

Proper use of a steam autoclave

All personnel who use autoclaves at ASU must have successfully completed the ASU Biosafety and Bloodborne Pathogens Training, the ASU Autoclave Training and received in-person training from their supervisor regarding the safe use and operation of autoclaves.

Material preparation

- Biohazardous waste must be processed according to ASU guidelines.
- Ensure material is safe for autoclaving.
- Glassware must be inspected for cracks prior to autoclaving.
- **Never autoclave flammable, reactive, corrosive, toxic or radioactive materials.**
- Place items in heat-resistant secondary containers to secure and contain spills.
- Prepare and package material suitably. Refer to the chart for guidance.

Loading autoclave

1. Wear Personnel Protective Equipment, or PPE, including laboratory coat, eye protection, heat-insulating gloves and closed-toe shoes. Wear an apron and face shield when handling liquids.
2. Inspect drain strainer daily. Clean when blocked.
3. Place materials in autoclave. **Do not** mix incompatible materials.
4. **Do not** overload; leave sufficient room for steam penetration and circulation.
5. Close and latch door firmly.

Operating autoclave

1. Close and lock door.
2. Choose appropriate cycle such as gravity, liquid or dry cycle for the material. Consult autoclave manual for assistance in choosing the appropriate cycle. Refer to chart for guidance.
3. Only designated individuals are allowed to set or change parameters for the autoclaves. Use indicators to determine the best treatment time.
4. Start your cycle and fill out the autoclave user log with your contact information. A completed cycle usually takes between 1 to 1.5 hours.
5. Check chamber and jacket pressure gauge for minimum pressure of 15 pounds per square inch (psi). Check temperature for 250°F (121°C) every load.
6. **Do not** attempt to open the door while autoclave is operating.
7. If problems with the autoclave are perceived, abort cycle and report it to the supervisor and Facilities Maintenance immediately.

Unloading autoclave

1. Wear PPE including heat-insulating gloves, eye protection, and laboratory coat and closed-toe shoes.
2. Ensure cycle has completed and both temperature and pressure have returned to a safe range.
3. Wearing PPE, stand back from the door as a precaution and carefully open door no more than 1 inch. This will release residual steam and allow pressure within liquids and containers to normalize.
4. Allow the autoclaved load to stand for 10 minutes in the chamber. This will allow steam to clear and trapped air to escape from hot liquids, reducing risk to operator.
5. **Do not** agitate containers of super-heated liquids or remove caps before unloading.

6. Wear PPE, plus an apron and face shield for liquids, to remove items from the autoclave and place them in an area which clearly indicates the items are hot until the items cool to room temp.
7. Shut autoclave door.
8. Allow autoclaved materials to cool to room temperature before transporting. **Never** transport superheated materials.

Autoclave use log

- Entries must be made in the logbook each time the autoclave is used. These records are used for maintenance and service schedules and reporting of incidents, accidents or faults.
- Entries should include: operator's names, phone number, date, time and duration.

Maintenance and repair

- No person shall operate the autoclave unless the autoclave is in good repair.
- Only qualified professionals are permitted to make repairs.

Equipment malfunction

- If the autoclave does not operate exactly as expected, **do not** attempt to fix the problem.
- Record the problem in the autoclave log book.
- Report the problem to the supervisor and Facilities Maintenance immediately.

Spill cleanup

1. Spills may occur from a boil-over, breakage of containers or a blocked drain.
2. No operation of the autoclave is allowed until the spill is cleaned up.
3. The operator is responsible for the cleanup of spills. Contain spilled material with paper towels or other absorbent material. Use your laboratory spill kit, if necessary. Turn off the autoclave and wait until the autoclave and materials have cooled to room temperature before attempting cleanup.
4. Review the manufacturer's instructions and Safety Data Sheet, or SDS, to determine appropriate PPE for spill cleanup and disposal protocols.
5. Dispose of waste in accordance with federal, state and local requirements. If materials have been mixed, follow the cleanup and disposal protocol for the most hazardous component.
6. Cracked glassware must be disposed of properly.
7. Record the spill and cleanup procedure in the autoclave logbook.

Note: Never allow waste to accumulate in the lab. Never leave waste unattended.

Incident response

- All incidents, including a spill or release of biohazardous materials, including recombinant and synthetic nucleic acids, must be reported to the supervisor and ASU EHS at 480-965-1823.
- If an injury occurs, seek first aid. For medical assistance call dial 911.
- If clothing is soaked, remove it and place the injury in cool water.
- Place a sign on the autoclave indicating that it is not to be used until it is deemed safe for operation.

<p>Typical articles</p>	<p>Glassware</p> 	<p>Dry items</p> 	<p>Liquids</p> 	<p>Biohazard bags</p> 
<p>Preparation</p>	<p>Dirty</p> <p>Place in heat-resistant pan</p>	<p>Clean</p> <ol style="list-style-type: none"> 1. Wash. 2. Rinse. 3. Wrap.* 4. Loosen caps. 	<p>Fabrics</p> <p>Wrap*</p>  	<p>Instruments</p> <ol style="list-style-type: none"> 1. Clean and Dry. 2. Lay in Pan. 3. Wrap.* 
<p>Placement in autoclave</p>	<p>Detergent and water in Pan</p> 	<p>On side or inverted</p> 	<p>Separated, on edge</p> 	<p>Flat in pan</p> 

Treatment time (minutes)	30	30	30-60	30-60
Exhaust cycle	Slow exhaust	Fast exhaust and dry	Fast exhaust and dry	Fast exhaust and dry
Notes	Glassware with cracks or deep scratches may break.	*Check references for proper packaging methods.	Hot bottles may explode. Cool before moving.	Avoid puncturing bags. Dispose of waste properly.

References

- EHS Biosafety: cfo.asu.edu/biosafety-program
- ASU Autoclave Manual: asu.edu/ehs/documents/asu-autoclave-safety-manual.pdf
- ASU Biosafety Manual: asu.edu/ehs/documents/biosafetymanual.pdf
- CDC, BMBL 5th Edition: cdc.gov/biosafety/publications/bmbl5/index.html
- Waste Pickup Request: ehsaweb.asu.edu/

Questions? Contact ASU Environmental Health and Safety
at 480-965-1823 or email SafetyPartners@asu.edu.

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