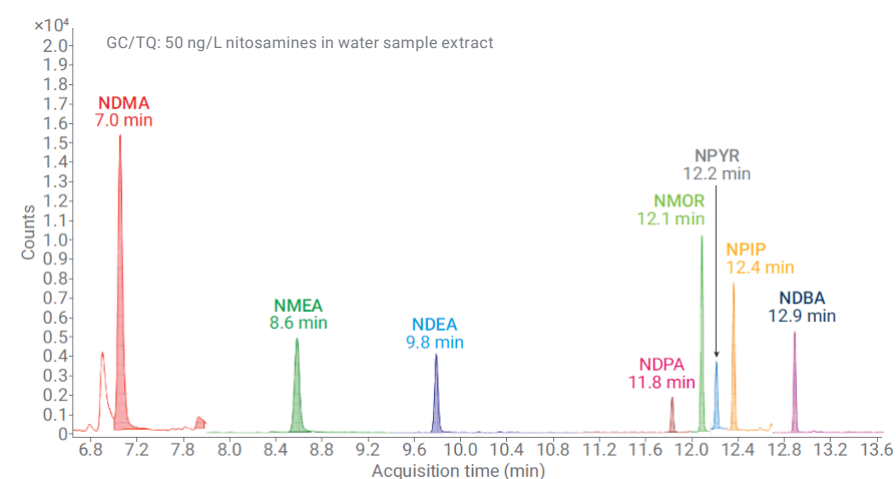


Figure 1. MRM of quantifier ion of 0.5 ng/L nitrosamines extracted from a water sample

The lowest concentration minimum reporting level (LCMRL) and detection limits (DL) can be met regardless of the inlet liner and injection conditions used, providing flexibility in choice. All three inlet conditions (Figure 2) have been confirmed to give performance better than EPA 521, as shown in an Agilent application note (5).

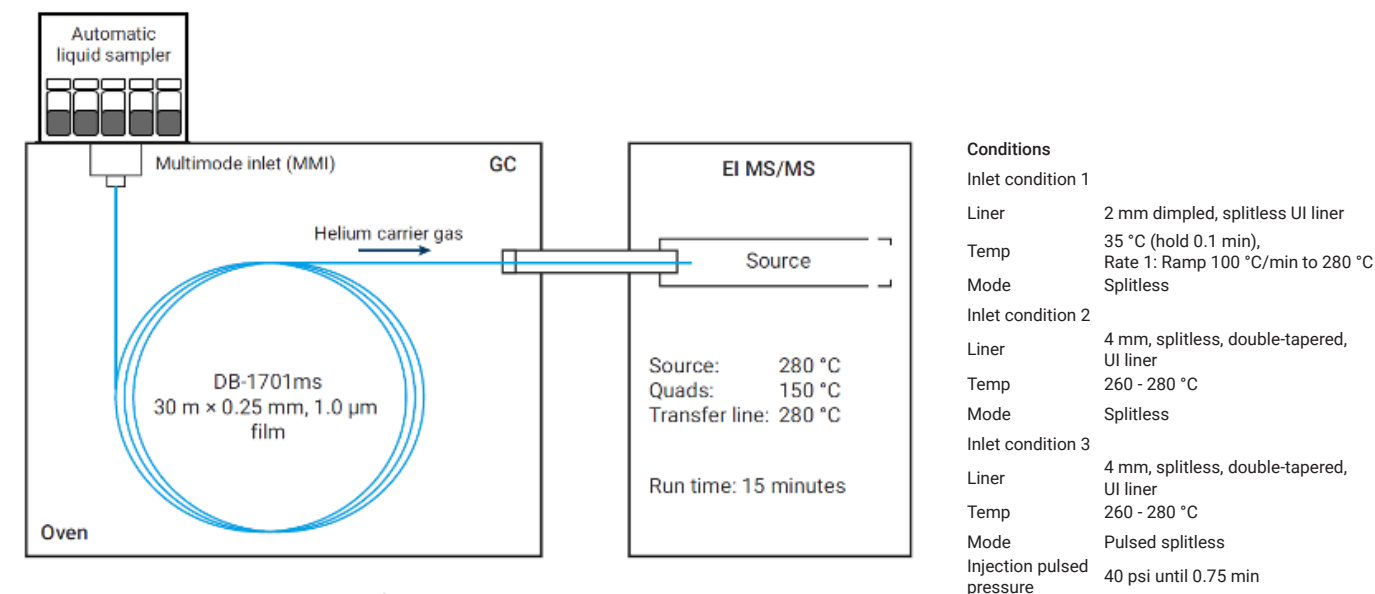


Figure 2. Triple quadrupole GC/MS configuration

Both the Agilent 7010 and 7000 GC/TQ systems meet the LCMRL and DL requirements with a much lower injection volume, shorter analysis time, and baseline separation of analytes.

Table 1. Linearity of calibration curves from an interlaboratory validation study (5).

| Analyte | 7010, Inlet condition 1 | 7010, Inlet condition 2 | 7000, Inlet condition 3 |
|---------|-------------------------|-------------------------|-------------------------|
| NDMA | 0.9999 | 0.9979 | 0.9935 |
| NMEA | 0.9999 | 0.9983 | 0.9988 |
| NDEA | 0.9999 | 0.9993 | 0.9986 |
| NDPA | 0.9998 | 0.9987 | 0.9965 |
| NMOR | 1.0000 | 0.9993 | 0.9992 |
| NPYR | 0.9981 | 0.9994 | 0.9976 |
| NPIP | 0.9999 | 0.9993 | 0.9979 |
| NDBA | 0.9996 | 0.9990 | 0.9985 |

References

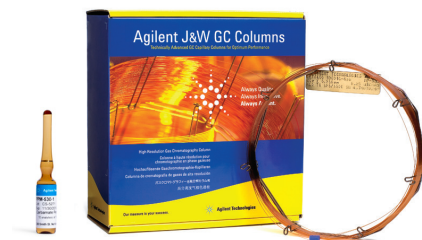
- Environmental Working Group, Tap Water Database, <https://www.ewg.org/tapwater/reviewed-nitrosamines.php> (accessed June 2020).
- World Health Organization, N-Nitrosodimethylamine in Drinking-water - Background document for development of WHO Guidelines for Drinking-water Quality, 2008, WHO/HSE/AMR/08.03/8
- Australian Government, National Health and Medical Research Council, Australian Drinking Water Guidelines 6, Version 3.5, 2011
- US EPA, Letter of Equivalency for EEA-Agilent 521.1 for the analysis of Nitrosamines in drinking water by GC/MS/MS. March 13, 2018.
- Nitrosamines Analysis in Drinking Water Using GC/MS/MS- Meeting Equivalence to EPA Method 521. Agilent publication number 5991-9224EN

Easy selection and ordering information

Agilent offers workflow solutions for nitrosamine analysis using EEA-Agilent Method 521.1, validated by three independent labs (3). Click [here](#) to add all the items in this list to your My Favorites list on the Agilent online store.* Alternatively, click the 'MyLists' link in each table heading to add all those items to your My Favorites list. Then enter the quantities for the products you need. Your list of items will remain under "My Favorites" for you to use with future orders.

| Item | Part Number |
|---|---------------|
| View MyList of Standards | |
| Nitrosamine standards | US-113N-1 |
| View MyList of GC Column | |
| Agilent J&W DB-1701 30 m x 0.25 mm, 1.0 um | 122-0733 |
| View MyList of Inlet Liners | |
| 2 mm dimpled, splitless, ultra-inert | 5190-2297 |
| 4 mm double-tapered splitless ultra-inert liner | 5190-3983 |
| View MyList of GC Inlet supplies | |
| Inlet septa, Advanced green, non-stick, 11 mm, 50/pk | 5183-4759 |
| Inlet septa, Advanced green, non-stick, 11 mm, 100/pk | 5183-4759-100 |
| Ultra Inert Gold seal, with washer, 1/pk | 5190-6144 |
| Ultra Inert Gold seal, with washer, 10/pk | 5190-6145 |
| Self-tightening column nut, collared, inlet | G3440-81011 |
| Self-tightening column nut, collared, MSD | G3440-81013 |
| Replacement collar for self-tightening nut | G3440-81012 |
| 15%Graphite/85% Vespel Ferrules, 0.4 mm i.d., 10/pk | 5181-3323 |
| 5 µL ALS syringe, fixed needle, 23-26s/42/cone | 5181-1273 |
| 5 µL ALS syringe, fixed needle, 23-26s/42/cone 6/pk | 5181-8810 |
| 10 µL ALS syringe, fixed needle, 23-26s/42/cone | 5181-1267 |
| 10 µL ALS syringe, fixed needle, 23-26s/42/cone 6/pk | 5181-3360 |
| 20 x magnifier loop | 430-1020 |
| View MyList of Vial and Caps | |
| 2 mL screw top amber, write-on spot, deactivated, certified, 100 pc | 5183-2072 |
| Screw Caps, blue, certified, PTFE/silicone/PTFE septa | 5182-0723 |
| 100 µL vial insert, glass with polymer feet | 5181-8872 |
| View MyList of Gas Filters | |
| Gas clean carrier gas kit for 7890 | CP17988 |
| Gas clean carrier gas kit for 8890 and 8860 | CP179880 |
| Gas clean carrier gas purifier replacement cartridge | CP17973 |
| View MyList of MS Supplies | |
| EI filament (for 7000A/B/C/D, 5977B Inert Plus, 5977A extractor, inert or stainless steel and 5975 systems) | G7005-60061 |
| Drawout plate, 3 mm, inert source (for 7000A or 7000B systems) | G2589-20100 |
| Drawout plate, 3 mm, extractor source (for 7000C or 7000D systems) | G3870-20444 |
| HES Filament for 7010 Triple Quadrupole GC/MS | G7002-60001 |

* If this is your first time using "My Favorites" you will be asked to enter your email address for account verification. If you have an existing Agilent account, you will be able to log in. If you don't have a registered Agilent account, you will need to register for one. Click [here](#) to learn more. This feature is valid only in countries that are e-commerce enabled. All items can also be ordered through your regular sales and distributor channels.



Agilent CrossLab: Real insight, real outcomes

CrossLab goes beyond instrumentation to bring you services, consumables, and lab-wide resource management. So your lab can improve efficiency, optimize operations, increase instrument uptime, develop user skill, and more.

Learn more about Agilent CrossLab, and see examples of insight that leads to great outcomes, at www.agilent.com/crosslab

U.S. and Canada
1-800-227-9770
agilent_inquiries@agilent.com

Europe
info_agilent@agilent.com

Asia Pacific
inquiry_lsca@agilent.com

DE.6232407407

This information is subject to change without notice.

© Agilent Technologies, Inc. 2020
 Published in the USA, September 3, 2020
 5994-2184EN