



Hydrazine and NDMA Analysis

Hydrazines by EPA 8315 (LC/MS/MS)

Hydrazines are most commonly known for their use in rocket fuels. They are highly toxic, colorless, flammable liquids with an ammonia-like odor. There are several types of hydrazines, including hydrazine, monomethylhydrazine (MMH) and 1,1-dimethylhydrazine, also known as unsymmetrical dimethylhydrazine (UDMH). Hydrazine is unstable and is usually handled as an aqueous solution for safety reasons.

Exposure to hydrazines can cause central nervous system effects as well as kidney and liver damage. Hydrazine and UDMH are listed as probable human carcinogens and classified under Group B2 by the U.S. EPA. UDMH has been linked to the generation of *n*-nitrosodimethylamine, another suspected human carcinogen.

The U.S. EPA has not established a reference concentration or dose for hydrazine; however, hydrazine is on the Contaminant Candidate List (CCL 3). The California EPA has calculated a chronic inhalation reference exposure level of .0002 milligrams per cubic meter.

Lancaster Labs offers trace level analysis of hydrazine, methylhydrazine and 1,1-dimethylhydrazine in water and soil. We are able to obtain the following limits of quantitation (LOQ):

| | <u>Water</u> | <u>Soil</u> |
|-----------------------|--------------|-------------|
| Hydrazine | 0.2 µg/L | 2 ng/g |
| Monomethylhydrazine | 0.5 µg/L | 5 ng/g |
| 1,1-Dimethylhydrazine | 0.5 µg/L | 5 ng/g |



Low-Level NDMA by EPA 1625

NDMA (*n*-nitrosodimethylamine) is used in the production of 1,1-dimethylhydrazine for liquid rocket fuel and in many other industrial uses such as cutting oils and disinfection products. Environmental contamination can be from liquids such as rocket fuel or formed from chemical reactions.

The U.S. EPA has classified NDMA as a Class B-2 probable human carcinogen, and the California Department of Health Services (CA DHS) has established a notification level of 10 ng/L or ppt.

| | <u>Water</u> | <u>Soil</u> |
|-----|---------------|-------------|
| MDL | 0.5 ppt | 16.67 ng/kg |
| LOQ | 2 ppt or ng/L | 33.3 ng/kg |

An MCL is currently not available for NDMA.

Note: This analysis must be prearranged with the laboratory prior to sample submission.



Perchlorate Analysis

Background

Perchlorate, ClO_4^- , is a common salt anion of ammonium, potassium and sodium. It can be found in rocket fuel, explosives, airbag inflators, leather finishing and fertilizers. A majority of the perchlorate produced in the U.S. is used as the primary ingredient of solid rocket fuel.

Perchlorate salts dissociate very readily and are not affected by pH or temperature. The resulting perchlorate ion is very mobile and persistent in aqueous systems and is very difficult to treat.

Releases have been identified in 18 states as well as the Colorado River, which is the main source of drinking water for millions of residents in the South-west United States.

For many years it was believed that perchlorate was not dangerous; however, there is a growing concern that even small amounts may cause thyroid tumors, decrease thyroid function and adversely affect neurological growth and development in fetuses and infants.

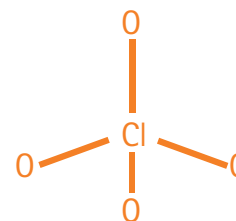
Regulations

In order to gather needed exposure information and consideration for possible regulation, perchlorate was placed on the Contaminant Candidate List (CCL) in March 1998 and on the Unregulated Contaminants Monitoring Rule (UCMR) in March 1999.

As a result of being placed on the CCL and UCMR, numerous projects are being conducted to determine the extent of perchlorate occurrence in the environment.

Since the physical and chemical nature (see structure below) of perchlorate effectively blocks reductants from attacking the chlorine, treatment of contaminated water is complicated.

CAS RN: 14797-73-0
Molecular Weight: 99.4506
Structure: Tetrahedral



Sample Analysis

Lancaster Labs offers trace-level analysis of perchlorate in water, using EPA Method SW-846 6850 (LC/MS/MS), which provides excellent sensitivity and selectivity. We are able to obtain the following limits:

| | |
|------------------------------|----------|
| Method detection limit (MDL) | 0.2 µg/L |
| Limit of quantitation (LOQ) | 1.0 µg/L |

Another option is Ion Chromatography (IC) using EPA 314.0 with the following limits:

| | |
|------------------------------|----------|
| Method detection limit (MDL) | 0.7 µg/L |
| Limit of quantitation (LOQ) | 2.0 µg/L |

Samples exhibiting high conductivity due to large concentrations of interfering anions can be very challenging by IC. Lancaster Laboratories performs several sample pretreatment techniques to remove matrix interferences, which allows us to maintain low detection limits and preserve expensive chromatographic supplies.

Note: This analysis must be prearranged with the laboratory prior to sample submission.

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Standard Services:

| | |
|----------------------------|---------------------------|
| Volatiles | Drinking Water |
| Semivolatiles | Vapor & Air Analysis |
| Metals | Sediment & Tissue Testing |
| Pesticides/PCBs/Herbicides | Method Development |
| Petroleum-Related Analysis | Shale Oil & Gas Analysis |
| Waste Characterization | |
| Water Quality | |

Specialty Services:

| | |
|---------------------------------|-------------------------|
| Dioxins/Furans | Aldehydes |
| Hydrazines/NDMA | 1,4-Dioxane (low level) |
| Explosives | Low-Level Mercury |
| Perchlorate | PMI |
| Alkyl PAHs, Alkanes, Biomarkers | Method 25D |
| PFC (PFOA) | Gulf Coast Services |
| Organic Acids | |

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