

Cedric Smith is an active volunteer member with the Santa Barbara County Sheriff's Search and Rescue Team. As a Mountain Rescue Association (MRA) accredited team, SBCSAR routinely responds to various technical rescue incidents, including vehicle over the side, downed aircraft, swift water/flood and alpine rescue. The team is also tasked with providing support functions to various Sheriff Department operations and to local fire departments during multiple casualty incidents and major wildfire incidents, as well as providing mutual aid support to other Mountain Rescue teams throughout the state of California.

Cedric has been an Engineering Technician with CMC Rescue, Inc. since 2003. His responsibilities at CMC include facilitating the design, development, and testing of rescue equipment. Cedric is also active with the ASTM F32 committee on Search and Rescue and is the current President of the Helicopter Rescue and Response Association.

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RESCUE
TACTICS TRAINING

Disinfecting Your Soft Goods

Cleanliness or Regret?



BIOHAZARDOUS
WASTE
DISPOSE OF PROPERLY

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ITRS 2013

Don't XXX on your rope revisited

- Both Nylon and Polyester ropes yielded a lower breaking strength when exposed to bleach without rinsing
- 100% solution = -13% - 20%
- 10% bleach/water solution = - 2% - 7%

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ITRS 2013

Don't XXX on your rope revisited

- 1 inch tube web.
- 5 samples of new webbing exposed to a 10% Clorox / tap water solution 3 exposure cycles of 76 days resulted in a -87% strength loss.
- From 4,229 lbf to 530 lbf




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ITRS 2013 Follow Up

- Survey current washing / disinfecting trends (search & rescue and caving communities)
- Test to explore tensile strengths post washing
- Ability of agents to clean or disinfect not measured


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Wash vs. Disinfecting

- A wash is intended to remove dirt, grime and minor oxidation transfer from equipment.
- Disinfecting intended to clean and neutralize bacteria and blood born pathogens

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Methods of Decontaminating


- Lysol® IC
- Hot water bath / immersion
- Formula 409
- Cavicide
- Chlorox bleach (10% and 100%)

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Lysol® IC Quaternary Disinfectant Cleaner

- Used by cavers to address White-Nose syndrome.
- National White-Nose Syndrome Decontamination Protocol v 06.25.2012
- 1:128 solution
- *“Virucidal, fungicidal and bactericidal, this multi-purpose, hospital disinfectant cleans and disinfects hard, nonporous surfaces”.*



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Hot Water Immersion


- Newest method used by the caving community.
- Sustained temperature of $\geq 50^{\circ}\text{C}$ (122°F) for 20 minutes (per National White-Nose Syndrome Decontamination Protocol)

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Cavicide

- Used by Santa Barbara County SAR to clean / decontaminate litters.
- Effective against TB in 3 minutes, and HIV-1, HCV, HBV and MRSA in 2 minutes
- Disinfectant, cleaner, decontaminant, all in one
- May be used on with most medical device materials
- For use on hard, non-porous surfaces




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Formula 409

- All purpose cleaner.
- Listed as treatment option for WNS for hard, non-porous surfaces.
- Registered as a disinfectant that kills 99.9% of bacteria commonly encountered in the cooking environment (Salmonella, Staphylococcus etc.).



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Chlorox (concentrated)


- “Kills 99.9% of common household germs” (E-coli, Salmonella, Staphylococcus, Influenza)
- 1:6 – 1:10 solution recommended
- Treatment option for WNS... for everything except personal safety equipment.
- Cleaning and sanitizing method recommended by Center for Disease Control (CDC) for hard surfaces.
- “Recommended” by some authorities in the technical rescue realm.

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Conditions and Procedures



- 5 samples for each group
- 10 minute soak times
- 2x hand rinses immediately following soak (rinse water replaced after each group)
- Minimum 3 day drying time
- 5 cycles per group



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Hot Water Immersion

- >50°C (122°F) for 20 minutes.
- Avg. temp 80°C (176°F)
- Max. temp 100°C (212°F)





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Control

- 1 inch 100% Nylon Tube web (Orange)

control	
sample 1	4122
sample 2	4163
sample 3	4210
sample 4	4248
sample 5	4249




Average = 4,198 lbf (18.67 kN)

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Lysol IC (1:128)

Lysol IC (1:128)	
sample 1	4379
sample 2	4127
sample 3	4309
sample 4	4059
sample 5	3592

Loss: 3%



Average: 4,093 lbf (18.21 kN)

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Hot Water Immersion

- Avg. temp 80°C (176°F)

Hot water immersion	
sample 1	4177
sample 2	4045
sample 3	4175
sample 4	4016
sample 5	4133

Loss: 2%



Average: 4,109 lbf (18.28 kN)


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Formula 409 (100%)

Formula 409 (100%)	
sample 1	3939
sample 2	4430
sample 3	4249
sample 4	4258
sample 5	4226

Gain: 1%



Average: 4,220 lbf (18.77 kN)


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Cavicide (100%)

Cavicide (100%)	
sample 1	4015
sample 2	3760
sample 3	4018
sample 4	4445
sample 5	3985

Loss: 4%



Average: 4,045 lbf (17.99 kN)


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Chlorox - 10%

- Diluted with tap water

Chlorox 10%	
sample 1	4265
sample 2	3348
sample 3	3772
sample 4	3889
sample 5	4020

Loss: 8%




Average: 3,859 lbf (17.17 kN)

Chlorox - 100%

Chlorox 100%	
sample 1	1840
sample 2	1931
sample 3	1833
sample 4	1739
sample 5	1953

Loss: 56%



Average: 1,859 lbf (8.27 kN)

The crunch (T-Test)

Type	Control	Lysol IC	Hot Water	40% bleach	10% Chlorox	100% Chlorox
1	4122	4379	4177	3939	4015	4265
2	4163	4127	4045	4430	3760	3348
3	4210	4309	4175	4249	4018	3772
4	4248	4059	4026	4226	4445	3889
5	4249	3592	4133	4258	3985	4020
Avg	4198	4093	4109	4220	4045	3859
Variance						
1	5776	81796	4624	78961	900	164836
2	1225	1156	4096	44100	81225	261121
3	144	46656	4356	841	729	7569
4	2500	1156	8649	36	160000	900
5	2601	251001	576	1444	3600	25921
sum	12246	381765	22305	125382	246454	460347
STD	49.48939	276.3205	66.78473	158.3553	222.0153	303.4294

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T-test con't

	Lysol IC	Hot Water	409	cavicide	10% chlorox	100% Chlorox
T-values	0.836383	2.394169	-0.29651	1.504053	2.46562	57.2686
Alt .95	Not sig	Sig	Not sig	Not sig	Sig	Sig
DF	8					
CF	95					
Crit T	1.86					

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Summary

- Distinguish between washing and disinfecting
- Consider equipment replacement versus disinfecting
- Use appropriate disinfecting agent.
- Beware of cleaning / disinfecting agent shelf life.
- Beware of the obvious (color change, "bleaching", strong odor)
- There may be other factors at play that could vary results. (age, washing method, wear & tear etc..)
- Use caution when disinfecting equipment multiple times (keep a log)

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