



Six Classes and Health: Petrol, Plastics, and Poisons

Plastic Health Summit

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A high-angle photograph of a vast stack of blue metal drums, likely containing chemicals. The drums are arranged in neat rows, filling most of the frame. In the lower right corner, a man wearing a blue hard hat, safety glasses, a light blue button-down shirt, and khaki pants is leaning over the drums, appearing to inspect or work on one. The scene is set outdoors on a paved surface under bright, direct sunlight, which creates sharp shadows and highlights the metallic texture of the drums. The number '356' is visible on the top of several drums.

**MORE THAN 80,000+ CHEMICALS
ARE ON THE MARKET TODAY**

**CHEMICAL PRODUCTION IS
INCREASING WORLDWIDE**



**BROMINATED TRIS
COULD MOVE
FROM THE PAJAMAS
INTO THE CHILD**



BROMINATED TRIS WAS BANNED FROM PAJAMAS

Flame-Retardant Additives as Possible Cancer Hazards

The main flame retardant in children's pajamas is a mutagen and should not be used.

Arlene Blum and Bruce N. Ames

Thousands of chemicals to which humans have been exposed have been introduced into the environment without adequate toxicological testing. The toxicological and biological properties of food additives and drugs have been monitored by the U.S. Food and Drug Administration and now pesticides are monitored by the U.S. Environmental Protection Agency, but most other new substances are tested only superficially.

Some chemical flame retardants provide a good example of a technological innovation where adverse environmental effects may outweigh some of the benefits. Recent federal regulations, requiring that children's sleepwear, mattresses, mattress pads, and carpets meet flammability standards, are said to have resulted in a decrease in the number of burn injuries and deaths (1). As a result, flammability standards to cover all children's and adults' clothing, tents, sleeping bags, curtains, and upholstered furniture are being considered. Currently about 300 million pounds of flame-retardant chemicals are being produced mainly for use in fabrics, plastics, and carpets (2, 3). These added directly to textiles are often present in amounts as high as 10 to 20 percent of the weight of the fabric. Further extension of the scope of the standards may increase their production and usage even more.

Inevitably, some fraction of the many millions of pounds of flame retardants that are being produced will find their way into people. The chemicals are rubbing off on children's skins, may be inhaled from furniture, rugs, and tents, and, after "disposal" in the environment, may be ingested. The decision to set flammability standards on the one hand, and the deaths of children from walking

peral of these potentially hazardous flame-retardant compounds should also be taken into account.

Until recently, little attention was paid to the long-term biological effects of these flame-retardant compounds. The main organic chemicals used in flame retardants contain bromine or chlorine or they are phosphate esters. Some have chemical structures (discussed below) that are closely related to compounds known to cause cancer or to be toxic to animals. Several compounds previously used as flame retardants have been shown to be teratogenic, carcinogenic, mutagenic, or highly toxic (4). In this article, we discuss the implications of the finding that tris-(2,3-dibromopropyl)phosphate (tris-BP) the main flame retardant currently used in children's pajamas, is a mutagen (see Fig. 1).

History of Flammable Fabric Standards

The history (5) of flammable fabric standards is as follows:

property damage. A general wearing-apparel standard, effective 1 July 1954, established minimum flammability standards to keep highly flammable apparel out of the marketplace. The act was amended in 1967 to allow flammability standards to be set for many additional consumer products. Standards for carpets and rugs became effective in 1971, and for mattresses and mattress pads in 1973. The first children's sleepwear standard (DOCF13-71) for sizes 0 to 6X became effective on 29 July 1972. Children's sleepwear fabric exposed to a gas flame along its bottom edge for 3 seconds is required to exhibit a char length no greater than 7 inches (1 inch = 2.54 cm) even after the fabric has been laundered 50 times.

In 1972, the Consumer Product Safety Commission was established and assumed jurisdiction over the regulation of flammable fabrics. A children's sleepwear standard for sizes 7 to 14 became effective on 1 May 1975. The requirements of this standard are similar to, but slightly less stringent than those for the sleepwear sizes 0 to 6X.

The Consumer Product Safety Commission is in the process of establishing uniform federal standards for upholstered furniture and tents. The National Bureau of Standards has carried out flammability studies for a standard flammability test (6) for both garment design and flame retardant fabrics and treatments to regulate the articles of adults' and children's clothing. Various state laws are being enacted to regulate the use of flammable curtains, tenting, and other items. A later test method for determining the carcinogenicity of chemicals is being developed.

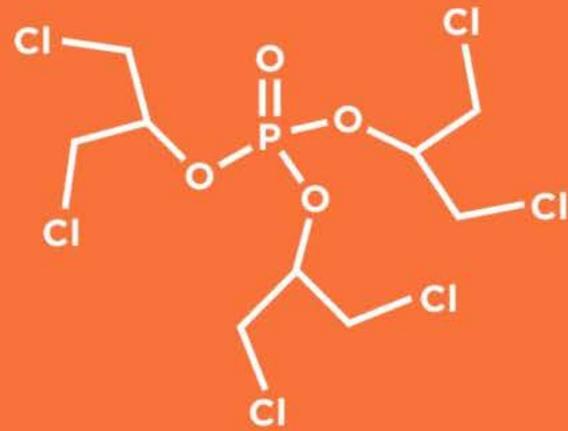
The consequences of the use of tris-BP are serious. It is a known to be a strong mutagen and may contain a potent carcinogen impurity. Infants' and young children's habit of sucking their clothing may lead to its ingestion. Therefore, tris-BP poses a potential hazard as a human carcinogen and mutagen.

In addition to the hazard posed by tris-BP and its impurities to those who make, work with, and wear fabrics treated with it, an environmental hazard may, or may not (15), be posed by its disposal in large quantities into water and soil. The simulated washing of six treated sheets in a total volume of 30 gallons of water yielded about 6 parts per million (ppm) of tris-BP in the wash water. A concentration of 1 ppm in water is sufficient to kill goldfish within 5 days (8).

The table contains the following text:

Acrylonitrile	Styrene
Acrylamide	Styrene oxide
Acrylonitrile-butadiene copolymer	Styrene sulfonate
Acrylonitrile-maleic anhydride copolymer	Styrene sulfonate sodium salt
Acrylonitrile-methyl methacrylate copolymer	Styrene sulfonate potassium salt
Acrylonitrile-vinylidene chloride copolymer	Styrene sulfonate calcium salt
Acrylonitrile-vinylpyridine copolymer	Styrene sulfonate magnesium salt
Acrylonitrile-vinylcarbazole copolymer	Styrene sulfonate barium salt
Acrylonitrile-vinylacetate copolymer	Styrene sulfonate strontium salt
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**BROMINATED TRIS
WAS REPLACED WITH
CHLORINATED TRIS**



Tris(1,3-dichloro-2-propyl) phosphate

A close-up, top-down view of a large quantity of multi-colored jelly beans. The beans are in various colors including red, orange, yellow, green, blue, purple, pink, and brown. They are scattered across the entire frame, creating a vibrant, textured background. The lighting is bright, highlighting the glossy surface of the beans.

**STUDYING ALL CHEMICALS ON THE
MARKET ONE AT A TIME IS NOT FEASIBLE**



EVALUATING **SIX GROUPS** OF
CHEMICALS IS MANAGEABLE



1

Highly
Fluorinated



2

Antimicrobials



3

Flame
Retardants



4

Bisphenols
+ Phthalates



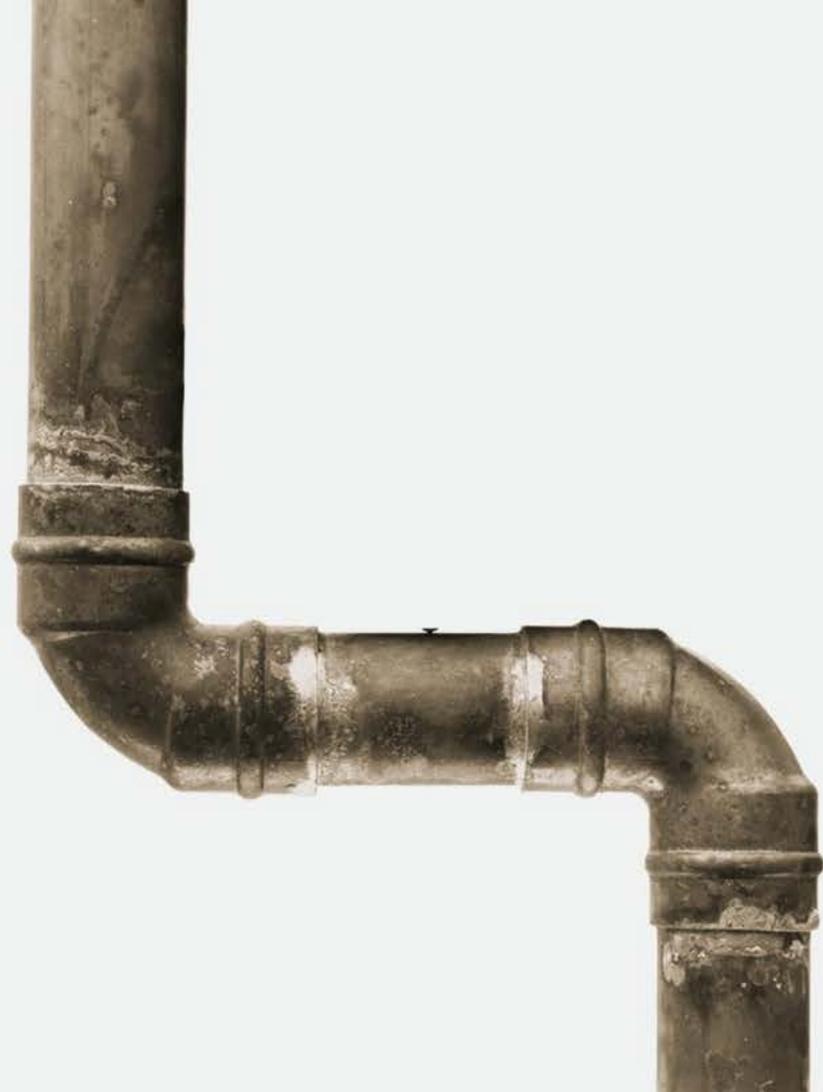
5

Some Solvents



6

Certain Metals



The Six Classes Approach

1

Highly
Fluorinated



2

Antimicrobials



3

Flame
Retardants



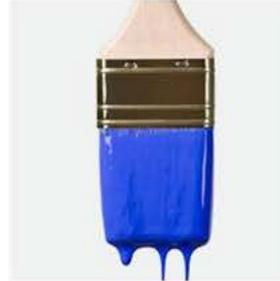
4

Bisphenols
+ Phthalates



5

Some
Solvents



6

Certain Metals



Watch short videos: SixClasses.org

**IS THIS CHEMICAL REALLY
NECESSARY?**



**IS IT WORTH THE POTENTIAL
FOR HARM?**

The Six Classes Approach

1

Highly
Fluorinated



2

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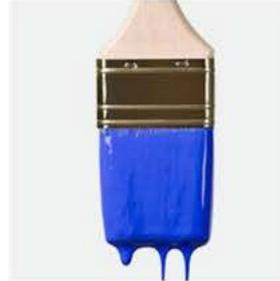
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CARPETS



CARPET CLEANING PRODUCTS



FOOD PACKAGING



FURNISHINGS



COSMETICS



OUTDOOR GEAR



CLOTHING



ADHESIVES AND SEALANTS



PROTECTIVE COATINGS



NON-STICK COOKWARE



CARSEATS



FIREFIGHTING FOAM



PERSONAL CARE PRODUCTS



HAND SOAPS



PAINTS



EXERCISE MATS



FLOORING



APPAREL



FOOD STORAGE CONTAINERS



HOME TEXTILES



KEY PADS/BOARDS



KITCHENWARE



SCHOOL SUPPLIES



COUNTERTOPS



TELEVISION CASES



BUILDING INSULATION



TEXTILES



CARSEATS



INFANT MATTRESSES



**REBONDED
CARPET PADDING**



FABRIC BLINDS



PAINTS AND COATINGS



**WIRE AND CABLE
SHEATHING**



**TRANSPORTATION
INTERIORS**

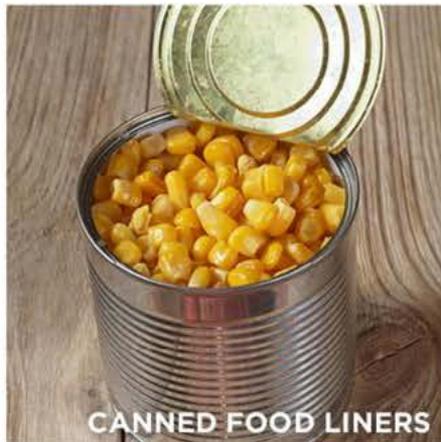


GYM FOAM BLOCKS



FURNITURE FOAM

BISPHENOLS CAN BE FOUND IN...



PHTHALATES CAN BE FOUND IN...



PERSONAL CARE PRODUCTS



TOYS



FLEXIBLE PVC PIPES



VINYL FLOORING

**CHEMICAL PRODUCTION IS
INCREASING WORLDWIDE**



The Six Classes Approach

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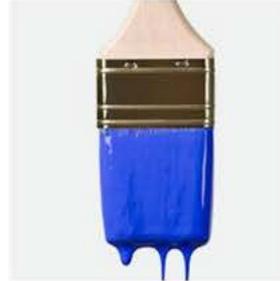
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HEALTHIER PRODUCTS, HEALTHIER PEOPLE

Thank you:

Healthy Materials Lab at Parsons School of Design

The JPB Foundation

The New York Community Trust



GREEN SCIENCE
POLICY INSTITUTE

A scenic landscape photograph featuring a dirt path on the left leading through a field of green grass and red wildflowers. In the background, a large mountain peak with a snow-capped summit rises above a thick layer of white clouds. The sky is clear and blue.

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SixClasses.org
GreenSciencePolicy.org