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Tons of expired munitions and propellants have been disposed of over the last century by the US military through open ocean disposal.



Many of these energetics and their breakdown by-products are known to be toxic. Low-level quantitative and qualitative analytical procedures are imperative to accurately assess the environmental and health risks posed by these compounds.

Columbia Analytical, in support of the U.S. Department of Defense's efforts to assess the potential exposure to the marine environment of contaminants from deteriorating underwater munitions, has developed a detection method using Liquid Chromatography/Mass Spectroscopy/Mass Spectroscopy (LC/MS/MS).

The triple-quad LC/MS/MS provides excellent selectivity in complex matrices by generating unique spectral fingerprints that result in unambiguous identification. This enhancement is essential in reducing co-extractable interferences.

The method, which is applicable to water, sediment/soil and tissue matrices, is used to detect trace residue of explosive constituents at the part per billion (ppb) level.

Analyte	Method	Sediment		Tissue	
		MDL	MRL	MDL	MRL
		ng/g, Dry Weight Basis		ng/g, Dry Weight Basis	
1,3,5-Trinitrobenzene	LC/MS/MS	2.8	10	2.1	10
1,3-Dinitrobenzene	LC/MS/MS	6.2	20	5.7	30
3,5-Dinitroaniline	LC/MS/MS	1.2	10	1.7	10
2,4,6-Trinitrotoluene	LC/MS/MS	1.1	10	2.1	10
2,4-Dinitrotoluene	LC/MS/MS	12	30	6.9	30
2,6-Dinitrotoluene	LC/MS/MS	6.9	20	3.2	10
2-Amino-4,6-dinitrotoluene	LC/MS/MS	0.90	10	3.7	10
4-Amino-2,6-dinitrotoluene	LC/MS/MS	1.6	10	3.1	10
HMX	LC/MS/MS	2.5	10	1.3	10
RDX	LC/MS/MS	1.8	10	0.60	10
Tetryl	LC/MS/MS	1.8	10	-	-
Picric Acid	LC/MS/MS	1.9	10	0.59	10
Picramic Acid	LC/MS/MS	0.74	10	3.2	10
PETN	LC/MS/MS	2.0	10	4.0	30
2,4-Diamino-6-nitrotoluene	LC/MS/MS	15	30	26	60
2,6-Diamino-4-nitrotoluene	LC/MS/MS	4.9	20	8.1	60
2,4-Dinitrophenol	LC/MS/MS	0.9	10	3.9	30
2-Nitrotoluene	LC/UV	330	1000	480	1000
3-Nitrotoluene	LC/UV	390	1000	130	1000
4-Nitrotoluene	LC/UV	530	1000	350	1000
Nitroglycerin	LC/UV	670	1500	520	1000
Nitrobenzene	LC/UV	170	1000	180	1000
Nitroguanidine	LC/UV	130	500	-	-

## Contact Information

1317 S. 13<sup>th</sup> Avenue  
Kelso, WA 98626

360.577.7222  
360.636.1068 (fax)