

Household Disinfection 101

By Linda Golodner

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Spring cleaning time is here again and many penny-wise consumers are choosing to mix their own cleaning and disinfecting solutions to help stretch the household budget. The Water Quality & Health Council would like to help consumers make good choices as they tackle their disinfecting chores.

Cleaning Is Not the Same as Disinfection

Cleaning and disinfecting are different tasks with different goals. In cleaning, water and detergent—and often a healthy dose of elbow grease—are used to help remove dirt and grime from surfaces. The goal of disinfection is to destroy pathogens, those microbes that can make us sick. After cleaning food-contact surfaces, such as the kitchen counter, it is important to disinfect. For many consumers, the question is: What is the most effective product to use to disinfect? Bleach, hydrogen peroxide, vinegar, lemon or lime juice and baking soda are some of the products suggested for use, but just how effective are they in destroying pathogens?



A few years ago, a team of scientists asked that question and designed experiments to rate the performance of five common household products against foodborne bacteria¹. The bacteria, *E. coli* O157:H7, *Salmonella* and *Listeria monocytogenes*, are frequent culprits in foodborne disease outbreaks and may be found as contaminants in food products brought into the home, including vegetables, cheeses, ice cream and raw meat. The scientists noted that these bacteria can

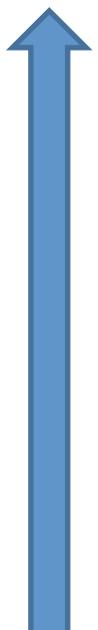
survive on food contact surfaces for hours or even days at a time. Contaminated surfaces may harbor bacteria that can then cross-contaminate other foods.

Research Findings

The researchers found that of the five products tested, only a diluted solution of chlorine bleach was effective against all three common kitchen bacteria. Baking soda had no detectable effectiveness against the trio of test microbes. For this analysis, product effectiveness was compared after one minute of exposure to microbes at room temperature. The table below summarizes the research findings.

Disinfecting Surfaces with Common Household Solutions

(Based on Yang *et. al*, 2009; all trials included application at room temperature during which solution was left on surface for one minute.)



Household Substance	Mixing Directions	Notes
Chlorine bleach (0.0314% sodium hypochlorite)	1 tsp. bleach + 1 qt. water	Make fresh solutions daily as bleach breaks down over time; degrades into mostly salty water as it destroys germs. Effective at room temperature. <i>Do not mix bleach solution with other products.</i>
Hydrogen peroxide (3%)	undiluted	Use freshly poured product within a short period of time; degrades quickly into oxygen and water when exposed to light.
White vinegar (5% acetic acid)	undiluted	
Lemon/lime juice (5% citric acid)	undiluted	
Baking soda (50% sodium bicarbonate)	Ineffective as a disinfectant	

Disinfection Efficacy of Common Household Products at Room Temperature and One-Minute Exposures

(Based on Yang *et. al*, 2009)

	<i>Listeria monocytogenes</i>	<i>Escherichia coli</i>	<i>Salmonella Typhimurium</i>
Chlorine bleach destroys...	✓	✓	✓
*Hydrogen peroxide destroys...		✓	✓
**White vinegar			✓
***Lemon/lime juice			
Baking soda			

*Yang *et. al* (2009) found bacterial reductions of *Listeria monocytogenes* were possible when hydrogen peroxide was applied at an initial temperature of 55° C for 1 minute.

**Undiluted white vinegar reduced *Listeria monocytogenes* and *E. coli* when applied at an initial temperature of 55° C for 1 minute.

***Citric acid (lemon/lime juice) reduced *Listeria monocytogenes* and *E. coli* when they were applied at an initial temperature of 55° C for 10 minutes at a time. Citric acid reduced *Salmonella typhimurium* when it was applied at 55° C for 1 minute.

ⁱ Yang, H., Kendall, P.A., Medeiros, L. and Sofos, J.N. (2009). Inactivation of *Listeria*

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