

(Volume I. Emergent chemicals)

N-Nitrosodimethylamine

CAS No. 62-75-9

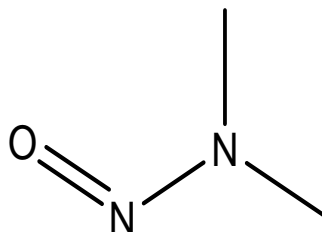
What is NDMA?

N-Nitrosodimethylamine (NDMA) is a yellow liquid with no distinct odor. NDMA has a boiling point of 154°C, a specific gravity of 1.0059 and is highly soluble in water (100g/L). NDMA breaks down rapidly in sunlight (½-life = 5-30min.), and within a few months in deeper soil (½-life = 50-55 days). NDMA has been shown to degrade slightly faster in aerobic soil. In unlit waters, NDMA is persistent, but evidence shows it is still subject to bio-degradation.

History and Uses: Prior to 1976, NDMA was used as an intermediate in the production of 1,1-dimethylhydrazine (rocket fuel). It has also been used as an anti-oxidant additive in lubricants, a softener for copolymers and as a

solvent and rubber accelerator. Since 1977, NDMA has been manufactured only in small research quantities. It has, however, been found as a manufacturing byproduct in commercial pesticides and herbicides. NDMA is also the most common volatile amine found in food (malt vinegar, beer/whisky, meat/bacon/sea-food, tobacco) and consumer products (toiletries, rubber-nipples/pacifiers).

Toxicology: The routes of exposure to NDMA include inhalation, ingestion and dermal contact. As NDMA is metabolized (after ingestion of high levels) it is known to cause severe hepatic (liver) damage, in humans and animals. NDMA exposure has been shown to result in liver and lung cancer in animals. Based on these animal studies, NDMA has been reasonably anticipated to be a human carcinogen.



Regulation: Since March 2002, the California Department of Health Services (DHS) has set a Notification Level at 0.01 µg/L (ppb). EPA Region IX has set preliminary remediation goals (PRGs) as follows: Residential soil at 9.5 µg/kg, Industrial soil at 34 µg/kg, Tap water at 0.0013µg/L. Within the meaning of California's Safe Drinking Water and Toxic Enforcement Act (Proposition 65), NDMA has been listed (10/01/1987) as a chemical known to cause cancer or reproductive harm.

Important Information

Molecular Formula	(CH ₃) ₂ NNO
Molecular Weight	74.08
EPA Region IX PRG (tap water)	0.0013 µg/L (ppb)
DHS Notification Level	0.01 µg/L (ppb)
DHS Detection Limit for Purposes of Reporting (DLR)	0.002 µg/L (ppb)
Calscience Reporting Limit (RL)	0.002 µg/L (ppb)
Calscience Method Detection Limit (MDL)	0.481 ng/L (ppt)

Analytical Methodology and Technology

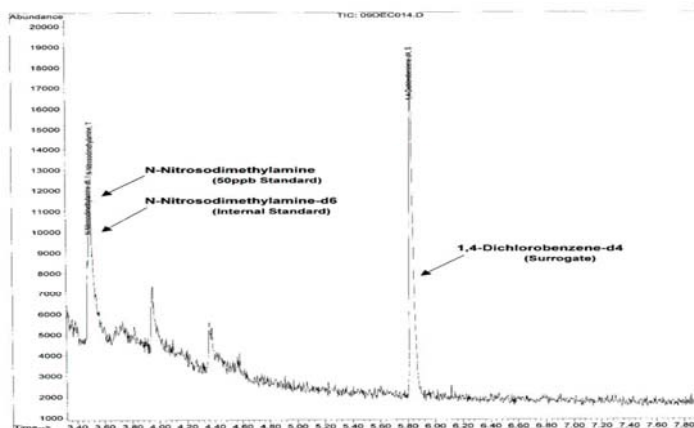
Scope: Determination of NDMA is applicable to ground and drinking water and to soil/solid samples. Using a modified version of EPA method 1625C — Gas Chromatography/Mass Spectrometry with Isotope Dilution—GCMS.

Procedure:

NDMA is determined by GCMS running in selective ion monitoring (SIM) mode, a deuterated analog (N-Nitrosodimethylamine-d6) is added to the sample prior to extraction. Aqueous samples are then extracted at a pH of 12-13 using Methylene chloride. The sample extract is then dried over sodium sulfate and concentrated to a final volume of 2 ml (soil) or 1ml (aqueous). The extract is then injected into the GC system where the extract constituents are chromatographically separated in the GC capillary column. After separa-

tion, NDMA is identified by the mass-spec detector using the 74 m/z and 42 m/z ion masses. Quantitation is performed using the extracted ion current profile (EICP) and adjusted relative to the recovery of the NDMA-d6 analog. Calscience performed an MDL (water) at a concentration of 0.002 µg/L (ppb) with a resulting standard deviation (of 0.186) and a calculated MDL of

0.000585 µg/L (0.585 ng/L). A reporting limit was established at the DHS required reporting limit (DLR) of 0.002 µg/L. A similar study was performed on soil, spiking replicates at 0.2 µg/kg, with a resulting standard deviation of 0.0230 and a calculated MDL of 0.0724 µg/kg. A laboratory reporting limit has been set at 5 µg/kg.



SAMPLE COLLECTION

- **CONTAINER:** Water samples should be collected into a one-Liter Amber Glass bottle.
- **PRESERVATION:** No preservation is required. Samples should be kept chilled until analysis.
- **HOLDING TIME:** 7 days; 40 days after extraction.

CONTACTS

For further information on laboratory capabilities, please call:

Bob Stearns at (714) 895-5494 or Kim Banks at 626 458-1032 at the Garden Grove Laboratory

Roger Lahr at 619-632-2438 in San Diego, CA

Alan Kemp at 925-689-9022 in Concord, CA or

Ara Aghajanian at 805 544-0486 in the Central Coast