

# **EARTH & ENVIRONMENTAL SCIENCE LAB CLEAN-UP**

What you need to know.



2020

# What did I forget to do in the prep area when my school was closed?

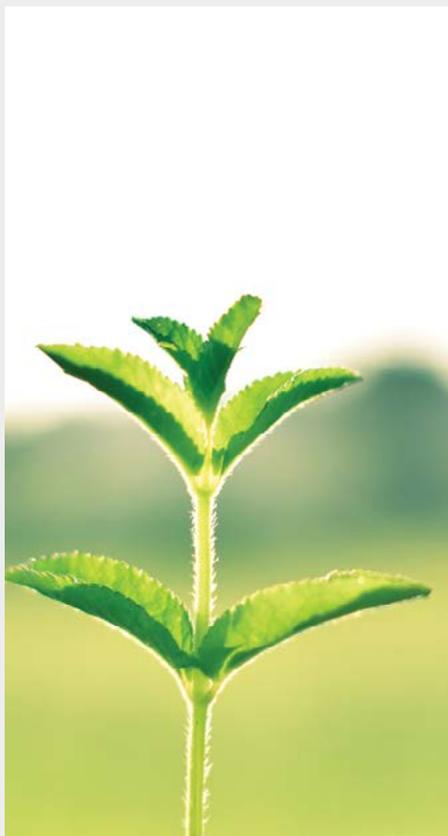
There are many teachers and science supervisors asking about prep room safety strategies while their schools are closed for months longer than the traditional summer vacation.

FLINN understands the situation that you are in currently and we have compiled a listing of common concerns and remedies for them which you can use.

During this challenging time we know that you are doing your best to provide remote learning and may not be thinking about the science department in the school, but there are some things to be mindful of back in your prep area and lab.

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# Chemical Storage Concerns

Closed schools offer the perfect opportunity to do an audit of your chemical storage

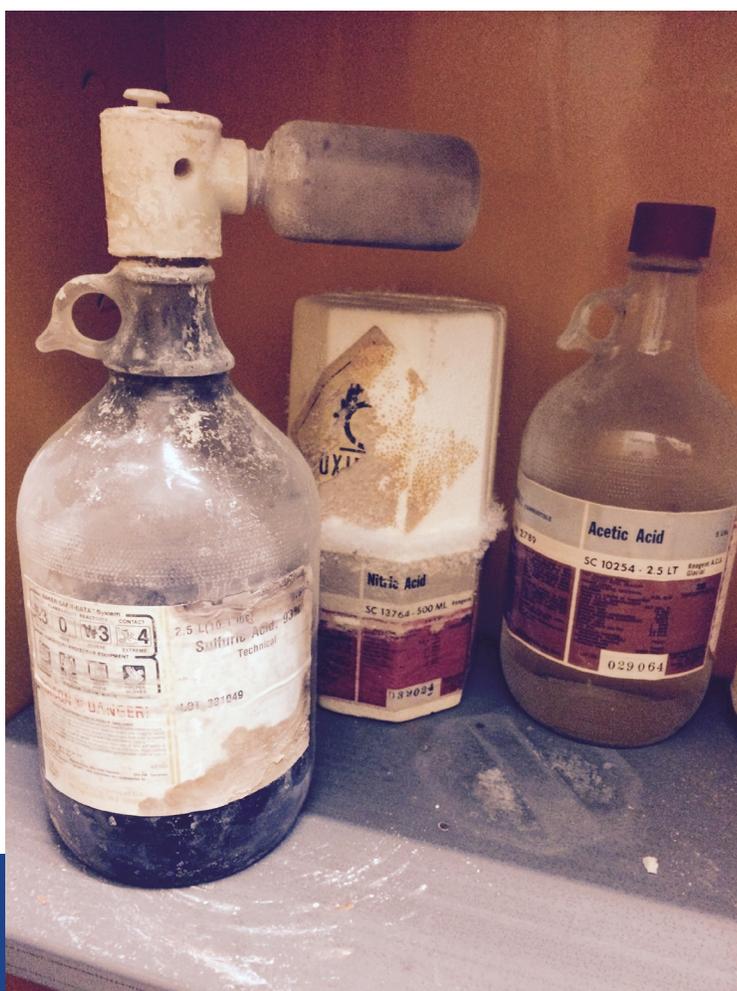
## Here's what you need to know:

Yearly audits are recommended to ensure school labs and prep areas are safety compliant. Audits also offer the perfect opportunity for you to take stock of what your classroom will need and what you should dispose of before students arrive back in the classroom.

Incompatible chemical storage of chemicals typically results in odors, precipitates forming, or chemical bottle failures. Many chemicals when stored incorrectly will create tell-tale smells in the room and these are usually hydrocarbons from alcohols and solvents in the flammables cabinet; or corrosives that are mixing (vapors) creating a pungent smell.

The fine white precipitate that forms in a corrosive cabinet that is storing both acids and bases (improper storage method) is the chemical result of an acid + base = salt + water.

You'll see a fine white powder all over the inside of the cabinet and bottles that leads to accelerated corrosion of metals and some labels if there is nitric acid present.



# Proper chemical storage is easy to achieve.

Make sure to separate out your acids from your bases and safely dispose of unsafe bottles and chemicals as needed.

## Here's what you need to do:

Isolate your Nitric acid – it is very noxious and the primary reason for smells and issues in a prep room. Most people are unaware that you cannot store all acids together in the same cabinet. Need a better storage solution, [click here](#).

Nitric acid and Acetic acid are combustible when in proximity to each other (just the vapors alone are enough to cause a flash fire/explosion).

Keep Nitric acid stored away from ALL other chemicals in an isolation chamber or its own locked cabinet. Consider if you need it any longer as there are plenty of greener, safer alternatives available, [click here](#).

If you have a deteriorating nitric acid bottle with crystalline structures on it, the cap has broken or see a crack in the bottle then you can dispose of this chemical by following the protocol established from the Science Safety Manual, Chemical Hygiene Plan, DOE, or local school district.

Flinn Scientific also has a disposal plan ( 24b) which is recognized as a safe method. To see our disposal information, [click here](#).



# Proper chemical storage is easy to achieve.

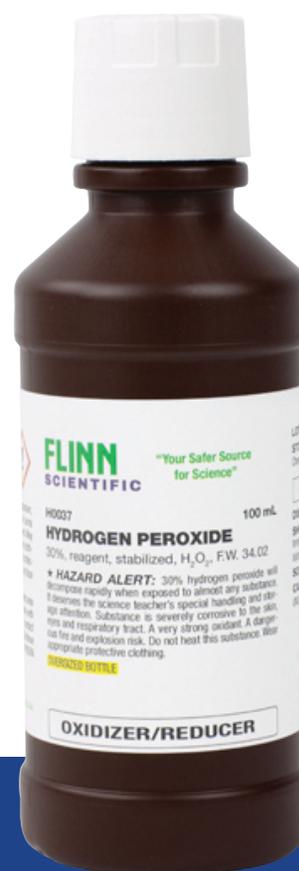
Hydrogen Peroxide is one of the most frequently used chemicals in chemistry labs. 30% Hydrogen Peroxide has special properties that are important to remember.

## Here's what you need to know:

Concentrated hydrogen peroxide needs to be stored properly as it typically expands. Older, "accordion-style" bottles allow for the safe expansion due to the decomposition of the  $H_2O_2$  over time. These bottles allow the volume of the gas to safely expand up to 3 times the size of the original vessel and are generally considered safe.

Today, Flinn provides concentrated hydrogen peroxide in a durable, high density bottle with a pressure cap for safety. Be aware that there will be approximately 0.5% reduction in the concentration per year at room temperature of this substance. It will still effectively work for your demonstration but might take a few extra seconds to perform as expected. We recommend you dispose of and replace after a year or two if you have any remaining liquid in the bottle.

We recommend only ordering the amount that you will use in a typical school year to minimize storage and disposal costs, and store this in accordance with the protocol established from the Science Safety Manual, Chemical Hygiene Plan, DOE, or local school district. Flinn Scientific also has a disposal plan (22a) which is recognized as a safe method. To see our disposal information, [click here](#).



# Common Incompatible Chemicals

Many chemicals are incompatible and need to be stored separately from each other.

## Here's a sample of what you need to know:

- Acetic acid with chromic acid, ethylene glycol, hydroxyl compounds, nitric acid, perchloric acid, permanganates, peroxides
- Acetone with concentrated sulfuric and nitric acid mixtures, hydrogen peroxide
- Acetylene with copper (tubing), bromine, chlorine, fluorine, iodine, silver, mercury and their compounds
- Alkali metals with carbon dioxide, carbon tetrachloride, chlorinated hydrocarbons, flammable liquids, oxidizers, salt, sulfur, water
- Ammonia (anhydrous) with mercury, halogens, calcium hypochlorite, hydrogen fluoride
- Ammonium nitrate with acids, metal powders, flammable fluids, chlorates, nitrates, sulfur, and finely divided organics or combustible materials
- Aniline with nitric acid, hydrogen peroxide, inorganic acids, oxidizers
- Bromine with ammonia, acetylene, benzene, butadiene, butane, petroleum gases, hydrogen, sodium carbide, turpentine, and finely divided metals

## Did you know?

*You can contact our staff scientists any time you have a question about your chemicals or need help identifying an unknown chemical. We field hundreds of questions every year.*

*In fact, we're so trusted, we routinely assist fire departments, and even assisted a state bomb squad who needed help identifying a chemical in the middle of a threat they were investigating.*

# Common Incompatible Chemicals

- Chlorates with ammonium salts, acids, metal powders, sulfur, finely divided organics or combustible materials
- Chromic acid with acetic acid, naphthalene, camphor, alcohol, glycerol, turpentine, and other flammable liquids
- Chlorine with ammonia, acetylene, butadiene, benzene, and other petroleum fractions, hydrogen, sodium carbide, turpentine, and finely divided powdered metals
- Cyanides with acids
- Hydrocarbons, generally with fluorine, chlorine, bromine, chromic acid, sodium peroxide
- Hydrogen peroxide with copper, chromium, iron, most metals or their respective salts, flammable fluids, and other combustible materials, aniline, and nitromethane.
- Hydrogen sulfide with nitric acid, oxidizing gases
- Iodine with acetylene, ammonia (anhydrous or aqueous)
- Mercury with acetylene, ammonia, fulminic acid, hydrogen
- Nitric acid with acetic, chromic, and hydrocyanic acids, aniline, hydrogen sulfide, flammable liquids or gases and substances which are readily nitrated
- Oxalic acid with silver, mercury and their salts

## Did you know?

*Flinn has always has SDS available online and has a Chemical Storage Guide that you can access free to ensure that you are following best chemical safety storage safety practices.*

**Find all our SDS at [www.flinnsci.com/sds/](http://www.flinnsci.com/sds/)**

*Please note: our safety guidelines are widely adopted nationwide, but you should always defer to your school, district or regional guidelines where applicable.*

# Common Incompatible Chemicals

- Oxygen with oils, grease, hydrogen, flammable liquids, solids and gases
- Perchloric acid with acetic anhydride, bismuth and its alloys, alcohol, paper, wood and other organic materials
- Phosphorous pentoxide with water, alcohols, strong bases
- Potassium permanganate with glycerol, ethylene glycol, benzaldehyde, sulfuric acid
- Sodium peroxide with any oxidizable substances (e.g. ethanol, methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerol, ethylene glycol, ethyl acetate, methyl acetate, furfural)
- Sulfuric acid with chlorates, perchlorates, permanganates, and water

[Watch our Shelf Life of Chemicals Video](#) to see how Flinn provides information to help you safely manage your chemicals.



# Chemical Waste Concerns

Waste chemicals often find themselves taking up space in prep areas. Proper and timely disposal is paramount to a safe lab and learning environment.

## Here's what you need to know:

If you will not be returning to on-site learning for the fall, try to get permission to go into your lab and go through your chemicals now. If you are returning to onsite learning for the fall, we suggest putting a small dot sticker on the bottle every time you pull it out for use which will allow you to visualize how often that particular bottle is used during the year. You will find that there about 15-20 chemicals that are very commonly used – and 40 more that are used periodically.

There will be some that are used for only one lab activity per year, and there will also be some chemicals that have no dots on their lids after a school year. That is indicative of an inventory that should be purged out to be disposed of since they are not being used and taking up space and could be contributing to chemical interactions.

We encourage you to be mindful of the volumes of the substances you are procuring and storing. While it may feel like purchasing a larger quantity for a lower price will save you money, in the long run, having to get rid of excess chemicals is more costly and can be harmful to the environment. If you can, use this time to “clean house.”



# Chemical Waste Concerns

Having too many chemicals in the prep room – even common inert substances such as sugars, starch, salts, sodium bicarbonates etc., will contribute to the smells in the room.

## Here's what you need to know:

Having too many chemicals in the prep room – even common inert substances such as sugars, starch, salts, sodium bicarbonates etc., will contribute to the smells in the room. Going forward, teachers should be mindful of the volumes of the substances they procure and keep.

We suggest putting a small dot sticker (The kind from the Dollar Store that are red, blue, white, yellow....) which will allow you to visualize how often that particular bottle is used during the year. You will find that there about 15-20 chemicals that are very commonly used – and 40 more that are used periodically.



# Chemical Waste Concerns

Chemical security is important all year round, but especially when you aren't there to monitor things daily. Long stretches of time where labs are unused require special precautions.

## Here's what you need to know:

Please make sure that the prep room and the chemical cabinets are all LOCKED properly and that there are extra keys for the locks with administration and maintenance.

It is essential to have an updated inventory of chemicals in your school storage and prep rooms, and if often a requirement. Need help? The Flinn Online Chemventory™ is a cloud-based laboratory chemical inventory system that allows multiple users access to the database from multiple locations and devices! The program comes fully loaded with updated GHS pictograms, hazard codes, and signal word information for over 2,400 Flinn chemicals.

### [Learn more here.](#)

Keep a print copy of our catalog with disposal information handy and easily accessible.

Are your locks broken or you don't have proper storage? We have cabinets especially designed for different school needs.

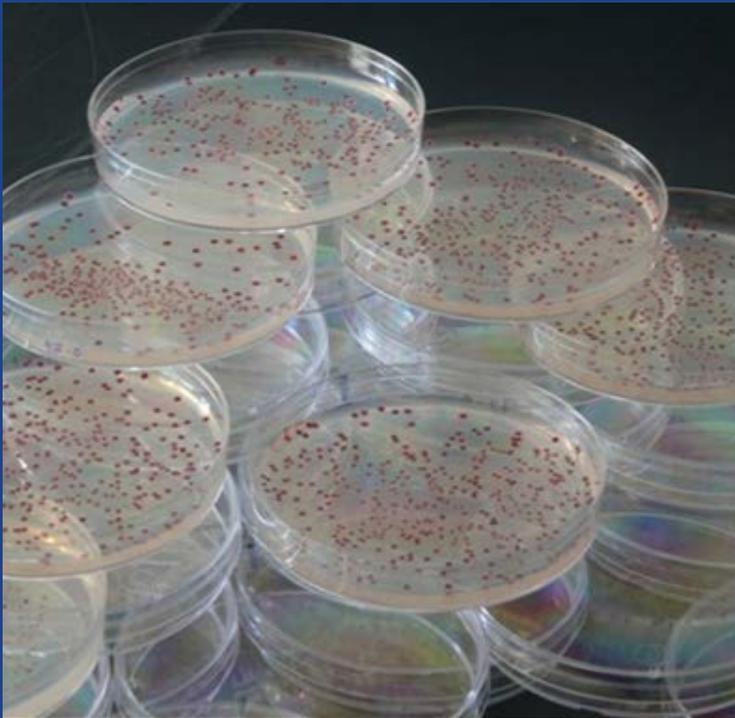


# Live Plants, Animals & Cultures at School

## Here's what you need to know:

Live plants and animals will need to be removed from school during the extended school closings and properly cared for if possible. Animals that are not native to your area or animals that have been purchased (even if they are thought to be native to your area) should not be released into the wild. They may suffer and die or they may become established and cause ecological damage

Are there any petri dish cultures at school? Were these dealt with prior to school closing or are these growing wildly on the lab bench / incubator oven in the prep area? Before disposing of dishes in the trash or cleaning for future use, the bacteria should be destroyed. Pour a small amount of household bleach over the colonies while holding the dish over sink. Caution - do not allow bleach to touch your skin, eyes or clothes. Wash all petri dishes with quality lab detergent and dry thoroughly before storage.



# Biological Jar Specimens

## Here's what you need to know:

Fetal pigs, rats, frogs, fish, grasshoppers and other common specimens need to be stored properly. Tight lids, unopened sealed vac-pacs, ideally in a climate-controlled space to minimize odors.

There should not be any homemade specimens in the prep area or science labs as these are unsafe and not recommended or approved. Only use commercially manufactured museum mounted specimens.



# Chemical Storeroom Ventilation

Proper room ventilation with adequate air exchanges will eliminate most unsafe chemical vapors.

## Here's what you need to know:

Many older school facilities do not have proper ventilation and are under the 'grandfathering' accepted rules from when the school was built. New schools and renovated science departments are required to have excellent ventilation into the rooms. This is a difficult thing to fix on existing schools, however, retrofit 'purge fans' do exist which can help.

If there is an exhaust fan in the prep area, if it can be fitted with a timer that allows the fan to come on and purge the air in the room often, that would be ideal. Every 10-15 minutes is the optimum cycle.

Some older schools leave the fume hood operational 24/7. These fume hoods need to have at least a draw of 100cfm (cubic feet per minute) of air being pulled into the hood and discharged outside the school through the roof or side wall depending on the design of the hood. Remember that the optimum sash height is about 6" above the work surface or indicated with arrows on the side of the face.

If possible, have the windows opened and the fans running to the best of their ability prior to having teachers or facilities personnel working in the area. Opening the chemical cabinets once teachers return to school will allow them to vent directly into the room which may be the only way to mitigate the concentrated odors—but do not have people stay in that immediate area when this is happening.



# Proper Set-Up: Ventilation

Here's what you need to know:

Now is the perfect time to review your school's set up and ensure your school is set up for success. As the safer source for science, Flinn Scientific has numerous resources that help you address any ventilation questions you may have. Here are some FREE videos we recommend viewing:

[Chemical Storeroom Ventilation](#) discusses how and why chemical storerooms should be properly ventilated.

[Critical Priority - Laboratory Ventilation](#) discusses how purge fans and fume hoods function and how to present the need for proper ventilation in the lab.

[Laboratory Ventilation and Use of Fume Hoods](#) discusses how laboratory ventilation must be well-designed, meet specific criteria, and be regularly tested for proper functionality.



# Natural Gas Lines & Burners

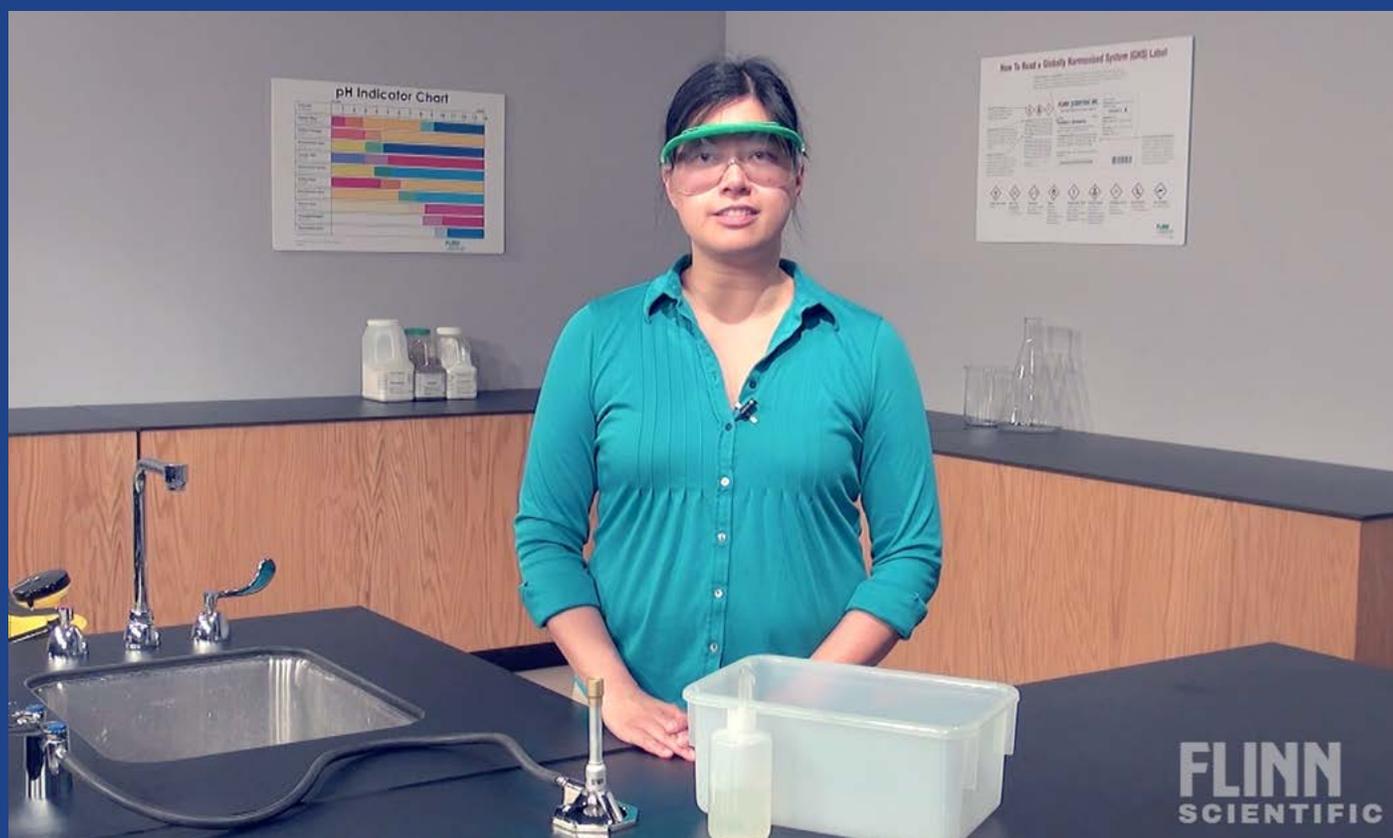
The natural gas lines, burners and tubing should be inspected.

**Here's what you need to know:**

Natural gas lines should be visually inspected at a minimum to ensure that there are no leaks or concerns from corrosion. Many schools have the Emergency Shut Off / Lock Out valve for gas lines at the instructor desk which need to be in the OFF position while the schools are closed indefinitely. Identify any defects and notify your school administration about gas line issues immediately.

Burners should be inspected yearly, as they may develop leaks at the gas adjustment valve or tubing connections. After visually inspecting the burner and tubing, burners can be tested in a shallow pan with a soap solution.

[Watch our Chemistry Minute Video](#) to learn how to inspect burners for leaks.



# Plumbing Issues When Schools are Closed

## Here's what you need to know:

The drains—if there are any present—in the floor may be dry inside the 'P' trap, which will allow for some sewer gases to find their way into the school science departments.

Usually over the summer, or on a set schedule the maintenance/janitorial staff add some water into these drains to freshen them up, and some add a few drops of vegetable oil to slow down the evaporation of the water and to keep the traps working as they should.

The drains in the lab benches and perimeter stations will also need to be topped up with the same liquid and maybe some oil drops seeing that the schools are going to be closed for months. This will prevent odors. If you have a dishwasher for glassware in the prep area, it will need to be run through a cycle to clean itself and remove odors.



# Storage and Prep Room Organizations

Keeping prep and storage rooms clean and organized is a never-ending task. Flinn has many helpful resources for you.

## Here's what you need to know:

We recognize that in the unexpected school closures there are likely some levels of 'messiness' in the prep area as a result of not planning to be away for an extended period of time.

It can be overwhelming to address organizing your prep room when a school closes abruptly, or if you only have limited time in your school. First, make sure all safety equipment is easily accessible including: Fire extinguisher; fire blanket; spill kit; PPE; UV goggle sanitizer; drench shower; eye wash station; first aid kit; master shut-off switches; smoke detectors. There needs to be clear access to these items.

Many school science departments keep certain lab reagents and consumer commodities in there ( including eggs used for lab activities which will expire and smell really bad... ) or milk products used for dairy labs etc. These will need to be purged ASAP to minimize potential odors & bacterial growth. If you cannot get into the school, you should alert your principal and the janitor/maintenance people to remove any products/items from the fridge when they can.

Make it a priority to organize the prep area once you are back in the building and that may require the removal of clutter. Student projects, textbooks, lab activities, glassware, boxes, random science items and bottles of chemicals are the usual contributors to the disorganization

## Did you know?

*Flinn has many free resources available to keep your labs and prep areas safe and organized. Search under the resources tab next to the search field at [www.flinnsci.com](http://www.flinnsci.com) to search our archives.*

**[Watch our End of the Year Safety and Clean Up Tips video.](#)**

## End-of-School Year Science Department Checklist.

1. Do a chemical inventory. All chemicals including stock solutions and even dropper bottles should be correctly labeled. Evaluate the chemicals in your prep room and make sure chemicals are properly stored according to the Flinn suggested organizational method.
2. Identify chemicals and accumulated chemical wastes for hazardous waste removal over the summer. You should contact the school district and alert your administrator about chemicals and chemical wastes that need to be removed.
3. Dissection specimens need to be stored so they do not get too warm. Ideally these should be kept in a climate conditioned room.
4. Cover your microscopes with dust covers or shopping bags to prevent dust accumulation over the summer. This is a very simple and effective way to protect your investment in this equipment.
5. Top off buffer solution on pH probes if needed so they stay hydrated over the summer. These tend to evaporate or leak over time if the caps are not secured properly.
6. Unplug all electrical devices (microscopes, hot plates, balances, etc.). This will save on energy consumption and provide a longer life for your equipment. Identify any issues with the power cords or outlets. (A circuit tester such as SE9095 is a handy device for checking electrical outlets.)
7. Inspect your scientific equipment and apparatus for any issues, including routine parts replacement. For example: check the Van de Graaff generator belts, the UV lamp in goggle sanitizers and the cartridge in a water demineralizer.
8. Do a walk-through of each lab in the science department to check and identify safety equipment with proper signage. For example: eye wash stations, drench showers, fire extinguishers, first aid kits, broken glass boxes, fume hoods, master shut off switches, and chemical spill kits.
9. Identify any urgently needed back-to-school supplies required early in the next school year. Order them to arrive when you return to school to ensure a strong start to your science program without any delays due to not having the right products on hand.
10. Document your end-of-the-year science department needs in a prioritized list and provide this information to your administrator prior to departing for the summer. Keep a copy for your records.

# FLINN SCIENTIFIC

Your Safer Source for Science.

Learn more about Chemical Safety at [www.flinnsci.com](http://www.flinnsci.com)