



Food Science and Technology Notes

Extension Division Department of Food Science and Technology Virginia Polytechnic Institute Blacksburg, Virginia

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SAFETY IN THE FOOD LABORATORY

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Many food processing firms already have laboratory facilities equipped for chemical and microbiological testing. Several food processors are in the planning stages and hope to get their laboratories established this year. Regardless of where you are in a laboratory program - safety must be considered.

Safety can have a monetary pay off in lower insurance rates and less lost time and disruption due to accidents.

In any testing laboratory the following should be observed:

- 1) Locate all safety devices in the laboratory.
- 2) Locate all of the fire extinguishers.
- 3) Every laboratory should be equipped with a fire blanket and chemical shower.
- 4) Handle all chemicals as if they are susceptible to fire.
- 5) Store all volatile compounds in cool ventilated areas.
- 6) Use care in handling toxic and corrosive chemicals.
- 7) Place a complete first-aid kit in the laboratory.
- 8) Prepare bottles of solutions to neutralize acid and alkali burns. Place these in a special place accessible to immediate use when needed.

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Precautions for Effective, Safe Steam Sterilization

Microbiological procedures call for sterility in the water, solutions, media, and sampling and plating equipment that are used. Steam sterilization is most often used. Again, certain precautions should be observed as follows:

- 1) Avoid over-crowding the autoclave.
- 2) Make certain all air has been exhausted before building up pressure.
- 3) Make sure the autoclave is equipped with accurate temperature and pressure gauges and a reliable pressure relief valve.
- 4) Do not release the pressure too suddenly. A rapid pressure drop will cause liquids to surge out or caps to blow off.
- 5) For safety in operation, make certain all pressure is off the autoclave chamber before attempting to open the door. Open door slowly to avoid contact with live steam in the face.
- 6) Always autoclave liquids in Pyrex or other hard glass to prevent breakage of glass by heat shock.
- 7) Always autoclave solutions in lightly closed containers. Never tighten the lids prior to autoclaving.

Chemical Burns

A variety of chemicals are present in any food laboratory. Many of these are acids and alkalis that can cause severe burns. With either acid or alkali burns, wash off as quickly as possible with a large quantity of water. Water from a tap may be allowed to flow over burns.

Acids. While the injury is being washed, have someone procure lime water or a mixture of baking soda and water or soap suds and apply freely. A 5% sodium bicarbonate solution is recommended. For acid in the eye, wash as quickly as possible with water and then with 3% sodium bicarbonate solution.

Alkalis. Wash with a large quantity of water as for acid burns. Neutralize with weak vinegar, or 1% acetic acid solution. For alkali burns in the eye wash with weak solution or vinegar or with olive oil or a 2% solution of boric acid.

In the case of burns, always obtain prompt medical help.

Fire Precautions

Many solvents are used in a food laboratory. These are all combustible, consequently we should realize the potential hazards.

Do not use a gas hot water heater in a laboratory where flammable solvents will be handled. Ignition of the gas flame is dependent on a pilot light continuously burning. This is a hazard where fat or other extractions are being conducted. Also carefully consider the use of explosion proof motors, switches and the like.

What do we do when a solvent becomes ignited?

Alcohol. Dilute with a spray of water to avoid spread of burning liquid./1

Benezene. Use water to cool containers which are endangered; extinguish flame with sand, earth, fire-foam or carbon tetrachloride fire extinguishers./1

Ether. Use water to cool containers which are endangered; extinguish blaze with sand, earth, fire-foam or carbon tetrachloride fire extinguishers./1

Gasoline. See under ether.

Lacquer solvents. See under ether.

Chemical "Spills"

Chlorine. Spray with water. The pungent nature of the gas makes the use of a gas mask imperative.

Hydrochloric acid. Use large volumes of water, also chalk or baking soda./1

Nitric acid. Use large volumes of water. Do not use sand or earth./1

Potassium hydroxide. Use large volumes of water or dilute acids.

Sodium hydroxide. Same as potassium hydroxide.

Sulfuric acid. Same as hydrochloric acid.

/1 Use suitable gas masks

Compressed Gas Cylinders

A gas cylinder can become a dangerous missile if the valve is accidentally sheared off; therefore, all cylinders in use should be belted or chained to the wall to prevent their tipping over. Cylinders not in use should be properly capped. Any tank can be a hazard if not cared for.

Proper Ventilation and Storage

Certain chemicals give off toxic fumes and should be handled under a well ventilated area or preferably in a fume hood. Examples of such chemicals are ammonia, benzene, carbon tetrachloride, ether, potassium hydroxide, sodium hydroxide, nitric acid, hydrochloric acid, sulfuric acid. Breathing fumes from such chemicals can be detrimental and even fatal if prolonged exposure is allowed.

Always store nitric acid in the dark to prevent formation of brown nitrous oxides which can build up pressure and cause the bottle to explode. Wrapping the nitric acid bottle in aluminum foil will help keep out light.