EXPRESS NEWS

August, 2010

See Us On The Road!

Our sales staff will be traveling to several shows and events in the next few months. If you're planning to attend any of the following events, stop by to see us and say hello. Scheduled events are listed on our website at: www.envexp.com/news/upcoming_events.asp.

August 19
WEASC Lab Workshop
Lexington, SC

September 1-2
Ohio WEA Lab Workshop
Columbus, Ohio

October 4-6
WEFTEC
New Orleans, LA

October 12-13
Gulf Coast Conference
Galveston, TX

October 27-29
FSEA Fall Conference
West Palm Beach, FL

See Us On The Web

Our website has new features that make doing business with us more convenient for you!

Shipment Confirmation – You'll receive notification when your order ships plus tracking numbers

Instant Quote – Add items to your cart, press a button and receive an email quote immediately

Customer HotList - Reordering is a snap with this list of your frequently ordered items

Environmental Express Supports Gulf Oil Clean Up

By Les Orr, Product and Technical Support Manager, Environmental Express

After almost 87 days of crude oil pouring into the Gulf of Mexico from the Horizon disaster, it seems that the well has been contained. Soon it should be capped off and sealed permanently and stay that way, we hope. This does not mean the work of the environmental laboratory is complete. Quite the contrary, it has just begun. Millions of gallons of oil continue to flow through the Gulf, into the estuaries, onto the beaches and fall to the seabed, contaminating and altering the chemistry of the land, sea and air. Many laboratories around the U.S. have become involved in testing for various aspects associated with the disaster. We would like to mention a few and thank them for their dedication to this project that will affect almost everyone in the country and many around the world.

What has been learned over the years of research on oil spills is that short and long term data must be analyzed to determine the impact that we are having on our environment. Baseline analysis from the past will help us understand these impacts in the future.

EPA has taken a large role in performing ongoing analysis. Air, water and sediment testing is being done 24/7. VOCs in the air from fuel burning at the surface are a concern for workers and may impact the coast. In addition, natural evaporation can affect residences along the coastline. In the water, they are looking for chemicals associated with the oil and also the remnants of the dispersant chemicals that are being used to combat the spill. Instrumentation has been placed around the region to perform real-time monitoring for immediate identification of health risks.

University of Georgia Marine Science Lab, with funding from NSF, has been involved in analytical research from the Gulf. Methods performed include a full range of organic analysis, radiological, microbiology and inorganics. Many of the offshore samples have been taken from the Research Vessel Walton Smith. From surface waters to deep benthic areas, samples have been taken and are currently being analyzed. According to Kim Hunter from the lab of Dr Joye, they are analyzing samples for dissolved oxygen, salinity, dissolved organic and inorganic carbon, sulfate, nitrate, ammonia and methane. And the full range of hydrocarbons via GC-MS. They are scheduled to publish their findings shortly. Please watch our website for links when papers become available to us.

Galson Laboratories located in East Syracuse, NY is analyzing air quality around the Gulf Region for both private contractors and government related organizations. According to Joe Unangst, President of Galson Labs, they are working seven days a week analyzing samples that monitor contaminates including carcinogens that can have long term health effects.

Oceanography researchers from Texas A&M have been looking for the escape of methane. According to John Kessler who led an expedition in June, "We found that most of (the methane) is staying dissolved in deep waters, and very little of it is making it out into the atmosphere." This is good for the atmosphere, but poor for marine animals as it causes oxygen depletion. Oxygen depletion is being studied by Steve DiMarco. It not only affects marine life near the surface, but also deep-water creatures which provide food throughout the food chain.

NOAA has collected and is analyzing more than 11,000 samples that are in direct relation to the spill. The majority of these samples are from water and sediment with the remainder being from oil, tar balls, dispersants and animal tissues. This, according to their website, is being performed even on coral reefs in the Keys, FL and Flower Gardens, TX so they can asses any impacts in the event that oil does reach these ecosystems later.

By no means is this a complete list of the labs performing analysis on the disaster in the Gulf; just a mention of a few that we have heard from. Everyone at Environmental Express is supportive and appreciative of all the efforts around the country to find resolutions and resolve the short and long term affects. Make an entry on our website blog and tell us what your lab is doing.

Askew Scientific Consulting LLC

Cyanide: The Molecule and Its Analysis
A Simple Compound with Complex Problems
Part 1: Cyanide Bonding Chemistry

By Edward F. Askew PhD, Askew Scientific Consulting

The cyanide molecule has been the center of heated debate over the last few years as regulatory limits for wastewater discharges under the Clean Water Act (CWA) and the NPDES permit are lowered. The lower regulatory limit for cyanide is being driven by new water quality standards for the watershed receiving the treated outfall from the NPDES permitee. As such, laboratories performing cyanide analysis are constantly modifying or changing their cyanide analysis to achieve reliable and accurate results at lower and lower cyanide concentrations. This has led organizations such as ASTM International and the Standard Methods Committee along with the Environmental Protection Agency to try to develop a default set of parameters for cyanide sample collection, preservation and analysis that will fit most sample matrices encountered in either drinking water or wastewater. But, the chemistry of the cyanide molecule and the regulatory definitions/requirements will prove the task more difficult than currently imagined.

The cyanide molecule is typically portrayed as a two atom pseudo-halide molecule. That is, it is assumed that the cyanide molecule, behaving like a chloride anion, attaches with a simple two electron sigma bond through the carbon atom to a metal, as illustrated by Type 1 in Figure 1. This type of cyanide bond will be a classical ionic bond and can be easily broken through lowering of the pH (< 4) to produce a cyanide anion that reacts with the analytical reagents/instruments used in the quantitation method.

But, a cyanide molecule can also bond through the electron pair of the carbon atom to form a weak covalent sigma bond with metal, as illustrated by Type 2 in Figure 1. This type of cyanide bond is more polar covalent in nature and requires a more rigorous chemical treatment such as distillation with low pH (< 2) and catalysts (e.g. $MgCl_2$) to produce the cyanide anion.

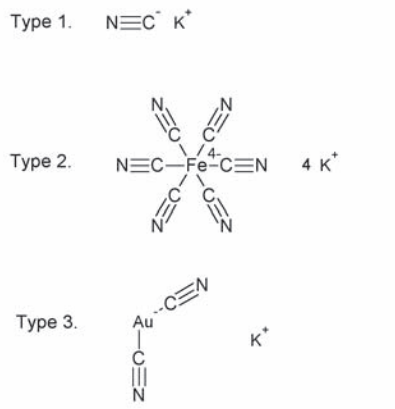


Figure 1: Typical Cyanide Bonding

The most complex type of cyanide bond involves the strong covalent bonding of the sigma electrons with the metal, as illustrated by Type 3 in Figure 1. This type of cyanide bond has varying degrees of classical covalent and polar covalent character and is more difficult if not impossible to break by distillation with the cyanide remaining intact.

Each of these cyanide bonds are found in metal complexes common to some industrial wastewater effluents. As illustrated in Table 1, the simplest cyanide complexes that have a Type 1 bond are not going to be prevalent in most wastewater samples as they are extremely toxic to both humans and wildlife. Type 2 cyanides are much more wide spread and can be found in a large number of industrial discharges. But, the toxicity of this type of cyanide complex is much less than a Type 1. As illustrated by the comparison of the LD_{50} of potassium cyanide to the potassium ferricyanide, the ratio is almost 1 to 300. Type 3 cyanide complexes have no published LD_{50} data and can be assumed to be much lower in toxicity than even the Type 2 cyanide compounds.

Here is where the regulatory requirements under a NPDES permit cause problems for cyanide analysis in the laboratory. Under the Code of Federal Regulations for the Clean Water Act , 40 CFR 136 or the Safe Drinking Water Act 40 CFR 141, cyanide is defined as Total Cyanide. That is, all cyanide that can be determined after distillation or other pretreatment process that removes interferences. Thus, a cyanide water or wastewater sample is subjected to chemically aggressive pretreatment process regardless of type of cyanide complex in the sample and its toxicity. This pretreatment process has been shown to produce inaccuracies in the final cyanide analytical results. The sources of these inaccuracies and processes to reduce their impacts on the final cyanide quantitative results will be covered in part 2 of this series.

Table 1: Typical Industrial Cyanides

Bond Type	Typical Molecular Compounds	Probable Source	LD_{50} (Mice)
1	Potassium Cyanide	Electroplaters Mine Waste	10 mg/kg
2	Potassium Ferricyanide	Electroplaters Photography Fabric Dyeing	2970 mg/kg
3	Potassium Gold (1) Cyanide	Electroplaters	Not Determined

Basic Ethics and Integrity in the Lab

By Rebecca Roztocil, Quality Assurance Officer, Paradigm Environmental Services

Ethics and data integrity in the lab is a simple concept that is extremely complicated to cover in detail. AND, it is getting a great deal more attention from accrediting authorities and lawyers alike. Laboratories are required to document training for their employees in ethics and data integrity.

If you strip away all the details, ethics in the lab is like ethics anywhere. It defines the ideal personal integrity of the individual employee. Individual employees may be entry-level bench chemists or upper management. Very simply put: don't lie or try to cheat the system. Fraud is punishable by law. However, most of us are human, and therefore this is not always as easy as it sounds.

Every analytical procedure in a laboratory should be described in an SOP. The SOP should not only describe, in detail, how to perform the procedure but also how to evaluate the quality of the data produced and what action is appropriate to take if the required data quality indicators are not met. Do not deviate from the SOP, no matter how tempting it may be. It is important to understand that QC is not a measure of the analyst, it is a measure of the data – and this concept should be stressed by management, so that employees never feel pressured to put the generation of the data above the quality of the data.

Speaking of management…There are not enough ways to stress how critically important it is to have the management in the company promoting good ethics through their own decisions and behavior. There is a quote I have hanging in my office – I do not know its origin but it is possible that it was penned by the technical director for our company – that reads, "Ethics, or the lack thereof, is supported by the daily decisions *made by management* and *witnessed by employees*". To those of you who are parents, you may be acutely aware how much of your less attractive behaviors your children observe and will later demonstrate in horrific detail at the worst possible moment.

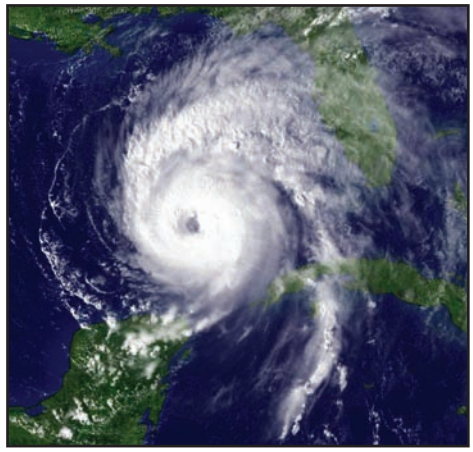
Perhaps the most important facet of producing ethical work is to stress documentation, traceability and analyst narration. For starters, analyst narration records observations about the work at the time the work is being done. Therefore, memories do not need to be relied upon at a later date. In many cases, the documented observations may provide valuable information for the client and the data may still be usable even though it is partially deficient in some manner. This can also serve to clarify a situation that could appear fraudulent if the data were audited at a later date and the analyst did not provide written narration regarding observations and the resultant decisions.

Do not ever assume your work will never be called into a court of law or investigated by higher authorities. Any data that is produced in a laboratory and is released to the client can be used in any number of ways. Perhaps the client does not behave ethically. Occasionally a client will petition the laboratory to generate a desired result, possibly with a financial 'gift'. Be sure the data ***you*** produce is of the highest quality. Follow the SOP and accurately represent the quality of the data according to whatever rules your industry follows. All too often, when cases of fraudulent behavior are investigated and prosecuted, many people become affected – even when they were not a part of the core problem. Unethical behavior reflects poorly on everyone that works in that company. Remember, as Thomas Paine wrote, "Character is much easier kept than recovered".

Paradigm Environmental Services is a full-service environmental laboratory located in Rochester, NY. Originally conceived in 1986 as an asbestos testing laboratory, Paradigm has evolved to include organic and inorganic chemistries as well. Rebecca Roztocil joined the Paradigm team in 1993 as the sole analyst in the inorganic lab and transitioned to the Quality Assurance Officer in 2003.

Disaster Preparedness For Your Lab

By Les Orr, Product and Technical Support Manager, Environmental Express



What would happen if your lab was struck by a hurricane? Or an earthquake, snowstorm or fire? Disaster recovery plans for your lab should be in place so that employees, customers and the physical location itself will experience as little impact as possible.

The lab should have an emergency plan for its employees and equipment. Employee work schedules, locations of work stations and emergency contact phone numbers should be collected and meticulously maintained. Develop evacuation plans and rehearse so that each employee understands his/her role in an emergency.

Employees. First and foremost is the safety of your employees. In the event of a sudden impact upon the building every employee should be accounted for in an agreed upon muster area. If time permits, the safety of your equipment should also be addressed. Sensitive instruments that may fault due to sudden power fluctuations or loss of power should be turned off and unplugged according to the manufacturers' recommendations. Cover equipment with plastic and raise it off the floor as water intrusion could cause extensive damage. Compressed gas cylinders should be turned off, disconnected, and moved to a

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structurally sound single location. All chemicals should be stowed appropriately in secured cabinets. Make sure that new employees are properly trained in "what to do" procedures and longer term employees are routinely reminded. Practice your procedures to make sure they are second nature. Grade schools are not the only places that should have emergency drills.

Customers. Commercial labs should alert their customers that certain tests may be unavailable during a disaster if electricity is severed. Even with power loss, some basic tests can be performed provided that the laboratory is prepared in advance. A large generator can run equipment and maintain sample storage refrigerators. There is a plethora of equipment that can be operated via batteries in the absence of circuit power. These would include pH and ISE meters, vacuum pumps and desiccators, even radiological counters. Remember to fill some clean containers with DI Water prior to turning off the DI Systems. Without power, at least some basic tests can be performed provided that you have lab water and portable equipment.

Supplies. Just as you would prepare your household for a hurricane with food rations and safety items, you should prepare your lab as well. Keep your lab stocked with everyday chemistry items. Remember that the UPS man may not physically be able to deliver packages to your lab after a disaster. So take stock of key inventory and don't run low. A few additional items not related to analyzing samples can make for a safer environment as well. Fire extinguishers are easy-to-maintain safety equipment. Make sure the number of units is appropriate and that they are fully charged. Flashlights with fresh batteries, raincoats and boots along with some non-perishable food should be on hand. Even the chemist has to stay healthy!

The day after. Make sure that you have a communication plan for the day after the emergency so that employees know whether or not to report to work. Arrange for a phone recording, website message or old fashioned phone tree to communicate important information.

This article is by no means a complete list of procedures; simply it should serve as a starting point for discussions and preparations for your emergency planning. Prevention can go a long way toward the health and safety of the lab. Elect a safety officer and review your plans with everyone. Be prepared, but be ready for the unexpected.