

**ENVIRONMENTALLY PREFERABLE
CLEANERS: ALL PURPOSE CLEANERS,
GLASS CLEANERS,
AND DISHWASHING LIQUIDS**

Report to Green Seal

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1. INTRODUCTION/PROJECT DESCRIPTION

This report is for follow-up work for Green Seal concerning an environmental and performance evaluation of general purpose cleaners, glass cleaners, and a more limited assessment of hand dishwashing liquids. The project was designed to further identify the key attributes of environmentally superior cleaners and specific ingredients and packaging alternatives that conform with these attributes.

2. METHODS AND RESULTS

This study included a shelf survey, gathering Material Safety Data Sheets (MSDSs) and other manufacturer information, conducting a literature search for toxicity and biodegradation data for ingredient chemicals, comparison of selected products to the Green Seal Standard for general purpose cleaners and recommended criteria for glass cleaners, and evaluation of leading environmental attributes for general purpose cleaners, glass cleaners, and to a more limited extent, hand dishwashing liquids.

2.1 Ingredient and Packaging Information for Cleaners

Tables 1, 2, and 3 summarize the information from shelf surveys and the manufacturers for general purpose cleaners, glass cleaners, and dishwashing liquids, respectively.

Shelf surveys were conducted for general purpose cleaners, glass cleaners, and light-duty or hand dishwashing liquids. These surveys were taken at local Kroger Company and Food City grocery stores, the Knoxville Food Cooperative, and two specialty "Natural" food stores, all located in Knoxville, Tennessee. The information obtained from the shelf survey included the container type and packaging classification (i.e., PETE, HDPE, PP, and PVC), the manufacturer's name, address, and telephone number; any ingredient information on the labels; and any environmental claims made for the products.

Other ingredient information, including CAS numbers and ingredient concentrations by weight percent, were obtained from the manufacturer's MSDSs or other product information provided by the manufacturers. MSDS information was limited; product ingredient concentrations listed as a weight percentage were not always provided, and some MSDSs listed only ingredient classifications rather than specific chemicals (e.g., nonionic surfactant, emulsifiers, cleaning agents).

Some changes noted from the 1992 survey include a number of "ultra" concentrated products, and the absence of secondary packaging of any of the products in this survey.

2.2 Comparison to Criteria

Selected products are evaluated in comparison to the Green Seal Standard for general purpose cleaners, and the recommended criteria for glass cleaners, and hand dishwashing liquids discussed in *Guidelines for Environmentally Preferable Cleaners* (Green Seal, 1995).

2.2.1 Green Seal Standard for General Purpose Cleaners

The Green Seal Standard includes specific requirements for product performance, environmental requirements, and packaging requirements. A summary of the product-specific requirements in the Green Seal Standard include:

- c The product shall clean common household surfaces effectively.
- c Ingredients should be used with minimal human toxicity (the product shall not be required to be labeled because it is toxic or highly toxic, as defined by the Consumer Product Safety Commission, CPSC).
- c The product shall not be formulated with carcinogens or reproductive toxins.
- c The product shall not be toxic to aquatic life.
- c Each organic ingredient shall exhibit ready ultimate biodegradability.
- c Phosphates and phosphonates shall not be present at more than 0.5 percent by weight.
- c The product shall not contain volatile organic compounds (VOCs) in concentrations exceeding 10 percent by weight of the product.
- c The product shall not be formulated with heavy metals (arsenic, lead, cadmium, chromium, mercury, selenium, or nickel) above specified limits.
- c State-of-the art packaging shall be used with respect to post-consumer material, source reduction, and recyclability, or shall use refillable packaging.
- c Secondary packaging shall not be used, unless the product is a concentrate.
- c The packaging shall not contain more than 100 ppm total lead, cadmium, mercury, and hexavalent chromium.

Additional key guidelines were discussed in the *Guidelines for Environmentally Preferable Cleaners* (Green Seal, 1995). These include:

- c Consider ingredients whose manufacture does not involve toxic releases.
- c For packaging: manufacture concentrates; minimize water content; use recyclable and recycled materials whenever possible; avoid secondary packaging, aerosol cans, and PVC plastic containers.

- c Ensure that the product is formulated to work optimally when diluted with water at room temperature.

General points regarding the criteria are discussed below.

2.2.1.1 Ingredients with minimal human toxicity. Acute mammalian toxicity data (oral rodent LD₅₀s) are presented in Table 4. The most toxic chemicals (those with the lowest LD₅₀s) include the quaternary ammonium compounds and o-benzyl-p-chlorophene (used as antimicrobials), and ammonia.

2.2.1.2 Not formulated with carcinogens or reproductive toxins. No specified ingredients, with the exception of ethanol, were noted from the label information or MSDSs. Although ethanol is listed under California's Safe Drinking Water Act as a reproductive toxin, the small amounts of ethanol used as a solvent in cleaners is not expected to pose a reproductive toxicity hazard, because the listing was based on ingestion of ethanol in alcoholic beverages during pregnancy.

2.2.1.3 Ingredients not specifically toxic to aquatic life. When weight percent in the product and subsequent dilution by a consumer is taken into account, the ingredients (for which we have aquatic toxicity data) in the evaluated products generally meet the criteria for aquatic toxicity.

Aquatic toxicity data for identified chemicals in general purpose cleaners, glass cleaners, and selected chemicals in hand dishwashing liquids are presented in Table 4. Data sources consulted include the peer-reviewed databases HSDB and AQUIRE, the RTECS and IRPTC databases, Verschueren (1983) and other literature sources. Some aquatic toxicity data were estimated using QSARs in the EPA's ECOSAR program (EPA, 1994), if no measured data were available. Sources for the data are included in Table 4.

It should be noted that OSHA, under the Hazard Communication Standard, requires chemicals to be reported on an MSDS based on health and safety information pertaining to humans. If a chemical exhibited aquatic toxicity or were not easily biodegradable, these factors alone would not require identification of the chemical on a product label or MSDS. This evaluation is based on the information that was available for product formulations.

The Green Seal Standard for aquatic toxicity requires that the *product* meet the following criteria:

- c Acute *Daphnia* or fish LC₅₀ >10mg/l.
- c Acute algae LC₅₀ >10mg/l.
- c Chronic *Daphnia* LC₅₀ >10mg/l.

These toxicity data are generally not available for products as a whole. Therefore, toxicity data for the known chemical ingredients are compared to the criteria, with consideration of percent of the total composition made up by each ingredient, and recommended dilutions of the product for consumer use.

Some common ingredients would meet these criteria, even if they made up 100 percent of the formulation. These include isopropanol, ethanol, 2-butoxy ethanol, and butoxy diglycol.

For the following chemical ingredients, the product would meet the criteria if the ingredient were present at some percentage less than full strength. These ingredients are discussed below:

- C *d-Limonene*: One data point reported for fathead minnow toxicity indicates an acute fish toxicity (EC₅₀) of 0.7 mg/l (AQUIRE, 1995). However, the reported acute *Daphnia* toxicity does meet the criteria, with an EC₅₀ of 69.6 mg/l (AQUIRE, 1995). No measured data were found for acute algae or chronic *Daphnia* toxicity. QSARs run using the ECOSAR program (EPA, 1994) estimate d-limonene EC₅₀s as low as 0.1 mg/l (for chronic *Daphnia* toxicity). Based on the measured data, d-limonene should make up no more than 7 percent of the product at the point of consumer use. Considering the QSAR estimates, this proportion should be no more than approximately 1 percent.

- C *Propylene glycol n-butyl ether*: Only one measured data point was found for this chemical — an acute fish toxicity (EC₅₀) for sea lamprey of 5 mg/L, at 24 hours exposure (AQUIRE, 1995). Because the exposure duration is less than the recommended time of 96 hours, a lower EC₅₀ could be expected for an exposure duration of 96 hours. QSARs run using the ECOSAR program (EPA, 1994) estimate minnow, *Daphnia* and algae LC₅₀s and EC₅₀s from 21 to 573 mg/l, all meeting the aquatic toxicity criteria. More information is required before a weight percent limit for this ingredient can be recommended.

- C *n-Alkyl dimethyl benzyl ammonium chloride*: Measured data for acute aquatic toxicity ranged from 0.018 to 6.5 mg/l (AQUIRE, 1995). Based on the most sensitive data point, weight percent should be no more than 0.2 percent in the product at the point of consumer use.

- C *Linear alkylbenzene sulfonates (LAS)*: Aquatic toxicity of LAS depends on the alkyl chain length; homologs with more carbon units in a chain are generally more toxic to fish, aquatic invertebrates, and algae. Acute fish toxicity values (EC₅₀) as low as 0.25 mg/l have been reported for C₁₄ LAS (Arthur D. Little, Inc., 1991). Based on the higher toxicity chain length, the weight percent of LAS should be no more than 2.5 percent. Studies have shown that LAS biodegradation products are considerably less toxic than non-degraded LAS, and that the most fish-toxic components of LAS are also the most rapidly biodegradable (Arthur D. Little, Inc., 1991).

- C *Ammonia*: Based on the most sensitive measured toxicity data (acute fish EC₅₀ of 0.73 mg/l; IPCS, 1986), the weight percent should not exceed 7 percent in a consumer product.

- C *o-Phenylphenol*: Based on the most sensitive measured toxicity data (acute *Daphnia* EC₅₀ of 0.71 mg/l; AQUIRE, 1995), the weight percent should not exceed 7 percent in a consumer product. The ECOSAR program (EPA, 1994) estimates a chronic *Daphnia* EC₅₀ of 0.4 mg/l; considering the QSAR estimates, this proportion should be no more than approximately 4

percent.

2.2.1.4 Organic ingredients exhibit ready ultimate biodegradability. Many of the labels claim that the product contains biodegradable ingredients, biodegradable surfactants, etc. One product claims "all active ingredients break down within 5 days under the standard OECD test."

Biodegradability data was not readily available for many of the specified ingredients, and is not known for the unspecified ingredients.

Biodegradation data for identified ingredients are also presented in Table 4. Chemicals that do not meet the Green Seal criteria for biodegradability include *EDTA*, perhaps *d-limonene*, and *LAS* (under anaerobic conditions). Dilution of ingredients in the product is not considered when evaluating biodegradability.

2.2.1.5 Ingredients whose manufacture does not involve toxic releases. Several ingredients in the products surveyed pose concerns in this area:

- c *Glycol ethers and ethoxylated alcohols*, the manufacture of which involves ethylene oxide (a potential carcinogen).
- c *LAS*, manufactured with benzene (a known human carcinogen), resulting in benzene air releases.
- c *Alkyl dimethylbenzyl ammonium chloride*, manufactured with methyl chloride (a neurotoxin).
- c *EDTA*, manufactured with ethylene dichloride (a potential carcinogen and neurotoxin), ethylene diamine (a potent sensitizer), and chloroacetic acid (acutely toxic through dermal contact).

This issue is discussed in more detail in Davis et al., 1992; sources of information include EPA, 1990; Pittenger, et al., 1991; HSDB, 1992 and 1995.

2.2.1.6 Product not formulated with phosphates. Only one product surveyed contains phosphates above 0.5 percent by weight (Blue Wolf).

2.2.1.7 Product not formulated with heavy metals. Heavy metals were not listed on any labels or available MSDS forms for the products surveyed.

2.2.1.8 Packaging. Most packaging, with a few exceptions, are made of recyclable material; most of the containers are either HDPE or PETE plastic. Not all of these, however, are made *from* recycled material. Of the 28 general purpose cleaners in the survey, three are packaged in 100 percent post-consumer recycled PETE bottles, two are packaged in 25 percent post-consumer recycled HDPE bottles, and one is sold in a paperboard box made of 90 percent recycled paper (minimum 30 percent post-consumer).

The "Ultra" products in the survey are made to dilute with water at a ratio of 1 to 128 (1 ounce product to 1 gallon water). Many other products recommend dilution to some extent. One product (Earth Wise) is a concentrate meant to be diluted into a re-used spray bottle.

No secondary packaging was noted in the surveyed products. Most labels did not provide complete ingredient identification or list weight percentages.

2.2.1.9 Product formulated to work optimally when diluted with water at room temperature.

Most of the concentrates recommend dilution with warm water. Several stated simply to dilute with "water". None recommended hot water; only one (Blue Wolf) mentioned cold water on the label.

2.2.1.10 Product performs effectively. *Consumer Reports* magazine (1993) evaluated the performance of general purpose household cleaners. A summary of their findings includes:

- c Six of the top seven rated pourable cleaners were pine oil formulations, with good to very good overall performance scores. The top eight, in order of decreasing scores, were: Spic and Span® Pine, Texize® Pine, Murphy Oil Soap®, Real Pine®, Pine-Sol®, Pathmark Pine®, Lysol® Pine Action, and Citra-Solv® cleaners.
- c Two of the three poorest-rated pourables were also "pine" cleaners.
- c The best pourables tested out-cleaned the top-rated sprays.

They also mentioned environmental claims on the product labels, and concluded that "Much of the 'green' prose [on product labels] is undefined or applies to most or all of the cleaning products on the market."

2.2.2 Glass Cleaners

Guidelines for glass cleaners were discussed in the *Guidelines for Environmentally Preferable Cleaners* (Green Seal, 1995). These include:

- c Reduce VOC content.
- c Use less toxic organic solvents.
- c Avoid disposable towelettes.
- c For packaging, market concentrates and refillables, maintain recycling.
- c Use simple ingredients that perform well; avoid using unnecessary ingredients.

These guidelines are in addition to those for general purpose household cleaners discussed previously in

Section 2.2.1. General points regarding the criteria are discussed below.

2.2.2.1 Reduce volatile organic compound (VOC) content. Reported weight percents for VOCs in the products surveyed are in the range of 2 to 12 percent. The highest reported VOC content is Windex® Country Garden Glass Cleaner at 4 to 12 percent isopropanol plus 2-butoxy ethanol. The California EPA Air Resources Board has set standards for percent VOCs in consumer products. For non-aerosol glass cleaners, the current standard is no more than 8 percent VOCs by weight, and no more than 6 percent after January 1, 1996.

2.2.2.2 Choose less toxic organic solvents. Table 4 lists available acute toxicity data for mammals (rat and/or mouse oral LD₅₀ data). The organic solvents identified in glass cleaners, in order of increasing toxicity, include: isopropanol, d-limonene, propylene glycol-n-butyl ether, and 2-butoxy ethanol. Other solvents identified were "mixed glycol ethers". One of the criteria in the Green Seal Standard for general purpose cleaners is that the product should not be "toxic" or "very toxic" as defined by the Consumer Product Safety Commission (CPSC). (These terms were not noted on any of the product labels in the survey.) Based on the available LD₅₀ data, 2-butoxy ethanol should make up no more than 30 percent of the product ingredients by weight to meet this criterion (an acute oral LD₅₀ for rats above 5 g/kg). 2-butoxy ethanol is more toxic than the other glycol ethers identified as ingredients in this survey, and is approximately 2 to 3 times more acutely toxic than isopropanol or d-limonene. The other solvents (isopropanol, d-limonene, and propylene glycol-n-butyl ether) would not be considered toxic under the CPSC definition even if they made up 100 percent of the product.

Aquatic toxicity should also be considered in evaluating organic solvents; products should be neither toxic to humans nor aquatic organisms. The weight percent of d-limonene, for instance, should be limited so as not to exceed the criteria for aquatic toxicity, as discussed in Section 2.2.1.3.

Toxicity is also a consideration in ingredient manufacturing. Ethylene oxide is used (and may be released) in the processing of glycol ethers; ethylene oxide is a potential human carcinogen. Manufacturing isopropanol also results in toxic releases (Davis, 1992). d-Limonene production results in releases of relatively less toxic chemicals.

2.2.2.3 Avoid disposable towelettes. None of the products surveyed contained disposable towelettes.

2.2.2.4 Packaging. Only one glass cleaner concentrate was found in the survey. This is actually sold as a general purpose cleaner (Citra-Solv) with a recommended dilution for glass cleaning listed on the back label. Many products provide refill containers as well as spray bottles. Most of the containers are made of recyclable HDPE or PETE bottles. Of the ten glass cleaners in the survey, one product container is made with 25 percent post-consumer recycled HDPE plastic (Glass Plus® Multi-Surface Cleaner). Few labels listed ingredient or weight percent information.

2.2.2.5 Use simple ingredients that perform well; reduce use of unnecessary ingredients. This includes the use of dyes and fragrances. Most of the products listed only a few ingredients.

2.2.2.6 Ammonia. Most of the glass cleaner labeling indicates that the glass cleaners are ammonia free. Two Windex® products surveyed include ammonia.

There is no evidence that ammonia is carcinogenic, although it has produced inflammatory lesions of the colon and caused cellular proliferation, which could increase susceptibility to malignant change (IPCS, 1986).

Ammonia is highly toxic for fish, and, because of its occurrence at high concentrations in some water systems, it can present a major pollution problem. It enters aquatic environments from several sources, including sewage effluent deposition of human wastes without treatment, industrial discharges, and runoff from agricultural operations. It is also a metabolic waste product of fish and, therefore, can be a problem in facilities involved with intensive fish culture (IPCS, 1986). Ammonia toxicity data are listed in Table 4. As mentioned in Section 2.2.1.3, based on aquatic toxicity data, the weight percent of ammonia should not exceed 7 percent in a consumer product. (Concentrations were not reported for the three products in our shelf survey containing ammonia and therefore cannot be compared to this limit.)

Many products, often leading brands, advertise being "ammonia free", at times in conjunction with a statement such as "free of harsh chemicals". The absence of ammonia apparently doesn't affect product performance, e.g., as noted by Consumer Reports (1992).

Ammonia is included in the Toxics Release Inventory (TRI). Another consideration for ammonia is the formation of toxic chloramine vapors if combined with a product containing chlorine. Because many people use ordinary household chlorine bleach as a disinfectant, mildew remover, and stain remover, the combination of these products while housecleaning is a concern.

2.2.3 Hand Dishwashing Liquids

The main additional guideline for light-duty liquids is the reduction of VOC content. Where reported, the amount of VOCs in dishwashing liquids ranged from 3 to 4 percent by weight.

Another consideration is the use of more concentrated formulations, to reduce packaging and transportation impacts. Two products in the shelf survey (Dawn and Ivory concentrated dishwashing liquids) are produced in a concentrated version, with a smaller hole in the spout to reduce the amount used by the consumer. (One-third as much liquid is required compared to the non-concentrated product.)

Of the 21 dishwashing liquids in the survey, three are packaged in 25 percent post-consumer recycled HDPE plastic bottles, and one is available in a 50 percent post-consumer recycled PETE bottle.

2.3 Selection of Leading Products

Sufficient information was not available on product ingredients to do a thorough comparison to the

Green Seal Standard or to decisively select environmentally superior products. Based on what is known about product ingredients, performance, and packaging, no products in our survey stood out as clearly and consistently superior.

One product that illustrates these trade-offs is Citra-Solv® Concentrate, based on d-limonene and orange oil. This product has several environmentally preferable attributes; the main ingredients are natural extracts, it is available in concentrated form for either general purpose cleaning or glass cleaning (the only concentrate seen for glass cleaning), it received a good overall performance rating for general purpose cleaning (Consumer Reports, 1993), and is sold in recyclable PETE and HDPE plastic bottles. However, the packaging does not contain any post-consumer recycled plastic, the undiluted contents are flammable, it contains ethoxylated alcohols (possibly contributing to releases of ethylene oxide during manufacturing), and little information could be found as to the biodegradability of d-limonene. The aquatic toxicity of d-limonene was discussed in Section 2.2.1.3; the proportion of d-limonene should be no more than approximately 1 percent based on QSAR estimates, or 7 percent based on measured data, to meet the aquatic toxicity standard (an EC₅₀ of >10 mg/l.) When used as a glass cleaner at the recommended dilution (1 ounce in 3 gallons of water) it seems to be within the standard. For some types of household cleaning, however, the recommended dilution is up to 1 ounce in 16 ounces water, or approximately 6 percent d-limonene, which would not meet the standard (based on QSAR toxicity estimates).

3. KEY ENVIRONMENTAL ATTRIBUTES AND RECOMMENDATIONS

3.1 Common Environmental Attributes for Each Type of Cleaner

Some key environmental attributes of environmentally superior cleaners are currently being met by most brands, such as not containing phosphates; not containing acutely toxic ingredients, reproductive toxins, carcinogens, or heavy metals; containing ingredients that are biodegradable; and being sold in a non-aerosol, recyclable package without secondary packaging. These should be considered as a minimum for any environmentally preferable cleaner.

Other environmental attributes, met by fewer brands, would tend to make a cleaning product environmentally superior to those currently available. These key environmental attributes are discussed as recommendations in the following section.

3.2 Additional Recommendations on Formulations and Packaging

Further recommendations pertaining to general purpose cleaners, glass cleaners, and dishwashing liquids include the following: use ingredients that meet the Green Seal criteria for toxicity and biodegradability; offer products that are effective when diluted with cold water; use ingredients that are not *manufactured* with carcinogens or reproductive toxins; and offer products in 100 percent post-consumer recycled PETE plastic containers or at least 50 percent recycled HDPE plastic containers,

with a minimum of 25 percent post-consumer recycled HDPE.

Davis et al. (1992) discussed in detail the health and environmental issues for general purpose household cleaners in terms of raw materials extraction, raw materials processing, product manufacturing, product distribution, consumer use of product, and post-use disposal. Based on available toxicity and biodegradability data for identified ingredients in this survey, available performance information, and consideration of impacts throughout the lifecycle of general purpose cleaners (discussed in Davis et al., 1992), some suggested environmentally preferable ingredients include the following:

- c *Surfactants*: sodium lauryl ether sulfate (SLES), vegetable oil surfactants and soaps.
- c *Solvents*: pine oil, d-limonene or citrus oil (at less than 7 percent by weight in the formulation), glycerol.
- c *Builders*: sodium citrate, sodium bicarbonate.
- c *Antimicrobials, dyes, fragrances*: Although not considered necessary, naturally-derived ingredients are preferable to synthetics. Natural extracts that serve more than one purpose are recommended here. For instance, pine oil and citrus oil are effective solvents that also provide fragrance. Pine oil and citronella oil have antimicrobial properties. Citronella also provides fragrance.

For General Purpose cleaners, water content should be reduced as much as possible to reduce transportation and packaging impacts. Many major brands currently offer "ultra" concentrates, which are diluted by a factor of 1 part cleaner to 128 parts water. Some brands offer concentrates with different recommended dilutions for different uses, either for diluting in a bucket or for refilling spray bottles.

For glass cleaners, in addition to the general recommendations:

- c Offer refills in non-spray bottles, and in concentrate form if possible.
- c Use less toxic solvents (as measured by acute mammalian toxicity), for example, isopropanol or d-limonene rather than glycol ethers. The aquatic toxicity of ingredients should also be considered.
- c Limit VOC content to less than 6 percent by weight of the product.

Also, ammonia is not recommended as an ingredient, based on its aquatic toxicity, the possibility of consumers accidentally generating toxic chloramine vapors, and the frequent

claims by products in the shelf survey that they are "ammonia free" (often associating ammonia with

"harsh chemicals").

For Hand Dishwashing Liquids, in addition to the general recommendations:

- c Offer concentrates to reduce transportation and packaging impacts. (The spout can be modified so less liquid is dispensed.)
- c Limit VOC content to less than 6 percent by weight of the product.

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**TABLE 1. GENERAL PURPOSE CLEANER INGREDIENT INFORMATION
FROM SHELF SURVEY AND MANUFACTURER MSDSs**

Product Name: Blue Wolf® Concentrate
Company Name: Blue Wolf Sales & Service, Inc.
Cleaner Type: cleaner/degreaser
Packaging:^a (2) HDPE, 32 oz spray bottle & 1 gal bottle
Environmental Claims: biodegradable, not tested on animals
Dilution: full strength or diluted with up to 4 parts water, "excellent cold water degreaser"

<u>Ingredients</u>	<u>CAS No.</u> ^b	<u>Weight %</u> ^b
Water		
Glycol		
Esters		
Soaps		
Alkaline [sic]		
Phosphates		

Product Name: Citra-Solv® Concentrate
Company Name: Chempoint Products Company
Cleaner Type: cleaner/degreaser
Packaging: (1) PETE; also (2) HDPE
Environmental Claims: contains only biodegradable substances, no water, no petroleum distillates, not tested on animals
Dilution: PETE bottle: 2 oz. per gal. water (1:64); HDPE bottle: 8 oz per gal (1:16)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Limonene fraction terpenes	65996-98-7	50-100
Oil of orange	8008-57-9	50-100
Ethoxylated alcohols C9-C11	68439-46-3	1- 10
Coconut diethanolamide	61790-63-4	1- 10

Product Name: Citra-Solv® Ready to Use Spray Formula
Company Name: Chempoint Products Company
Cleaner Type: multi-purpose spray cleaner
Packaging: (3) PVC spray bottle
Environmental Claims: biodegradable

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water	7732-18-5	50-100
Isopropanol	67-63-0	1 - 10

Methioxirane polymer with oxirane, monodecyl ether	37251-67-5	1 - 10
Oil of orange	8008-57-9	1 - 10

Product Name: Dr. Bronners® Sal Suds Super Concentrated Organic Cleaner

Company Name: All-One-God-Faith, Inc.

Cleaner Type:

Packaging: (2) HDPE

Environmental Claims: 100% biodegradable, no phosphates, free from all harsh chemicals, no silicates, no sequestering agents or other strong alkalies

Dilution: for house and car: 1 oz "in a pail of water" (1:128); other dilutions listed for dish soap, bubble bath, shampoo, vegetable rinse, laundry soap, etc.

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Protein bound castor oil		
Natural coconut and pine needle oils		
Potassium salts		
Emollient skin conditioners		

Product Name: Earth Wise® Household Cleaner Concentrate

Company Name: Earth Wise, Boulder, CO

Cleaner Type: cleaner/degreaser concentrate

Packaging: (2) HDPE

Environmental Claims: biodegradable, phosphate free, dye-free, non corrosive, non abrasive, reduces plastic waste by 72%

Dilution: add contents (4 oz) to 22 oz. spray bottle with water (1:4.5)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Diethanolamine	111-42-2	< 1.0
Ethylenediamine tetracetic acid tetrasodium salt	64-02-8	< 2.0
Water		
Degreasers		
Vegetable derived surfactants		
Water softener		
Quality control agents		
Mint fragrance		

Product Name: Earth Wise® Household Cleaner Concentrate, citrus scent

Company Name: Earth Wise, Boulder, CO

Cleaner Type:

Packaging: (1) PETE

Environmental Claims: biodegradable, phosphate free, dye-free, non corrosive, non abrasive, 100% post-consumer recycled bottle

Dilution: 1/4 C to 1 gal. warm water (1:64)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Deionized water		
Vegetable detergents derived from coconuts and palm kernel oils		
Water conditioners		
Citrus degreasers and fragrance		

Product Name: Earth Wise® Household Cleaner Concentrate, apple-lime

Company Name: Earth Wise, Boulder, CO

Cleaner Type:

Packaging: (2) HDPE spray bottle

Environmental Claims: biodegradable, phosphate free, dye-free, non corrosive, non abrasive, 25% post-consumer recycled bottle

Dilution: 1/4 C to 1 gal. warm water (1:64)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Deionized water		
Water soluble degreasers		
Vegetable detergents derived from coconuts, corn, and palm kernel		
Water softener		
Quality control agents		
Apple-lime fragrance		

Product Name: Ecover® Fully Biodegradable Non-Scratch Cream Cleanser

Company Name: NV Ecover SA, Belgium

Cleaner Type: weakly alkaline liquid

Packaging: (2) HDPE

Environmental Claims: no petroleum-based surfactants, no solvents, no synthetic perfume, no colorings, not tested on animals, fully biodegradable ("all active ingredients breakdown within 5 days under the standard OECD test")

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water		
Finely ground chalk		

Coconut oil-based surfactant

Cellulose colloids

Clay

Biodegradable Preservatives

Product Name: FANTASTIK® All Purpose Cleaner

Company Name: Dow-Brands

Cleaner Type: multi-purpose spray cleaner

Packaging: (2) HDPE

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Propylene glycol n-butyl ether	5131-66-8	< 4
Unspecified surfactants		
Unspecified chelating agent		
Unspecified fragrance		
Water		

Product Name: Formula 409® All Purpose Cleaner

Company Name: The Clorox Company

Cleaner Type: multi-purpose spray cleaner

Packaging: (2) HDPE

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
2-butoxyethanol	111-76-2	0.5 - 5
Water		
Detergents		
Builder		
Color		

Product Name: Lysol® Brand Disinfectant Deodorizing Cleaner

Company Name: L & F Products

Cleaner Type: disinfecting cleaner

Packaging: (2) HDPE

Environmental Claims: bottle is 25% post-consumer recycled plastic, no phosphorus, cleaning agent is biodegradable

Dilution: full strength or 1/4 C per gal warm water (1:64)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Alkyl (C12-C16) dimethyl-benzyl-ammonium chlorides	68424-85-1	2.7

Product Name: Lysol Pine® Scent Pine Action Cleaner

Company Name: L & F Products

Cleaner Type:

Packaging: (1) PETE

Environmental Claims: no phosphorus, 100% post-consumer recycled plastic

Dilution: 1/4 C per gal water (1:64)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Pine oil		9.0
n-Alkyl (50% C ₁₄ , 40% C ₁₂ , 10% C ₁₆) dimethyl benzyl ammonium		0.8
Octyldecyl dimethyl ammonium chloride		0.25
Dioctyl dimethyl ammonium chloride		0.25
Didecyl dimethyl ammonium chloride		0.125
Inert ingredients		89.7

Product Name: Murphy® Kitchen Care All Purpose Cleaner

Company Name: Colgate-Palmolive Company

Cleaner Type: weakly alkaline liquid

Packaging: (5) PP bottle

Environmental Claims: phosphate free, biodegradable detergents

Dilution: 1/4 C per gal warm water (1:64)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Butoxydiglycol	112-34-5	3.5

Product Name: Murphys® Oil Soap Pure Vegetable Household Cleaner

Company Name: Colgate-Palmolive Company

Cleaner Type:

Packaging: (5) PP bottle

Environmental Claims: "naturally gentle cleaner," biodegradable, phosphate free

Dilution: 1/4 C to 1/2 C per gal warm water for non-wood surfaces (1:32 to 1:64)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water		
Tall oil fatty acid		
Potassium hydroxide	1310-58-3	3.1
Cocamidopropyl amine oxide		
Fragrance		
Cocamidopropyl hydroxysidaine		
Triethanolamine		
Grain alcohol (denatured)		

Tetrasodium EDTA

CI pigment brown

Product Name: Pro Formula 409® Degreaser and Multipurpose Cleaner

Company Name: The Clorox Company

Cleaner Type: cleaner/degreaser

Packaging: (1) PETE, spray bottle

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
2-butoxy-ethanol	111-76-2	5 - 10
Sodium hydroxide	1310-73-2	0.1 - 0.5

Product Name: Pine-Sol® All Purpose Cleaner

Company Name: The Clorox Company

Cleaner Type: cleaner/degreaser

Packaging: (1) PETE bottle

Environmental Claims: no phosphorus, cleaning agents are biodegradable

Dilution: 1/4 C per gal warm water (1:64)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Pine oil		19.9
Unspecified surfactants		< 10
Isopropyl alcohol	67-63-0	< 10

Product Name: Pine-Sol® Spray Cleaner

Company Name: The Clorox Company

Cleaner Type: disinfecting cleaner

Packaging: (1) PETE spray bottle

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
2-butoxyethanol	111-76-2	< 8
Isopropyl alcohol	67-63-0	< 3
Cationic/nonionic surfactants		< 5
N-alkyl dimethyl benzyl ammonium chloride		0.2

Product Name: Real Pine®

Company Name: White Cap, Inc., Lester, PA

Cleaner Type: general purpose cleaner

Packaging: (3) PVC bottle

Environmental Claims: biodegradable cleaning agents, no phosphorus

Dilution: 2 oz per gal water (1:64)

Ingredients**CAS No.****Weight %**

Pine oil

25%

Unspecified detergent & other ingredients

75%

Product Name: Safe Choice® Super Clean Degreaser (Concentrated All-Purpose Cleaner)

Company Name: American Formulating & Manufacturing

Cleaner Type: cleaner/degreaser

Packaging: (2) HDPE bottle

Environmental Claims: for the chemically sensitive, no butyl ethers, no ammonia, no fragrance, no chlorine bleach, no acids, no caustics, non-corrosive, non-flammable, biodegradable, not toxic, dye free, not tested on animals; AFM does not discharge waste water into the water system or landfills

Dilution: routine home and office 15:1 (water: product); tougher indoor/outdoor 7:1; heavy duty 1:1

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water		80
Unspecified emulsifiers		
Unspecified nonionic surfactants		
Neutralizing agent		
Sodium percarbonate		
Brightner		

Product Name: Seventh Generation®

Company Name: Seventh Generation

Cleaner Type: multi-purpose spray cleaner

Packaging:

Environmental Claims: completely biodegradable, not tested on animals

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
[product info and MSDS requested]		

Product Name: Ultra Lysol® Original Scent Concentrate

Company Name: L & F Products

Cleaner Type: disinfecting cleaner

Packaging: (1) PETE bottle

Environmental Claims: bottle made from 100% post-consumer recycled plastic

Dilution: 1 1/4 oz per gal water (1:100)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
O-phenylphenol	90-43-7	2.8
O-benzyl-p-chlorophenol	120-32-1	2.7

Ethanol	64-17-5	1.8 - 2.0
Inert ingredients		94.5

Product Name: Ultra Mr. Clean® Lemon Fresh, Mountain Falls

Company Name: Proctor & Gamble

Cleaner Type:

Packaging: (2) HDPE bottle

Environmental Claims: no phosphorus, no chlorine bleach, no ammonia

Dilution: 1 oz per gal warm water (1:128)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Nonionic surfactant (alcohol ethoxylates)		
Anionic surfactant		
Quality control agents		
Perfume		
Colorant		
Water		

Product Name: Ultra Mr. Clean® Pine Cleaner

Company Name: Proctor & Gamble

Cleaner Type:

Packaging: (1) PETE bottle

Environmental Claims: no phosphorus, no chlorine bleach, no ammonia

Dilution: 1 oz per gal warm water (1:128)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Nonionic surfactant (alcohol ethoxylates)		
Anionic surfactant		
Quality control agents		
Perfume		
Colorant		
Water		

Product Name: Ultra Mr. Clean® Top Job with Ammonia

Company Name: Proctor & Gamble

Cleaner Type:

Packaging: (2) HDPE bottle

Dilution: 1 oz per gal. warm water (1:128)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Butyldiglycol		
Unspecified anionic surfactant		
Sodium carbonate		
Sodium citrate		
Ammonia		

Perfume

Colorant

Product Name: Ultra Spic and Span® Multi Purpose Cleaner - Powder

Company Name: Proctor & Gamble

Cleaner Type:

Packaging: paperboard box

Environmental Claims: surfactant is biodegradable, < 0.5% phosphorous by weight; box made from 90% recycled paper (minimum 30% post consumer), scoop made from 100% post-consumer recycled plastic

Dilution: 2.3 oz (1 scoop) per gal warm water (1:58 w/w)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Anionic surfactant		
Sodium silicate		
One or more of sodium carbonate, and/or		
Sodium tripolyphosphate and/or		<0.5%
Sodium citrate, and/or		
Sodium polyacrylate.		
Sodium sulfate		
Perfume		
Colorant		

Product Name: Ultra Spic and Span® Multi Purpose Cleaner - Liquid

Company Name: Proctor & Gamble

Cleaner Type:

Packaging: (2) HDPE bottle

Environmental Claims: "more powerful, use less," no phosphorus, no chlorine bleach, no ammonia

Dilution: 1 oz. per gal. warm water (1:128)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Nonionic surfactant (alcohol ethoxylates)		
Anionic surfactant		
Quality control agents		
Perfume		
Colorant		
Water		

Product Name: Ultra Spic and Span® Pine Deodorizing Cleaner

Company Name: Proctor & Gamble

Cleaner Type:

Packaging: (1) PETE bottle

Environmental Claims: no phosphorus, no chlorine bleach, no ammonia

Dilution: 1 oz/gal water (1:128)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Isopropanol	67-63-0	
Pine oil		
Water softening agents		
Anionic surfactant		
Quality control agents		
Perfume		
Colorant		
Water		

Product Name: Ultra Spic and Span® Professional Strength Cleaner

Company Name: Proctor & Gamble

Cleaner Type:

Packaging: (1) PETE bottle

Environmental Claims: no phosphorus, no chlorine bleach, no ammonia

Dilution: 1 oz per 1 gal warm water (1:128)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water	[MSDS requested]	
Anionic surfactants		
Water conditioning agents		
Quality control agent		
Perfume		
Colorant		

(a) Plastic codes and abbreviations:

- (1) PETE: polyethylene terephthalate
- (2) HDPE: high-density polyethylene
- (3) PVD: polyvinyl chloride
- (4) PP: polypropylene

(b) CAS number and weight percent (%) listed if available from product label or MSDS.

TABLE 2. GLASS CLEANER INGREDIENT INFORMATION FROM SHELF SURVEY AND MANUFACTURER MSDSs

Product Name: 409® Glass & Surface Cleaner
Company Name: The Clorox Company
Packaging:^a (1) PETE, spray bottle and refill bottle

<u>Ingredients</u>	<u>CAS No.</u> ^b	<u>Weight %</u> ^b
Isopropyl alcohol	67-63-0	2 - 9

Product Name: Citra-Solv® Concentrate
Company Name: Chempoint Products Company
Packaging: (1) PETE bottle
Environmental Claims: Contains only biodegradable substances, no water, no petroleum distillates, not tested on animals
Dilution: 1 oz. in 3 gal. water for glass cleaning

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Limonene fraction terpenes	65996-98-7	50-100
Oil of orange	8008-57-9	50-100
Ethoxylated alcohols C9-C11	68439-46-3	1- 10
Coconut diethanolamide	61790-63-4	1- 10

Product Name: Allens Naturally® Glass Cleaner
Company Name: Allens Naturally, Farmington, MI
Packaging: plastic type not identified, spray bottle
Environmental Claims: cruelty free, (also implied by product name)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water		
Mixed glycol ethers		

Product Name: Glass Plus® Multi-Surface Cleaner
Company Name: DowBrands
Packaging: (2) HDPE, spray bottle
Environmental Claims: No phosphates, 25% post-consumer recycled plastic bottle

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Propylene glycol n-butyl ether	5131-66-8	< 3.0
Isopropyl alcohol	67-63-0	> 1.0

Product Name: Mr. Clean® Glass
Company Name: Proctor & Gamble
Packaging: (2) HDPE, spray bottle

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Isopropyl alcohol	67-63-0	

Product Name: Murphy® Kitchen Care and Surface Spray
Company Name: Colgate-Palmolive Company
Packaging: (2) HDPE, spray bottle and refill bottle
Environmental Claims: phosphate free, biodegradable cleaning agents, "non-harsh formula" (no bleach, ammonia or harsh detergents)

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Butoxypropanol (propyleneglycol n-butyl ethers)	5131-66-8	4.0

Product Name: S.O.S.® Glass Cleaner, extra strength, vinegar
Company Name: Clorox Co.
Packaging: (1), spray bottle
Environmental Claims: No phosphorus or ammonia

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
2-butoxy ethanol		
Concentrated vinegar		
Surfactants		
Inert ingredients		

Product Name: Windex® - Blue
Company Name: S.C. Johnson & Son, Inc.
Packaging: (1) PETE, spray bottle and refill bottle

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Ammonia	7664-41-7	
Ethylene glycol monobutyl ether	111-76-2	1-5
Isopropanol	67-63-0	1-5

Product Name: Windex® Clear
Company Name: S.C. Johnson & Son, Inc.
Packaging: (1) PETE, spray bottle

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
2-butoxyethanol	111-76-2	0.5-1.5
Isopropanol	67-63-0	1-5
Water	7732-18-5	60-100

Product Name: Windex® - Country Garden Glass Cleaner
Company Name: S.C. Johnson & Son, Inc.
Packaging: (1) PETE, spray bottle

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Ammonia	7664-41-7	
Isopropanol	67-63-0	3-7
2-Butoxyethanol	111-76-2	1-5

(a) Plastic codes and abbreviations:

- (1) PETE: polyethylene terephthalate
- (2) HDPE: high-density polyethylene
- (3) PVD: polyvinyl chloride
- (4) PP: polypropylene

(b) CAS number and weight percent (%) listed if available from product label or MSDS.

TABLE 3. DISHWASHING LIQUID CHEMICALS OBTAINED FROM MSDSs AND SHELF SURVEY

Product Name: Ajax® Dishwashing Liquid; Ajax Dishwashing Liquid with Lemon Juice

Company Name: Colgate-Palmolive Company

Packaging:^a (1) PETE

Environmental Claims: phosphate free

<u>Ingredients</u>	<u>CAS No.</u> ^b	<u>Weight %</u> ^b
Ethanol	64-17-5	4.0

Product Name: Dawn® Liquid Dishwashing Detergent

Company Name: Procter & Gamble

Packaging: (2) HDPE; available as a concentrate, 1/3 of the regular amount required

Environmental Claims: no phosphorus, biodegradable

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Anionic surfactant		
Nonionic surfactant		
Amphoteric surfactant		
Ethanol	64-17-5	
Water		
Stabilizing agents		
Colorants		
Perfume		

Product Name: Dawn® Free Liquid Dishwashing Detergent

Company Name: Procter & Gamble

Packaging: (1) PETE

Environmental Claims: no phosphorus, biodegradable

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Anionic surfactant		
Nonionic surfactant		
Dispersing aid		
Water		
Stabilizing agents		

Product Name: Dial® Dishwashing Liquid & Antibacterial Hand Cleanser

Company Name: The Dial Corporation

Packaging: (1) PETE

Environmental Claims: phosphate free

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Ammonium linear alcohol ether sulfate	68891-29-2	
Ethanol	64-17-5	
Sodium cocoamphoacetate	68608-65-1	
Sodium laureth sulfate	68585-34-2	
Lauramine oxide	70592-80-2	
Urea	57-13-6	
Alcohol ethoxylate	68002-97-1	

Product Name: Dermassage® Dishwashing Liquid

Company Name: Colgate-Palmolive Company

Packaging: (1) PETE

Environmental Claims: biodegradable, phosphate free

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Ethanol	64-17-5	2.8

Product Name: Dove® Light Duty Liquid Dishwashing Detergent

Company Name: Lever Brothers Company

Packaging: (2) HDPE

Environmental Claims: no dyes, biodegradable, no phosphorous

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Unspecified		

Product Name: Dr. Bronners® Sal Suds Super Concentrated Organic Cleaner

Company Name: All-One-God-Faith, Inc.

Packaging: (2) HDPE

Environmental Claims: 100% biodegradable, no phosphates, free from all harsh chemicals, no silicates, no sequestering agents or other strong alkalies

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight%</u>
Protein bound castor oil		
Natural coconut and pine needle oils		

Potassium salts

Emollient skin conditioners

Product Name: Earth Wise® Dishwashing Liquid

Company Name: Block Drug Company, Inc.

Packaging: (2) HDPE

Environmental Claims: bottle is made with 25% post-consumer recycled plastic; biodegradable, phosphate free, dye free

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Deionized water		
Water soluble degreasers		
Vegetable detergents derived from coconuts and palm kernel oils		
Water softeners		
Quality control agents		
Apple fragrance		
Aloe vera extract		

Product Name: Earth Wise® Dishwashing Liquid

Company Name: Earth Wise, Boulder, CO

Packaging: (2) HDPE

Environmental Claims: not tested on animals, rapidly biodegradable coconut oil-based surfactant (breaks down completely in less than 5 days - OECD test 1971); biodegradable, phosphate free, dye free

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water		
Coconut oil-based surfactant		
Milk whey		
Salt		
Citric acid		
Chamomile and calendula extracts		
Herbal extracts		
Biodegradable preservatives		

Product Name: Ecover® Dishwashing Liquid

Company Name: Ecover, Inc.

Packaging: (2) HDPE

Environmental Claims: 25% post-consumer recycled plastic, biodegradable, phosphate free, dye free

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Deionized water		
Water soluble degreasers		
Vegetable detergents from coconuts and palm kernel oils		
Water softeners		
Quality control agents		
Apple fragrance		
Aloe vera extract		

Product Name: Ecover® Fully Biodegradable Dishwashing Liquid

Company Name: Ecover, Inc.

Packaging: (2) HDPE

Environmental Claims: the surface active ingredient is rapidly and fully biodegradable into natural and harmless substances in <5 days under the standard OECD test; contains no petroleum based detergents, no synthetic perfumes, and no colorings

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Water		
Coconut oil based surfactant		
Milk whey		
Salt		
Citric acid		
Chamomile		
Calendula extracts		
Herbal extracts		
Biodegradable preservatives		

Product Name: Green Hand® Liquid Dishwashing Detergent

Company Name: Seventh Generation, Inc.

Packaging: (2) HDPE

Environmental Claims: bottle is made from minimum 25% post-consumer recycled plastic; free of phosphates, dyes, and artificial fragrances; biodegradable; no NTA or EDTA

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Sodium chloride		
Ethanol	64-17-5	
Sodium coco ethoxy sulfate		
Diethanol amide		
D-limonene	138-86-3	

Product Name: Ivory® Liquid (Clear) Dishwashing Detergent

Company Name: Procter & Gamble

Packaging: (1) PETE; also available as a concentrate, 1/3 of the regular amount required

Environmental Claims: no phosphorous, biodegradable

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Anionic surfactant		
Nonionic surfactant		
Ethanol	64-17-5	
Water		
Stabilizing agents		
Perfume		

Product Name: Joy® Liquid Dishwashing Detergent

Company Name: Procter & Gamble

Packaging: (2) HDPE

Environmental Claims: no phosphorus, biodegradable

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Anionic surfactant		
Nonionic surfactant		
Ethanol	64-17-5	
Water		
Stabilizing agents		

Colorant

Perfume

Product Name: Lemon Hand® Dishwashing Detergent

Company Name: Home Care Products

Packaging:

Environmental Claims: biodegradable

Ingredients

CAS No.

Weight %

Water

Sodium alkylbenzene sulfonate

Coconut diethanolamide

Sodium chloride

Lemon oil

Product Name: Lemon Dawn®

Company Name: Procter & Gamble

Packaging: (2) HDPE

Environmental Claims: no phosphorus, biodegradable

Ingredients

CAS No.

Weight %

Anionic surfactant

Nonionic surfactant

Amphoteric surfactant

Ethanol

64-17-5

Water

Stabilizing agents

Colorant

Perfume

Product Name: Mountain Spring Dawn® Liquid Dishwashing Detergent

Company Name: Procter & Gamble

Packaging: (2) HDPE

Environmental Claims: no phosphorous, biodegradable

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Anionic surfactant		
Nonionic surfactant		
Amphoteric surfactant		
Ethanol	64-17-5	
Water		
Stabilizing agents		
Colorant		
Perfume		

Product Name: Palmolive® Dishwashing Liquid and Palmolive® Dishwashing Liquid with Lemon-Lime

Company Name: Colgate-Palmolive Company

Packaging: (1) PETE

Environmental Claims: bottle is made with 50% post-consumer recycled plastic; biodegradable, phosphate free

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Ethanol	64-17-5	

Product Name: Palmolive® Dishwashing Liquid and Antibacterial Hand Soap

Company Name: Colgate-Palmolive Company

Packaging: (1) PETE

Environmental Claims: biodegradable, phosphate free

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Ethanol	64-17-5	4.3
Sodium dodecylbenzene-sulfonate		5.3
Ammonium laureth sulfate		
Water		
Lauryl polyglucose		
Magnesium dodecylbenzene sulfonate		
Lauramide myristamide MEA		
Sodium xylene sulfonate		
Magnesium sulfate		
Sodium chloride		
Perfume		
Trisodium HEDTA		
Quaternium 15		
Sodium bicarbonate		
D&C orange # 4		
Methenamine HCL		
Formaldehyde		

Product Name: Palmolive® Sensitive Skin Dishwashing Detergent

Company Name: Colgate-Palmolive Company

Packaging: (1) PETE

Environmental Claims: biodegradable, phosphate free; free of dyes and the harshest irritants; the only leading dishwashing liquid free of alcohol

<u>Ingredients</u>	<u>CAS No.</u>	<u>Weight %</u>
Alcohol-free		

Product Name: Sunlight® Light Duty Liquid Dishwashing Detergent

Company Name: Lever Brothers Company

Packaging: (2) HDPE

Environmental Claims: biodegradable, no phosphorus

Ingredients

CAS No.

Weight %

Cleaning and sudsing agents

(a) Plastic codes and abbreviations:

(1) PETE: polyethylene terephthalate

(2) HDPE: high-density polyethylene

(3) PVD: polyvinyl chloride

(4) PP: polypropylene

(b) CAS number and weight percent (%) listed if available from product label or MSDS.

Chemical Ingredient Name (synonyms)	CAS No.	Acute <i>Daphnia</i> EC ₅₀ (48h) (mg/l)	Acute fish EC ₅₀ (96h) (mg/L)	Acute algae EC _{50,≥96h} (green algae) (mg/l)	Chronic <i>Daphnia</i> EC _{50,≥14d}	Biodegradability	Acute mammalian toxicity ¹ oral LD ₅₀ (mg/kg)
Alkyl (C12-C16) Dimethyl- benzyl-ammonium Chlorides <i>quaternary ammonium compounds</i>	68424-85-1						426 ^k 919 ^k
ammonia	7664-41-7	25.4 ^a 2.9-6.0 ^a 3.3-5.1 ^a	0.75 - 3.4 ^l 0.73 - 2.35 ^l	16.5 ^{a,14} 31 ^{a,14}		not applicable	350 ^b
Butoxy diglycol (diethyleneglycol monobutyl ether) <i>a glycol ether</i>	112-34-5	2,850 ^{a,2} 3,200 ^{a,2} 5,000 ^{a,2}	2,000 ^a 1,300 ^{a,d}	1,000 ^{a,3} 1,000 ^{a,d,4} 1,000 ^{a,3} 1,000 ^{a,4}	170 ^f		5,500 - 6,600 ^d 2,400 ^k
2-butoxy-ethanol (ethylene glycol monobutyl ether) <i>a glycol ether</i>	111-76-2	1,720 ^{a,2} 1,815 ^{a,2} 2,500 ^{a,2} 1,054 ^{c,7}	1,250 ^{a,d} 1,490 ^{a,d}	900 ^{a,d,4} 900 ^{a,3} 900 ^{a,3} 900 ^{a,4}	34 ^f	88% ThOD (20d) ^c	2,500 ^d 1,200 ^{b,d} 1,480 ^b 1,344 ^{b,13}
Coconut Diethanolamide (cocamide DEA; n-cocoyl diethanolamine)	61790-63-4						
d-limonene	138-86-3 5989-27-5	69.6 ^a 1.0 ^f	0.70 ^a 0.8 ^f	0.7 ^f	0.1 ^f	"difficult to biodegrade" ^b	5,600 - 6,600 ^b
EDTA	60-00-4	>100 ^{d,4,9} 625 ^{a,2}	159 ^{b,d} 486 ^{d,8} 1,030 ^{d,8} >300 ^{d,4,9}	11 ^{b,d} 76 ^{b,d}		28% Th CO ₂ (28d) ^b negligible anaerobic biodegradation ^b	2,000 - 4,000 ^{d,8} 4,000 ^d
ethanol (ethyl alcohol)	64-17-5		13,000 ^b 15,300 ^b 12,900 ^b 14,200 ^b	5,000 ^{b,d} 1,450 ^{b,d}	86 ^f	74% ThBOD (5d) ^b 84% ThBOD (20) ^{b,d} 79% ThBOD (20) ^d	10,809 ^{b,d} 7,060 ^k 3,450 ^k

Chemical Ingredient Name (synonyms)	CAS No.	Acute <i>Daphnia</i> EC ₅₀ (48h) (mg/l)	Acute fish EC ₅₀ (96h) (mg/L)	Acute algae EC ₅₀ ≥96h (green algae) (mg/l)	Chronic <i>Daphnia</i> EC ₅₀ ≥14d	Biodegradability	Acute mammalian toxicity ¹ oral LD ₅₀ (mg/kg)
Ethoxylated alcohols C9-C11	68439-46-3						
Isopropanol (isopropyl alcohol)	67-63-0	10,000 ^{a,2} 9,714 ^{a,2} 5,102 ^{a,2} 10,000 ^{a,2}	11,130 ^a 10,000 ^j 9,640 ^a 10,400 ^a 6,550 ^a 9,640 ^a 9,540 ^b 6,120 ^b 9,490 ^b	79 ^{a,3} 79 ^{a,3} 1,800 ^{a,3} 1,800 ^{a,4} 1,800 ^{a,3}	141 ^{c,6}	72-78% ThOD (20d) ^d	5,840 ^d
lauramine oxide (dimethyl lauramine oxide)	70592-80-2						
Limonene fraction terpenes (see d-limonene)	65996-98-7						
Methioxirane Polymer with Oxirane, Monodecyl Ether	37251-67-5						
n-alkyl Dimethyl Benzyl Ammonium Chloride (benzalkonium chloride) <i>a quaternary ammonium compound</i>	8001-54-5	0.16 ^a 0.12 ^a	5.5-6.5 ^a 3.4 ^a 1.8 ^a 6.1 ^a 1.3 ^a 2.4 ^a	0.54 ^a 0.10 ^a 0.32 ^a 0.10 ^a 0.10 ^a 0.018 ^a 0.085 ^a			240 ^k
o-benzyl-p-chlorophenol (chlorophene)	120-32-1						1,700 ^k 65 ^k
Oil of Orange (see d-limonene)	8008-57-9						
o-phenylphenol	90-43-7	15 ^b 13.2 ^b 0.71 ^a 1.0-2.4 ^a		5.3 ^f	0.4 ^f	85% ThOD (28d) ^b	>1,000 ^b 2,700 ^{b,d} 2,480 ^{b,d} 2,000 ^b

Chemical Ingredient Name (synonyms)	CAS No.	Acute <i>Daphnia</i> EC ₅₀ (48h) (mg/l)	Acute fish EC ₅₀ (96h) (mg/L)	Acute algae EC ₅₀ ≥96h (green algae) (mg/l)	Chronic <i>Daphnia</i> EC ₅₀ ≥14d	Biodegradability	Acute mammalian toxicity ¹ oral LD ₅₀ (mg/kg)
Pine Oil	8002-09-3						3,200 ^k
Propylene glycol n-butyl ether (1-butoxy-2-propanol) <i>a glycol ether</i>	5131-66-8	573 ^f	5 ^{a,2,5} 566 ^f	342 ^f	21 ^f		3,100 ^{k,12}
sodium alkylbenzene sulfonate (LAS) ¹⁰	??	8-20 ^g 5.7 ⁱ	3-10 ^g 0.72 ^d 0.25 - 47 ^{i,10} 4.6 ⁱ generally <10 ⁱ	30-300 ^g	1.2-1.7 ⁱ 2.2-4.1 ⁱ 1.5-2.6 ⁱ	65-73% ^g 60-80% (28d) ^h	
sodium laureth sulfate (SLES; sodium lauryl ether sulfate)	68585-34-5	41 (LC ₀) ^m	8 (LC ₀) ^m	550 (NOEC) ^m 10 (LOEC) ⁿ	16.5 (NOEC) ^m	>90% ^{h,m}	

Data Sources:

- (a) AQUIRE, 1995
- (b) HSDB, 1995
- (c) IRPTC database, 1993
- (d) Verschueren, 1983
- (e) Howard et al., 1991
- (f) estimated using ECOSAR (EPA, 1994)
- (g) Gerike, 1987
- (h) Swisher, 1987
- (i) A.D.Little, 1991
- (j) Veith et al., 1983
- (k) RTECS, 1995
- (l) IPCS, 1986
- (m) Steber et al., 1988
- (n) Hopkins and Kain, 1978

Notes:

- (1) rat or mouse oral LD₅₀ unless otherwise noted
- (2) only 24 h test data available
- (3) exposures from 1 to 20 days
- (4) exposure duration not reported
- (5) sea lamprey
- (6) 16 day
- (7) estimated from QSAR
- (8) tetrasodium salt
- (9) trisodium, trihydrate
- (10) depending on the number of carbon units.
- (11) biodegradation products of LAS are considerably less toxic¹¹
- (12) rabbit, dermal exposure
- (13) approximate lethal oral dose to humans
- (14) 30 day exposure