

### Introduction

“Green” chemistries are a popular topic in the environmental analysis industry today. Green chemistries are those designed to have no (or a reduced) negative impact on the environment. Designing chemistries to be greener may involve reducing waste products, utilizing non-toxic components, and/or improving efficiency.

Lachat Instruments’ Application team is aware of the impact that many common chemistries can have on the environment. Lachat strives to modify and introduce methods that are as safe to the environment as to our customers. This application note highlights several green Lachat methods and techniques available.

### Ion Chromatography

Seven common anions (fluoride, bromide, chloride, nitrate, nitrite, sulfate, and orthophosphate) can be measured simultaneously, with a single sample, in about seven minutes with Lachat’s Rapid Anions IC methods. None of the reagents required for these methods are toxic to the environment. Additionally, the waters Rapid IC method is EPA accepted for analysis of drinking water under NPDWR. Additionally, the Lachat IC channel option is easily configured to run side-by-side with FIA chemistry channels.

### Amperometric Cyanide

Lachat’s amperometric detection methods for determination of cyanide do not use pyridine, barbituric acid, or their derivatives, commonly used in colorimetric techniques. The amperometric methods use dilute acids and bases only in conjunction with a membrane diffusion block and an electrochemical amperometric detector. Methods are available for Free Cyanide, Total Cyanide, WAD Cyanide, and ligand exchange. Lachat MICRODIST and inline apparatus can also be utilized for sample preparation.

### UV and Enzymatic Nitrate Reduction Methods

Lachat has developed two green methods for determination of nitrate/nitrite. These methods replace traditional cadmium and hydrazine methods that utilize hazardous materials. Both, the UV Photo-conversion and Enzymatic Reduction methods are available for waters, 2M KCl soil extracts, and seawater.

### Gas Diffusion Ammonia

The Gas Diffusion Ammonia methods are based on an ISO standard. In these methods, the sample is mixed with a high pH buffer, converting ammonium to ammonia gas. The solution is passed through a diffusion block with a hydrophobic membrane, where the ammonia gas passes through a pH indicator solution. The resulting color change is proportional to the ammonium concentration in the sample. The Gas Diffusion methods offer a green solution for water, soil extracts, and TKN analysis without requiring phenol, salicylate, or nitroprusside reagents.

### Ultra High Throughput and Ultra Low Flow Methods

Both UHT and ULF method suites are designed to reduce reagent consumption while using USEPA methodologies. Ultra High Throughput (UHT) methods allow the analysis of over 100 samples per hour on up to five analytical channels simultaneously. Reagent use per sample is decreased by 20-50%. Ultra Low Flow (ULF) methods use even smaller amounts of reagents per sample (comparable with discrete analyzer systems).

### Contact

See the **Lachat Methods List** for a comprehensive list of Lachat methods available. Lachat application chemists routinely develop custom methods. Visit [www.lachatinstruments.com](http://www.lachatinstruments.com) for more information.