

## APPENDIX F: Chemical Inactivation of Selected Toxins

Toxin	NaOCl (30 min)	NaOH (30 min)	NaOCl + NaOH (30 min)	Ozone Treatment
Botulinum neurotoxin	> 0.1% a	> 0/25 N	ND	Yes b
Staphylococcal Enterotoxin	> 0.5% c	> 0.25 N	ND	ND
Ricin	> 1.0% d	ND	> 0.1% + 0.25N e	ND
Saxitoxin	≥ 0.1% e	ND	0.25% + 0.25N e	ND
Palytoxin	≥ 0.1% e	ND	0.25% + 0.25N e	ND
Microcystin	≥ 0.5% e	ND	0.25% + 0.25N e	ND
Tetrodotoxin	≥ 0.5% e	ND	0.25% + 0.25N e	ND
T-2 mycotoxin	≥ 2.5% e, f	ND	0.25% + 0.25N e	ND
Brevetoxin (PbTx-2)	≥ 2.5% e, f	ND	0.25% + 0.25N e	ND

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### Notes:

ND indicates “not determined” from available decontamination literature.

- Solutions of NaOCl (#0.1%) or NaOH (> 0.25 N) for 30 min inactivate BoNT and are recommended for decontaminating work surfaces and spills of *C. botulinum* or BoNT. Chlorine at a concentration of 0.3-0.5 mg/L as a solution of hypochlorite rapidly inactivates BoNT (serotypes B or E tested) in water. Chlorine dioxide inactivates BoNT, but chloramine is less effective.
- Ozone (> 2 mg/L) or powdered activated charcoal treatment also completely inactivate BoNT (serotypes A, B tested) in water under defined condition.
- SEB is inactivated with 0.5% hypochlorite for 10-15 mi.
- Ricin is inactivated by a 30 min exposure to concentrations of NaOCl ranging from 0.1-2.5%, or by a mixture of 0.25% NaOCl plus 0.25 N NaOH. In general, solutions of 1.0% NaOCl are effective for decontamination of ricin from laboratory surfaces, equipment, animal cages, or small spills.
- The minimal effective concentration of NaOCl was dependent on toxin and contact time; all LMW toxins tested were inactivated at least 99% by treatment with 2.5% NaOCl, or with a combination of 0.25% NaOCl and 0.25N NaOH.
- For T-2 mycotoxin and brevetoxin, liquid samples, accidental spills, and nonburnable waste should be soaked in 2.5% NaOCl with 0.25% N NaOH for 4 h. Cages and bedding from animals exposed to T-2 mycotoxin or brevetoxin should be treated with 0.25% NaOCl and 0.025 N NaOH for 4 h. Exposure for 30 min to 1.0% NaOCl is an effective procedure for the laboratory (working solutions, equipment, animal cages, working area and spills) for the inactivation of saxitoxin or tetrodotoxin.

Decontamination of equipment and waste contaminated with select brevetoxins has been reviewed.

## Inactivation of Non-Select Agent Toxins

<b>Toxin</b>	<b>0.5% hypochlorite</b>	<b>or</b>	<b>Autoclave</b>
Pertussis Toxin	30 minutes		60 min at 121°C
Diphtheria Toxin	30 minutes		60 min at 121°C
Cholera Toxin (A and B)	30 minutes		60 min at 121°C
Cholera Toxin B	30 minutes		20 min at 121°C
Lipopolysaccharide	30 minutes		20 min at 121°C