

# Understanding Exposures to Chemicals in Cleaning Products

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# Chemicals In Cleaning Products



- Chemicals are added to products to impart a particular function (for example, act as a biocide, cleansing agent, or fragrance)
- Other chemicals can be present due to contamination (from manufacture or packaging) or degradation of intentionally added ingredients
- Manufacturers consider both product efficacy and safety when developing product formulations
- How do we know what chemicals are in the products that we use?

# Consumer Product Chemical Ingredients



- Hazardous chemicals in products used in occupational settings must be reported on Safety Data Sheets, per The U.S. Occupational Safety and Health Administration's Hazard Communication Standard
- Might not capture all non-intentionally added ingredients or contaminants
- Might be difficult for users to locate information – usually ingredients are not reported on the label

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %	Trade Secret
Tall oil fatty acids, sodium salts	61790-45-2	5 - 10	*
Stoddard solvent	8052-41-3	3 - 7	*
Pine oil	8002-09-3	1 - 5	*
Sodium hydroxide	1310-73-2	0.1 - 1	*

\* The exact percentage (concentration) of composition has been withheld as a trade secret.

### Signal word

Danger

### Hazard Statements

Causes mild skin irritation.  
Causes serious eye irritation.  
May cause genetic effects.



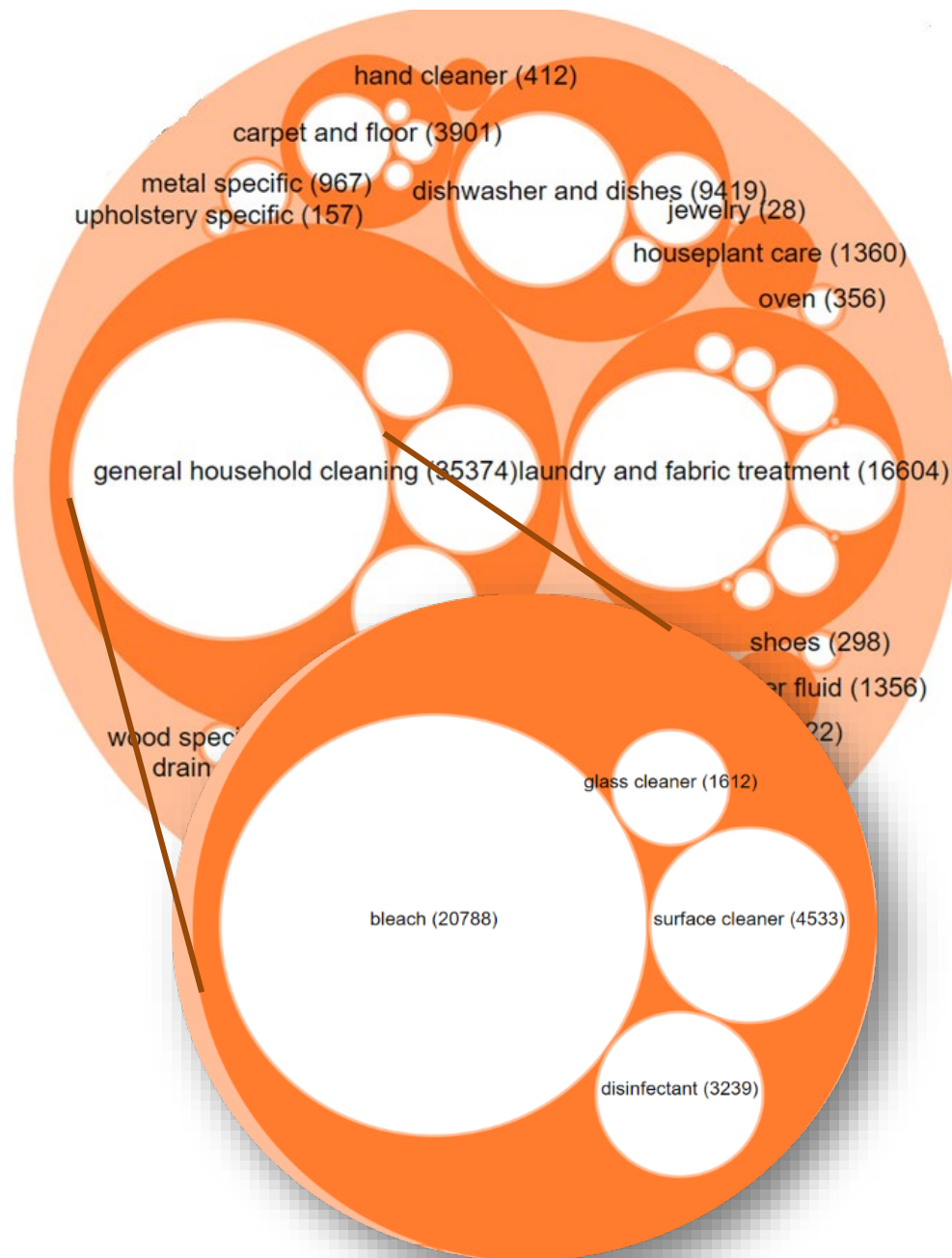
**Appearance** Clear, light amber

**Physical State** Viscous liquid

**Odor** Solvent

# Chemicals in Products

- In EPA's Office of Research and Development, we collect and curate data about chemicals in products (from SDS sheets and other manufacturer disclosures) to support chemical risk evaluations



**EPA Database of  
Consumer Product  
Ingredient Information**

**~99,000 Cleaning Products**

**>3000 Chemicals**

# Chemicals in Products

- In EPA's Office of Research and Development, we collect and curate data about chemicals in products (from SDS sheets and other manufacturer disclosures) to support chemical risk evaluations
- We are also developing new technologies for screening samples (including product samples) for many chemicals

***Bottom line - there can be a lot of uncertainty!***

## ENVIRONMENTAL Science & Technology

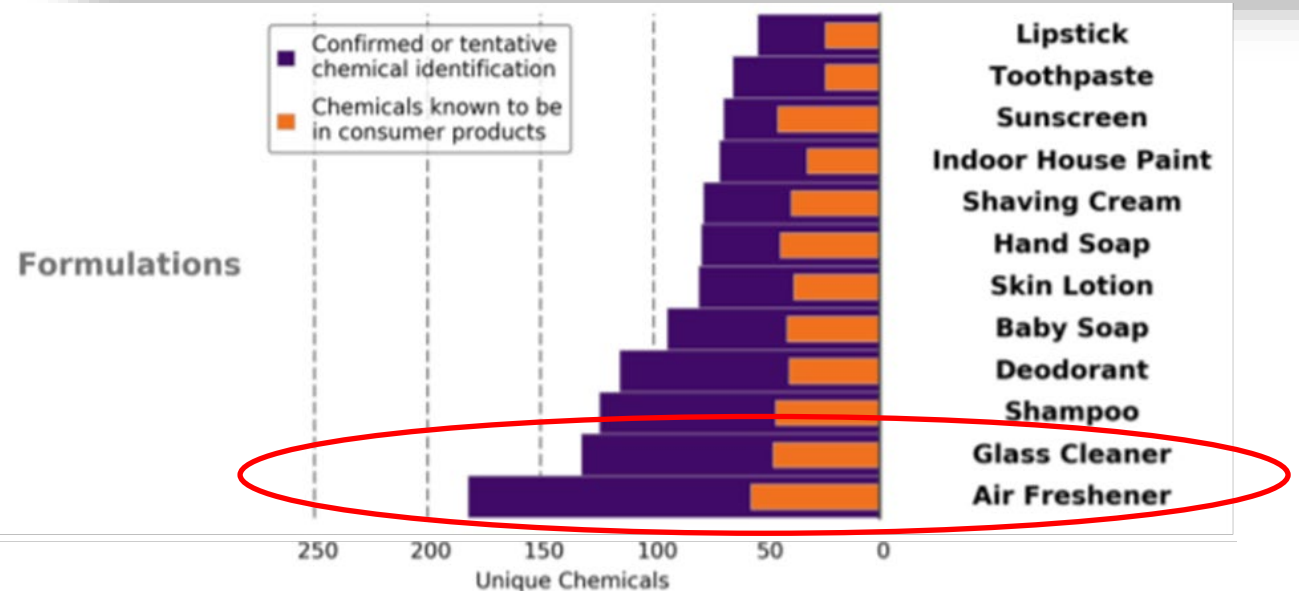
Cite This: *Environ. Sci. Technol.* 2018, 52, 3125–3135

Article

[pubs.acs.org/est](https://pubs.acs.org/est)

### Suspect Screening Analysis of Chemicals in Consumer Products

Katherine A. Phillips,<sup>†,§</sup> Alice Yau,<sup>‡</sup> Kristin A. Favela,<sup>‡</sup> Kristin K. Isaacs,<sup>†</sup> Andrew McEachran,<sup>§,||</sup> Christopher Grulke,<sup>||</sup> Ann M. Richard,<sup>||</sup> Antony J. Williams,<sup>||</sup> Jon R. Sobus,<sup>†</sup> Russell S. Thomas,<sup>||</sup> and John F. Wambaugh<sup>\*,||</sup>



***Even when we looked at only 20 products, we found many chemicals not in our database of reported substances!***

# Health Effects Associated with Chemicals in Cleaning Products

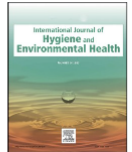
- Asthma or other respiratory effects
- Skin sensitization/dermatitis
- Potential endocrine disruption
- Other health effects



Contents lists available at [ScienceDirect](#)

International Journal of Hygiene and Environmental Health

journal homepage: [www.elsevier.com/locate/ijheh](http://www.elsevier.com/locate/ijheh)



Review

Chemicals inhaled from spray cleaning and disinfection products and their respiratory effects. A comprehensive review



**Cutaneous and respiratory symptoms among professional cleaners**

**ehp** Environmental  
Health  
Perspectives

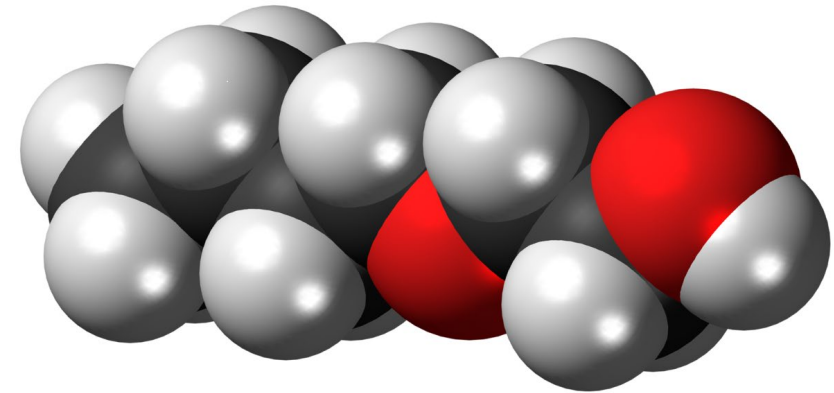
**Endocrine Disruptors and Asthma-Associated Chemicals in Consumer Products**



## Example: Glycol Ethers

- Glycol ethers are a group of water-soluble organic compounds that have many uses, including as solvents and as ingredients in cleaning compounds and paints
- From EPA fact sheets: Both short- and long-term exposure to toxic glycol ethers can have adverse health effects
  - Short-term exposure can result in narcosis, pulmonary edema, and liver and kidney damage
  - Chronic long-term exposure to toxic glycol ethers can result in fatigue, lethargy, nausea, anorexia, tremor and anemia
  - Animal studies have also reported reproductive and developmental effects from inhalation and oral exposure

*2-butoxyethanol*



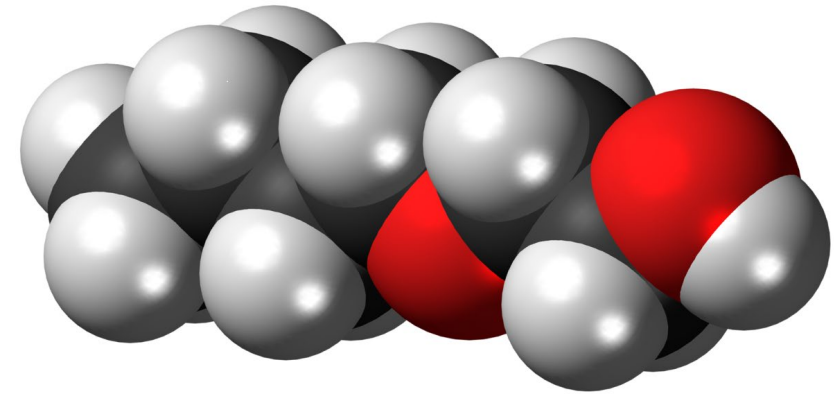
*Found in general purpose surface cleaners, bathroom cleaners, floor and carpet cleaners, and glass cleaners in our database, as well as in other categories of products*



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*2-butoxyethanol*



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***Exposure is an important concept!***

# Risk Associated with Chemicals in Cleaning Products

The **Risk** of Health Effects is a Function of both ***Toxicity*** and ***Exposure***  
***(“The dose makes the poison”)***

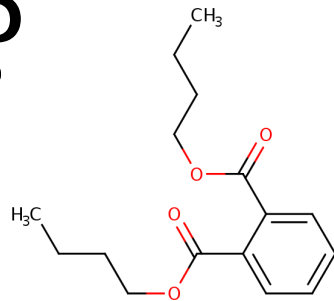
# Risk Associated with Chemicals in Cleaning Products

The **Risk** of health effects is a function of both **Toxicity** and **Exposure**  
*(“The dose makes the poison”)*

**Toxicity:** Degree to which a chemical can cause harm



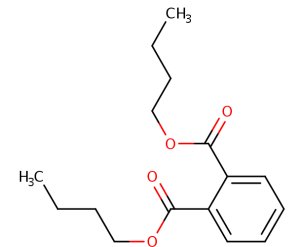
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**Exposure:** Degree of contact between a chemical and a human

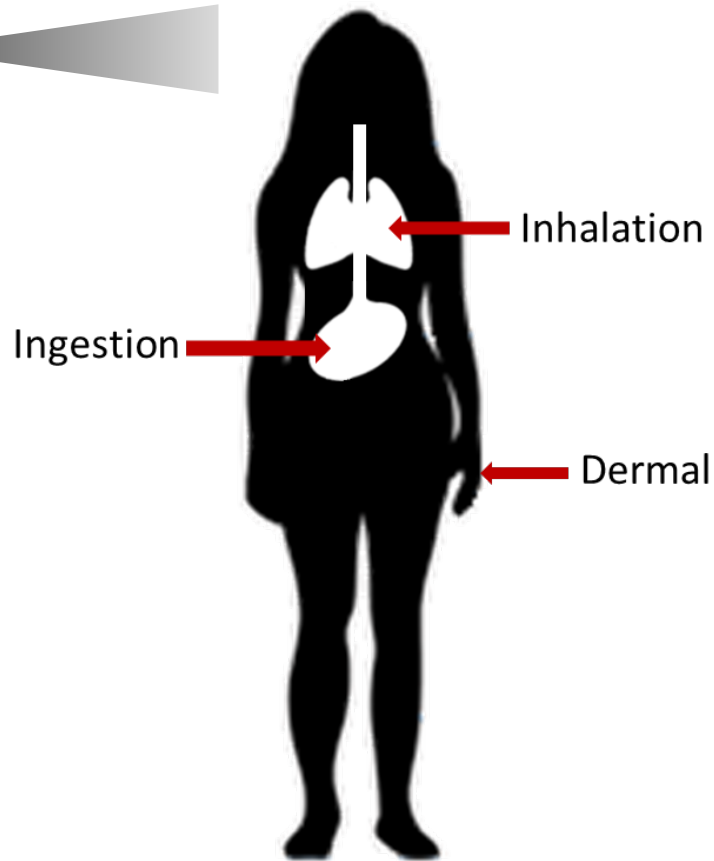


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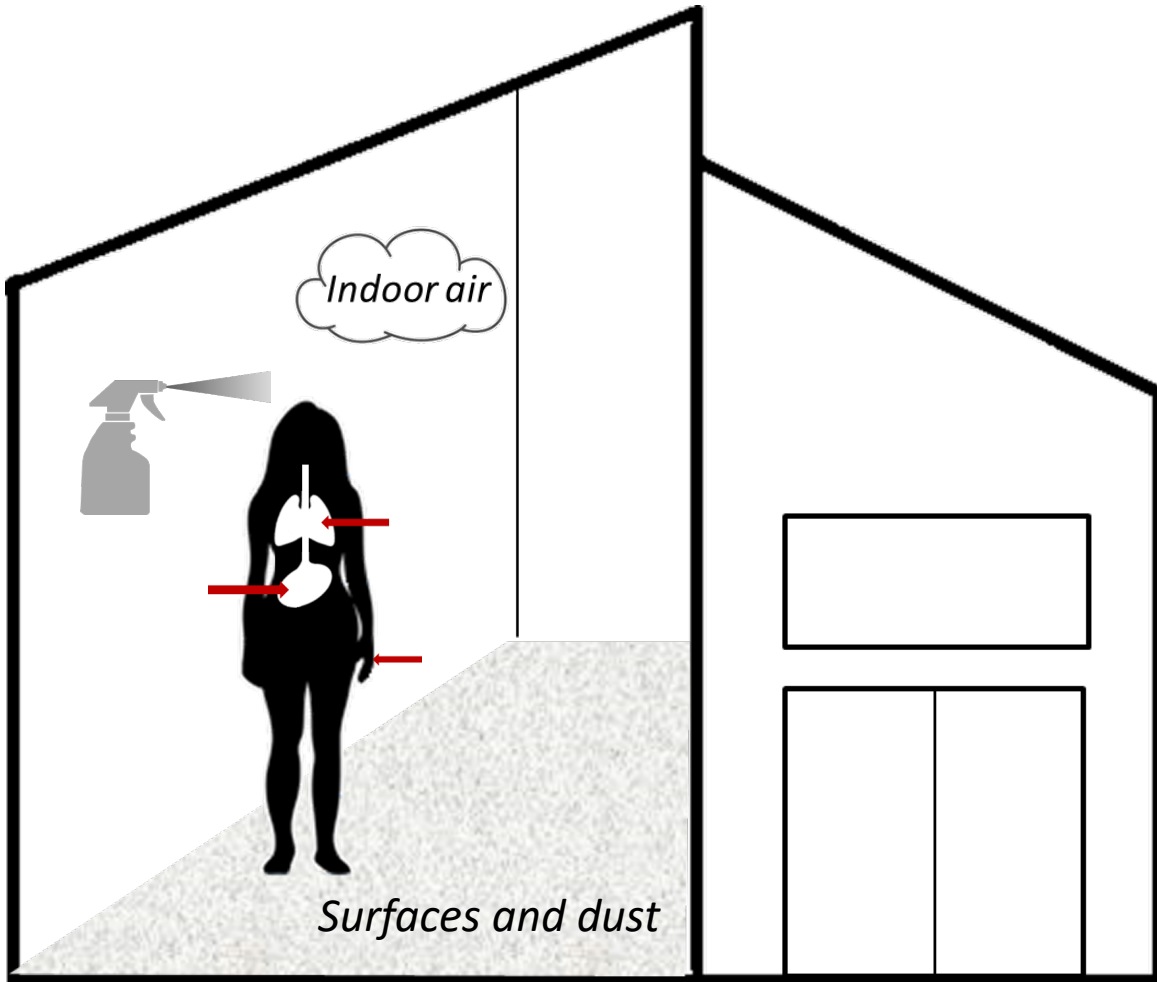
*Often measured as amount entering the body per kilogram body weight*

# How Can Exposure Occur?



- Highest exposures occur during direct use of the products
  - Different routes of exposure
    - Dermal (skin)
    - Inhalation
    - Unintentional ingestion (via hand-to-mouth behaviors or swallowing chemical in mucus from inhalation)

# How Can Exposure Occur?



- Highest exposures occur during direct use of the products
  - Different routes of exposure
    - Dermal (skin)
    - Inhalation of vapor or aerosol particles
    - Unintentional ingestion (via hand-to-mouth behaviors or swallowing chemical in mucus from inhalation)
- Indoors, chemicals can remain on surfaces, migrate into air and dust, resulting in indirect exposures over time
- Risk can be a function of exposure pattern
  - Single ("acute") exposure
  - "Chronic" exposure over time

# Reducing Risk

- Risk can be reduced by decreasing the toxicity of chemicals in products and/or by reducing exposure
- EPA's Safer Choice Program provides information about lower-toxicity ingredients through its Safer Chemicals Ingredient List (SCIL)
- Exposure can be reduced through the selection of products with lower chemical concentrations, use of personal protective gear (gloves, respirators), or selection of non-spray formulations

<https://www.epa.gov/saferchoice/safer-ingredients>



The screenshot shows the EPA Safer Chemical Ingredients List webpage. At the top, the title "Safer Chemical Ingredients List" is displayed in a large, bold, dark blue font. Below the title, there is a blue button with the text "Lista de sustancias químicas más seguras". Underneath the button, the text "On this page:" is followed by a bulleted list of links: "Safer Chemical Ingredients List", "Overview of the Safer Chemical Ingredients List", "Technical notes about the list", and "Additional resources". To the right of the main content, there is a green sidebar with the heading "Related Information". The sidebar contains text for chemical manufacturers and raw material suppliers, directing them to a step-by-step guide. At the bottom of the screenshot, the EPA logo and the text "United States Environmental Protection Agency" are visible.

**Safer Chemical Ingredients List**

[Lista de sustancias químicas más seguras](#)

On this page:

- [Safer Chemical Ingredients List](#)
- [Overview of the Safer Chemical Ingredients List](#)
- [Technical notes about the list](#)
- [Additional resources](#)

**Related Information**

For chemical manufacturers and raw material suppliers looking for information on how to list a chemical on the Safer Chemical Ingredients List (SCIL), [visit our step-by-step guide.](#)

 United States  
Environmental Protection  
Agency

- Chemicals can occur in products both intentionally and unintentionally
  - Products contain a wide variety of chemicals
  - There is a lot of uncertainty as to what chemicals may be present
- The risk to humans from chemicals in cleaning products depends on both toxicity and exposure
- Risk can be reduced by reducing the toxicity associated with product ingredients and/or reducing exposure