

Table 1. Recommended Biotoxin Inactivation Methods for Liquid or Dry Stocks
 Note: Consult Safety Data Sheet (SDS) where methods vary or if your toxin is not listed.

Biotoxin	Autoclave (121°C /15 psi/60 min)	2.5% NaOCL (w/v) (Equivalent to a 50% Bleach Solution)
Abrin	Yes	No
Anthrax Lethal Toxin (PA & LF) & Anthrax Edema Toxin (PA & EF)	Methods vary; see vendor/manufacturer SDS	Yes
Botulinum neurotoxins	Yes	Yes
Brevetoxin (PbTx-2)	No	Yes
Bungarotoxin	Methods vary; see vendor/manufacturer SDS	Methods vary; see vendor/manufacturer SDS
Clostridium difficile – binary toxin C, enterotoxin A, toxin A, toxin B	Yes	Methods vary; see vendor/manufacturer SDS
Clostridium perfringens, epsilon toxin	Yes	Methods vary; see vendor/manufacturer SDS
Conotoxin*	Methods vary; see vendor/manufacturer SDS	Methods vary; see vendor/manufacturer SDS
Diphtheria Toxin	Yes	Yes
Microcystines	No	Yes
Palytoxin	No	Yes
Pertussis toxin	Yes	Methods vary; see vendor/manufacturer SDS
Pseudomonas exotoxin A	Yes	Methods vary; see vendor/manufacturer SDS
Ricin	Yes	Yes
Saxitoxin	No	Yes
Shiga toxin & Shiga-like ribosome inactivating proteins	Yes	Methods vary; see vendor/manufacturer SDS
Staphylococcal enterotoxins	Yes	Yes
Tetanus Toxin	Yes	Methods vary; see vendor/manufacturer SDS
Tetrodotoxin (TTX)	No	Yes

*Conotoxin inactivation depends on the presence or absence of disulfide bonds. Conotoxins with disulfide bonds will be incubated with an excess of dithiothreitol (DTT) (usually 10-20mM buffered solution, pH8.7) for at least 1 hour at room temperature or 30 minutes at 50°C. Then, an equal volume of 50-100mM solution of iodoacetamide (buffered solution, pH8.7) will be added and incubated for 1 hour at room temperature.

Table 2. Bleach Dilutions

NaOCL % (w/v)	Dilution of Liquid Bleach (~4-6% NaOCL) in water	Bleach solution
0.1%	1 to 50	2%
0.25%	1 to 20	5%
0.5%	1 to 10	10%
1.0%	1 to 5	20%
2.5%	1 to 2	50%

Important: Chemical inactivation procedures must be performed in a Biosafety Cabinet or Chemical Fume Hood while wearing a lab coat/ gown and gloves. Manipulation of biotoxins in dry/lyophilized form presents a significant hazard that may require use of respiratory protection; refer to the laboratory-specific biotoxin precautions.

1. Put the biotoxin into solution, if not already in liquid form.
2. Use freshly prepared bleach solutions (stock bleach should be within manufacturer's expiration date).
3. Place primary container into a small, secondary disposable container (e.g., Tupperware to catch inadvertent spills).
4. Add an equal volume of bleach to the primary container to achieve a minimum 2.5% NaOCL concentration.
5. Do not replace the cap on primary container.
6. Inform coworkers (especially those who may use the BSC or CFH) that a biotoxin inactivation is in progress.
7. Allow a minimum 30 minute exposure time.
8. Dispose of inactivated liquids down the sink.