

Green Cleaning

**How To Select
And Use
Safe Janitorial Chemicals**



Preface

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1 Common Janitorial Chemicals

Custodians and janitorial contractors use anywhere from 6 to 50 different products, although the higher number usually includes seldom-used chemicals kept on hand “just in case” for special cleaning jobs.

Which of these jobs are done at your site?

Tasks	How Often	Examples of Products Used:
Vacuum / dust mop floors	Daily	Dust Mop Spray
Wet mop floors	Daily to Weekly	Neutral Cleaner Finish Restorer
Strip & refinish floors	Quarterly to Yearly	Stripper, Rinse, & New Finish
Carpet maintenance	Daily to Weekly	Spot Remover Gum Remover
Wet-clean or shampoo carpets	Monthly to Yearly	Pre-spray, Shampoo, etc.
Clean restrooms	Daily	BTT, Disinfectant, Glass, & Bowl Cleaners
Clean windows	Quarterly to Infrequent	Glass Cleaner; Blind Cleaner
Clean furniture, display cabinets, etc.	Daily to Never	Upholstery Cleaner; Furniture Polish; Glass Cleaner
Other cleaning jobs	Upon Request	Metal Polish Deodorants



2 What Chemical Injuries Happen?

What injuries do your janitors actually experience, and how much do these injuries cost? Workers' compensation data from Washington State show that six out of every hundred janitors have lost-time chemical injuries every year.

- 40% of these injuries involve eye irritation or burns;
- 36% involve skin irritation or burns; and
- 12% involve breathing chemical fumes.

How significant are these chemical injuries? Each incident requiring medical treatment took the worker off of the job for an average of 18 hours. Medical costs averaged \$375 per claim, while lost time for the worker and supervisor are estimated as \$350 per claim. That makes the total cost equal to \$725 per claim.

	Typical Contractor
Number of Janitors	100
Accidents Per Year	6 Accidents With Lost Time
<u>For Each Accident</u>	
Cost For Janitor's Lost Time	18 hours @\$15 [1] = \$270
Supervisor's Lost Time	4 hours @\$20 [2] = \$80
Medical Cost	\$375
Cost Per Accident	\$725 for 1 accident
Cost Per Year For All of Your Janitors	\$4,350 for 6 accidents



3 What Ingredients Cause Greatest Risk?

The following ingredients pose hazards to the user, building occupants, or the environment in general. In most cases routine exposure to the user creates the highest risk. Details are at <<http://www.westp2net.org/janitorial/jp4.htm>>.

Type	Examples	Problems
<u>Acids</u>	Hydrochloric Acid, Phosphoric Acid	Corrosive - Causes blindness Damages skin Sewer discharge pH too low
<u>Caustic</u>	Sodium Hydroxide; Sodium Metasilicate; Potassium Hydroxide	Corrosive - Causes blindness Damages skin Sewer pH too high
<u>Solvents</u>	Perchloroethylene Butoxyethanol; Ethanolamine Toluene HCFC-141	Causes cancer Poison - Absorbs through skin & poisons liver, kidneys, and a pregnant woman's fetus Environmental - Destroys the ozone layer; causes global warming
<u>Surfactants</u>	Alkyl Phenol Ethoxylates	Environmental - Persists in the environment; bioaccumulates; affects animal hormone systems
<u>Disinfectants</u>	Bleach (Sodium Hypochlorite) Paradichlorobenzene (Urinal Blocks) Quaternary Ammonium Chloride	Corrosive - Can burn eyes & skin Reacts - Bleach mixed with acid or ammonia causes poison gas Causes cancer Corrosive - Can burn eyes & skin



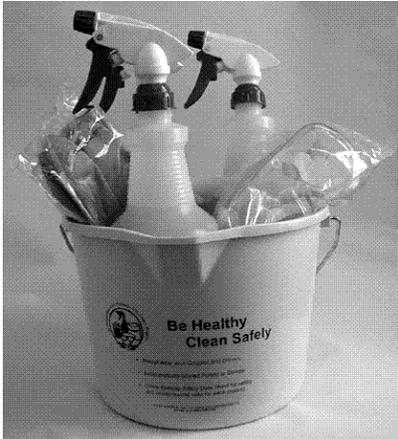
4 Using Material Safety Data Sheets

Material Safety Data Sheets are the best place to start when you want to learn what risks a janitorial product has. Call your supplier or distributor to get current MSDSs for each of your products. Talk with technical staff to get details, particularly where MSDS is not clear.

	What Does example MSDS Say?
Product Name	
Manufacturer	
MSDS Date	
List Hazardous Ingredients	
Are there any Volatile Organic Compounds (VOCs)?	
Product corrosive? What is the pH?	
Product flammable? What is Flash Point?	
NFPA Rating? Health Fire Reactivity	
Health Hazards? Eyes? Skin? Inhalation? Absorbtion? Cancer? Other?	
Is MSDS Complete?	



5 Finding Preferable Products



One way to find safer and environmentally preferable chemicals is to find out what various cities, states, and other agencies are buying. Another route is to evaluate and test the products yourself.

SUPPLIERS OF PREFERABLE PRODUCTS

The attached list includes several suppliers and products that the author has tested in field trials with various organizations.

A few words of caution: This list is incomplete. There are other firms that offer environmentally preferable products, and the listed firms offer other products that could not be tested in the time available. Also, it's important to try each product out for yourself to assure that it meets the specific needs you have.

GREEN SEAL CRITERIA FOR ENVIRONMENTALLY PREFERABLE PRODUCTS

Green Seal is a private organization that sets standards for evaluating environmentally preferable products. In addition, Green Seal provides a service to chemical manufacturers to certify that their products satisfy its standards.

GS-37 was recently developed for Green Seal via an industry - agency stakeholder team. This standard has 15 criteria for certifying general purpose, restroom, and glass cleaning products. Three comments:

- The standard is "pass/fail". A product must meet all of the 15 requirements or it will not be certified by Green Seal.
- The standard was accepted unanimously by the stakeholder panel. To reach consensus, several potential criteria were considered but were eventually set aside.
- The standard and its individual criteria may not be appropriate for janitorial chemicals outside the three work areas mentioned.

The following page provides an example of one of the Green Seal criteria.

Other criteria have been developed by Santa Monica, San Francisco, Massachusetts, Washington, and other agencies. Refer to the websites of these organizations for details.



Example Green Seal Criterion

1 Overall Toxicity (LD50)/(LC50)

The *undiluted product* shall not be toxic to humans. Dispensing-system concentrates shall be tested as used. A product is considered toxic if any of the following criteria apply:

Oral lethal dose 50 (LD₅₀) <2,000 mg/kg
Inhalation lethal conc. (LC₅₀) <20 mg/L*

* If the vapor-phase concentration of the product at room temperature is less than 20 mg/L, it should be tested at its saturation concentration. If it is not toxic at this concentration, it passes the inhalation criterion.

Toxicity shall be measured on the product as a whole. Alternatively, a mixture need not be tested if existing toxicity information demonstrates that each of the ingredients complies. Ingredients that are nonvolatile do not require inhalation toxicity testing, and ingredients that are not readily absorbed through the skin do not require dermal toxicity testing. It is assumed that the toxicity of the individual component compounds are weighted and summed and that there are not synergistic effects.

The toxicity testing procedures should meet the requirements put forth by the Organization for Economic Cooperation and Development (OECD) Guidelines for Testing of Chemicals. These protocols include Acute Oral Toxicity Test (TG 401), Acute Inhalation Toxicity Test (TG 403), and Acute Dermal Toxicity Test (TG 402).

Technical Details

Although cleaning chemicals are not generally the most significant source of VOCs in an indoor environment, they are a significant source of VOCs to the workers who use them. This makes the inhalation toxicity of volatile cleaning chemicals an important consideration.

Due to concern over worker exposure to some volatile compounds, the Occupational Safety and Health Administration (OSHA) has set permissible exposure limits (PELs) and the American Conference of Governmental Industrial Hygienists (ACGIH) has set threshold limit values for a number of solvents.

Cleaning chemicals can also be absorbed through the skin, particularly some glycol ethers. Dermal toxicity of cleaning chemicals is also an important consideration. The potential for skin absorption can be greatly reduced by wearing gloves, as manufacturers generally recommend.

The Consumer Product Safety Commission (CPSC) defines a toxic material as (16 CFR Part 1500.3):
LD50 < 5 g/kg (oral)
LC50 < 20,000 ppm (inhalation)
LD50 < 2 g/kg (skin)
LD50: Dose lethal to 50% of a population; LC50: Concentration lethal to 50% of the population.

It is important to note that health effects occur at levels below those defined as toxic.

SUMMARY - KEY DECISIONS YOU MUST MAKE

No chemical is 100% "safe". Even products that we call environmentally preferable still have some potential health hazard or environmental impact. You must decide how to reduce risks for each of your cleaning jobs:

- Which products to tackle first?
- Reduce hazard by shifting to milder product; or
- Reduce exposure by wearing personal protection; or
- Do both.



6 Glass Cleaners

Janitors may use one or more different kinds of glass cleaners in their work. The amount of cleaner needed to do the job depends upon the

- surface being cleaned;
- type of soil on the surface; and
- cleaning tools used.

Glass doors with extensive finger prints or glass surfaces in kitchens require stronger cleaning products than do glass partitions or interior windows in offices.

Restroom mirrors may need a strong product depending upon their location and the number of people using the facilities.

Typical Amounts Of Glass Cleaner Used

Size of Building (Low Rise Office Buildings)	<u>Product Totals</u>		<u>Hazardous Materials in Product</u>		
	gal	lbs	lbs	lbs/Pers	lbs/1,000SF
150,000 Sq Ft	40	334	33	5.5	0.2
500,000 Sq Ft	50	417	42	2.0	0.1
1,000,000 Sq Ft	100	834	83	2.0	0.1

Common Glass Cleaner Hazards

Types of Glass Cleaner	Ingredients	Hazards
Ammonia	Ammonia Ammonium Hydroxide	Inhale Irritation & Poison Eye/Skin Burns
Solvent Degreaser	2-Butoxyethanol & Other Glycol Ethers	Skin Poison (blood/liver/kidneys) Eye/Skin Burns (concentrate)
Alcohol	Isopropanol (Rubbing Alcohol)	Inhale Poison (concentrate) Central Nervous System (CNS)
Vinegar	Acetic Acid	Eye Irritation Inhale Irritation



7 Toilet Cleaners

Janitors may use one or more different kinds of toilet cleaners in their work. The amount of cleaner needed to do the job depends upon the

- hardness of the water;
- type of soil on the toilet or urinal surface;
- use of drip cleaner systems;
- use of autoflush valves; and
- cleaning tools used.

Toilets in public restrooms generally require stronger cleaning products than do toilets in offices. Toilets may also need strong products if there is calcium carbonate hardness in the water.

Typical Amounts Of Toilet Cleaner Used

Size of Building (Low Rise Office Buildings)	<u>Product Totals</u>		<u>Hazardous Materials in Product</u>		
	gal	lbs	lbs	lbs/Pers	lbs/1,000SF
150,000 Sq Ft	50	430	44	7.3	0.3
500,000 Sq Ft	80	670	65	3.2	0.1
1,000,000 Sq Ft	150	1,250	125	3.0	0.1

Common Toilet Cleaner Risks

Types of Toilet Cleaners	Ingredients	Risks
Strong Acid	Hydrochloric Acid	Corrosive Blindness/Skin Burns Severe Inhalation Irritant
Medium Acid	Phosphoric Acid	Corrosive Severe Eye/Skin Burns Moderate Inhalation Irritant
Weak Acid	Citric Acid	Moderate Eye/Skin Irritant Moderate Inhale Irritant
Non-Acid	Quaternary Ammonium Chlorides	Corrosive if Concentrated Moderate to Severe Eye/Skin Irritant



8 Restroom Cleaners

In addition to the glass and toilet cleaners we already talked about, janitors may use one or more different kinds of restroom cleaners in their work. The amount of cleaner needed to do the job depends upon the

- type of soil on the counter or tile surface;
- use of a combined cleaner/disinfectant; and
- cleaning tools used.

Counters and partitions in public restrooms generally require stronger cleaning products than do fixtures in offices.

Typical Amounts Of Restroom Cleaner Used

Size of Building (Low Rise Office Buildings)	Product Totals		Hazardous Materials in Product		
	gal	lbs	lbs	lbs/Pers	lbs/1,000SF
150,000 Sq Ft					
500,000 Sq Ft					
1,000,000 Sq Ft	250	1,900	300	7.2	0.3

Common Restroom Cleaner Risks

Types of Restroom Cleaners	Ingredients of Concern	Risks To Worker
Basin, Tub & Tile (Tile & Grout) (Mildew Remover)	Bleach Acids 2-Butoxyethanol Nitrilotriacetate	Corrosive Eye/Skin Burns Skin/Inhale Poison Cancer
Washroom Fixture	2-Butoxyethanol Ethanolamine	Skin Absorb Poison Flammable
Disinfectant Cleaner	Quats Bleach 2-Butoxyethanol	Corrosive (concentrate) Eye/Skin Burns Skin Absorb Poison
Disinfectant	Quats Bleach	Corrosive (concentrate) Eye/Skin Burns



9 Metal Cleaners

The amount of metal cleaner needed to do the job depends upon the:

- type of metal;
- type of soil on the surface;
- presence of water; and
- cleaning tools used.

Surfaces that have oily fingerprints or water spotting, or that are made of metal that tarnishes easily, generally require stronger cleaning products than do other metal items. Some products leave behind a protective layer of oil to keep the metal from tarnishing.

Typical Amounts Of Metal Cleaner Used

Size of Building (Low Rise Office Buildings)	<u>Product Totals</u>		<u>Hazardous Materials in Product</u>		
	gal	lbs	lbs	lbs/Pers	lbs/1,000SF
150,000 Sq Ft	11	88	14	2.3	0.1
500,000 Sq Ft	24	194	45	2.1	0.1
1,000,000 Sq Ft	50	400	90	2.0	0.1

Common Metal Cleaner Risks

Types of Metal Cleaners	Ingredients of Concern	Risks To Worker
Stainless Steel	perchloroethylene n-methyl pyrrolidone naphtha / mineral oil Hexane	Causes Cancer / Flammable Eye/Skin Burns Inhale Poison / Flammable Inhale Poison
Brass	isopropanol ammonium hydroxide	Inhale Irritant Skin/Eye Burns
Polishing Towels	n-methyl pyrrolidone d-limonene	Eye/Skin Burns Odor / Indoor Air
Degreaser	2-butoxyethanol ethanolamine	Both are Skin Absorb Poisons and Cause Eye/Skin Burns
Glass Cleaner	2-butoxyethanol isopropanol	Skin Absorb Poison Inhale Poison / Indoor Air (if product has more than 15%)



10 General Purpose Cleaners

The amount of general purpose cleaner needed to do the job depends upon the:

- the surface being cleaned (walls, floors, counters);
- type of soil on the surface;
- other types of cleaning work being done;
- cleaning tools used.

Surfaces that have oily fingerprints or water spotting generally require stronger cleaning products than do other items. Sometimes the same product can act as a cleaner or a degreaser depending upon how much you dilute it.

Typical Amounts Of General Purpose Cleaner Used

Size of Building (Low Rise Office Buildings)	Product Totals		Hazardous Materials in Product		
	gal	lbs	lbs	lbs/Pers	lbs/1,000SF
150,000 Sq Ft	52	434	70	11.7	0.5
500,000 Sq Ft	80	668	108	5.1	0.2
1,000,000 Sq Ft	---	---	---	---	---

Common General Purpose Cleaner Risks

Types of Cleaners	Ingredients of Concern	Risks To Worker
Glycol-Based Cleaner or Degreaser	2-butoxyethanol ethanolamine sodium metasilicate nonyl phenol	skin absorb poison - same - eye/skin burns hormone impacts (if swallowed)
Caustic-Based Cleaner or Degreaser	ammonium hydroxide potassium hydroxide	corrosive & eye/skin/inhale burns
Solvent-Based Degreaser	perchloroethylene hexane HFC-134a	causes cancer affects nervous system extremely flammable affects global warming
Citrus-Based Degreaser	citrus terpene d-limonene	eye/skin irritant & odor / indoor air
Surfactant-Based Cleaner	nonyl phenol	hormone impacts (if swallowed)



11 Minimizing Use of Janitorial Products

Four key steps are involved with changing or reducing chemical use:

1. **Measure what is being used today.** Find out which are your highest risk products, and focus on changing those first.
2. **Educate yourself and your people.** What alternative products are available? How can you do the same work with less chemicals?
3. **Initially restrict use of highest risk chemicals.** As an interim measure, use a sign-out system to control inventories. Be sure that employees are trained and know how to minimize chemical use.
9. **Then eliminate highest risk chemicals.** Shift your people completely away from old products after finding, testing, and introducing workable substitutes.

CHECKLIST OF CHANGES TO MAKE

- Change to products with less-toxic ingredients.
- Decrease the amounts of products that your janitors use.
- Use floor mats to reduce amount of dirt entering into the building.
- Modify techniques janitors use for applying your cleaning products.
- Design buildings with easy-to-clean architectural features (e.g., keep carpets out of locker rooms).
- Take care that features with incompatible cleaning needs are kept apart from each other (e.g., do not install carpets and vinyl tiles together); and
- Operate your building air conditioning systems so as to minimize the movement of dust.
- Other Ideas:

More Info: <<http://www.westp2net.org/janitorial/jp4.htm>>

