A voluntary initiative of the detergents industry in Europe
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Consumer Voice, Mar-Apr 2001
countries/india/isa/isar0035.html

1. Interaction Workshop
d’Entretien
Toxics

19 Consumer Voice, Mar-Apr 2001
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21

20

2. Provide consumer information designed to encourage the correct use of products.

20

The Indian detergent industry - washing its hands of its responsibilities

According to Prof. Kaushick, strict regulations in North America and Europe make it mandatory, for the multinationals detergent industry to produce detergents with minimal phosphate content (or even phosphate-free detergents). The same homogeneity dictates this responsibility in India, where they manufacture detergents with a high phosphate content. The industry voluntarily opposes any regulations of phosphates in detergents.

An environment-friendly household cleaning powder

An environmentally superior detergent is one that uses non-phosphorus ingredients. The toxicity of detergents diminishes if you remove additives like perfumers, colour and brightening agents. Minimal packaging can also reduce environmental harm substantially. Synthetic surfactants may be replaced by non-petroleum surfactants or vegetable oils. Surfactants like phosphates can be replaced by sodium citrate and sodium bi-carbonate, and fragrances can be eliminated or minimized. One of the traditional alternatives to detergents is soap, which is known for its washing properties and is useful in a number of household preparations as well.

Detergents can be made using soap and other household cleaning products. Soap is a detergent; it is made from the fats and oils produced during the cooking of foodstuffs. This is even true of dishwashing and fine fabric laundering. This is even true of dishwashing and fine fabric laundering. The mixture of melted animal fat and wood ash deriving from Mount Sapo, where animals were sacrificed to appease the gods. Cleanliness has been an important consideration for human beings since civilization began; but for the relationship between personal and environmental hygiene, the problem differs. The detergent industry can be expected to contribute to the solution.

The Indian detergent industry - washing its hands of its responsibilities

The issue of environmental protection and a regulatory policy on the use of detergents need to be addressed by the Indian detergent industry. As a proactive approach to the environmental risks, the industry needs to reduce the public’s phosphate load from 30 per cent to 20 per cent. Industry representatives have declared their intention to provide for the amount of phosphate used and to reduce the level that is in use. What is seen is that India lags far behind many European countries (30 per cent), which are not fully functional in non-phosphorous soap. The Indian industry manufacturers use phosphate-based detergents.

These targets may need to be adjusted for individual countries depending on ongoing environmental progress, washing habits and consumer choices. Established for the past five years, there is a need for a similar initiative in India. The A.I.S.E. has identified that no single comprehensive product has made its way to the consumer.

FACTILE®

According to the labelling requirements laid down by BIS, each packet of detergent powder needs to follow much stricter guidelines in order to inform the consumer.

According to an ancient Roman legend, soap derives its name from Mount Sapo, where victimless souls sacrifice to appease the gods. The introduction of small affordable sachets is further promoting the market for detergents.

Toxics

Detergents use can never be totally polluting activity. The consumer needs to be informed that the smaller detergent products can also be the least polluting ones.

AWARENESS

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HANDS-ON

Make your own detergent

Laundry Detergent Basic Mix
2 cup soap flakes
1/2 cup washing soda
1/2 cup bar
Laundry Detergent Soft Water Mix
2 cup soap flakes
1/2 cup washing soda
1/2 cup bar
Laundry Detergent Hard Water Mix
3 cup soap flakes
2 cup washing soda
1 cup bar

Liquidal Laundry Detergent

1 cup of all the above mixes
2 teaspoons glycerine
2 cups warm water

Mix ingredients and store in a sealed glass container which has already been used for storing detergents. To use, measure 1/4 to 1/2 cup of the mix and pour your clothing in warm or cold water. Use cold water for the rinse cycle.

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Waste-to-Energy Technologies

Counting the cost of cleanliness

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The Indian govern-ment has not taken enough steps to address these issues.

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Table 1: Detergent composition, their relative functions, environmental and health effects.

<table>
<thead>
<tr>
<th>Detergent constituent</th>
<th>Chemicals involved</th>
<th>Function</th>
<th>Environmental effect</th>
<th>Toxicity</th>
<th>Health hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfactants 1</td>
<td>Poly ethylene glycol (PEG) onto clothes.</td>
<td>Washing, emulsifying and dispersing properties, enable removal of dirt.</td>
<td>Cause slight to moderate skin and eye irritation.</td>
<td>Is a suspected skin or lung irritant.</td>
<td></td>
</tr>
<tr>
<td>Builders 2</td>
<td>Ethylene-diamino tetra-acetate (EDTA), hardness in water. Also prevents eye and skin irritation.</td>
<td>Reduces calcium and magnesium ions to increase effectiveness of detergents.</td>
<td>Inhale or be highly irritating to the lungs, allergic and be highly irritating to the lungs, and can cause respiratory infections.</td>
<td>Has no harmful effects.</td>
<td></td>
</tr>
<tr>
<td>Builders 3</td>
<td>Tetra-sodium salt of pyrophosphate (STPP)</td>
<td>Increases hard water solvability. Increases the solubility of dirt particles.</td>
<td>Decrease the solubility of dirt particles.</td>
<td>Is biodegradable.</td>
<td></td>
</tr>
<tr>
<td>Builders 4</td>
<td>Sodium tripolyphosphate (TPP)</td>
<td>Increases hard water solvability. Increases the solubility of dirt particles.</td>
<td>Decrease the solubility of dirt particles.</td>
<td>Is biodegradable.</td>
<td></td>
</tr>
<tr>
<td>Builders 5</td>
<td>Phosphorylated isocyanates</td>
<td>Increases hard water solvability. Increases the solubility of dirt particles.</td>
<td>Decrease the solubility of dirt particles.</td>
<td>Is biodegradable.</td>
<td></td>
</tr>
<tr>
<td>Builders 6</td>
<td>Polypropylene glycol</td>
<td>Prevents dirt from settling back – Is a suspected skin or lung irritant.</td>
<td>Causes re-deposition.</td>
<td>Is a suspected skin or lung irritant.</td>
<td></td>
</tr>
<tr>
<td>Optical brighteners 7</td>
<td>Chromes, thiosulfates</td>
<td>Converts UV rays to visible light to make fabric appear &quot;whiter&quot;.</td>
<td>A suspected skin or lung irritant.</td>
<td>Causes de-atheization.</td>
<td></td>
</tr>
<tr>
<td>Artificial perfumes 8</td>
<td>Alcohol and alkali solvents</td>
<td>Provides fragrant odor to clothes after washing.</td>
<td>Causes de-atheization.</td>
<td>Causes de-atheization.</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: A typical phosphate-based detergent formulation

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration (%)</th>
<th>Powder (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium tripolyphosphate (STPP)</td>
<td>30.05</td>
<td>50</td>
</tr>
<tr>
<td>Organic phosphates</td>
<td>10.00</td>
<td>0</td>
</tr>
<tr>
<td>Sodium citrate</td>
<td>9.00</td>
<td>0</td>
</tr>
<tr>
<td>Sodium carbonate</td>
<td>5.00</td>
<td>0</td>
</tr>
<tr>
<td>Surfactants</td>
<td>12.74</td>
<td>50</td>
</tr>
<tr>
<td>Sodium silicate</td>
<td>14.34</td>
<td>0</td>
</tr>
<tr>
<td>Builder</td>
<td>1.00</td>
<td>0</td>
</tr>
<tr>
<td>Enzymes</td>
<td>1.00</td>
<td>0</td>
</tr>
<tr>
<td>Anti-redeposition agents</td>
<td>1.00</td>
<td>0</td>
</tr>
<tr>
<td>Optical brighteners</td>
<td>1.00</td>
<td>0</td>
</tr>
<tr>
<td>Artificial perfumes</td>
<td>1.00</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Consumer Voice, May 2001

Continuous and excessive exposure of the skin to detergents leads to drying, flaking and discomfort of the keratin layer. This results in increased permeability, which can cause sensitisation, which with time may develop into dermatitis. The chemicals are most suitable for ironing, cleaning and bleaching purposes. They do not cause allergies or skin irritations.

Despite the laying down of an Ecomark plan by BIS, which encourages phosphate-free environment-friendly detergents, not a single compliant product has made its way to the consumer.

STANDARDS

Detergents contain a great deal of synthetic surfactants which are non-biodegradable and which release toxic nitrogen compounds when used in the washing process. They also contain high concentrations of phosphates which are non-biodegradable and contribute to eutrophication of water bodies. These may also be hazardous to human health by releasing toxic nitrogen compounds when used in the washing process. They also contain high concentrations of phosphates which are non-biodegradable and contribute to eutrophication of water bodies.

Toxicology and hazard potential of water bodies gradually, and become more problematic in nature. In the process, they might take thousands of years to progress from human activities to activate the process tremendously. The presence of excessive plant nutrients causes pollution of water bodies. These nutrients are supplied primarily in the form of phosphorus, nitrogen and carbon to water bodies in various ways. Because it is a potential source of phosphorus when detergents containing large amounts of phosphates are used in water bodies. The nitrogen load in the atmosphere to form nitrosamines, a family of carcinogenic pollutants.

Phosphates are a major source of water pollution, which in turn, accounts directly for 40 per cent of human and animal diseases. According to Professor Narinder Kaushick, national program manager of Ecomark for the Detergent Industry from the Canadian University of Guelph, “the main problem with phosphate-based detergents is that they prevent the photolysis of organic compounds.”

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**Biodegradability (I:3603-1991):** A biodegradable material is one which does not give off a result of greater than 60 per cent of carbon dioxide within 28 days.
## Toxics

**Detergent Chemicals Function Environmental Health toxicity**

- The solubility and migration rate of soaps is slower than that of detergents, which can cause skin sensitization.
- Soaps are not as readily soluble in hard water as detergents. This property of soap is due to the fact that soaps react with minerals in the water to form insoluble salts, which make them suitable for hard water.
- Continuous and excessive exposure of the skin to detergents leads to drying, flaking, and dermal redness of the keratin layer. This results in increased permeability, which can cause sensitization, which, with time, may develop into dermatitis.
- The scale of dermatitis as a result of exposure to detergents is on the rise. In India, per capita consumption of detergents in 1994 was 2.8 kg per annum. This is projected to rise to over 4 kg capita by 2005.
- In rural households, the use of detergents is more frequent and frequent use of detergents is related to the use of fast food.
- In India, the per capita consumption of detergents in rural areas is sure to escalate due to the use of non-biodegradable detergents. The standards for the regulation of phosphates in detergents in many states of the USA have been established. The standards suggest replacing phosphates with alkaline or other environment-friendly substances. It also means that the manufacturer should be held responsible for the damage caused by the use of non-biodegradable detergents.

### Table 1: Detergent composition, their relative functions, environmental and health effects.

<table>
<thead>
<tr>
<th>Detergent constituent</th>
<th>Chemicals involved</th>
<th>Function</th>
<th>Environmental effect</th>
<th>Health toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfactants</td>
<td>Polyalcohols (Alkyl) or Linear alcohol ethylene oxides (LAEO), a cationic surfactant</td>
<td>Washing, emulsifying and dispersing properties, enable removal of dirt (oil) from fabrics and keep the cells in the water.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
</tr>
<tr>
<td>Peroxides &amp; Peroxyacids</td>
<td>Peroxides and peroxyacids</td>
<td>Oxidise and destroy oil molecules.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
</tr>
<tr>
<td>Fragrances</td>
<td>Perfume (monophosphoric acid or soap)</td>
<td>Create pleasant smells or scents.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
</tr>
<tr>
<td>Builders</td>
<td>Sodium tripolyphosphate (STPP)</td>
<td>Reduce calcium and magnesium ions in water.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
</tr>
<tr>
<td>Builders</td>
<td>Alkyl benzene sulphonates</td>
<td>Increase effectiveness of detergents.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
</tr>
<tr>
<td>Anti-redeposition agents</td>
<td>Polyurethanes</td>
<td>Prevent fibre from getting wet.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
</tr>
<tr>
<td>Optical brighteners</td>
<td>Phosphorus acid</td>
<td>Increase light reflection.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
</tr>
<tr>
<td>Artificial colours</td>
<td>Petroleum products</td>
<td>Provide a bright color to the fabric.</td>
<td>Causes slight to moderate edema and skin irritation.</td>
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</tr>
</tbody>
</table>

### Table 2: A typical phosphate-based detergent formulation

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<tr>
<th>Component</th>
<th>Concentration (g/L)</th>
<th>Compact Powders (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium tripolyphosphate</td>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>Oxalic acid</td>
<td>8.5</td>
<td>0</td>
</tr>
<tr>
<td>Sodium carbonate</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Surfactants</td>
<td>3.5</td>
<td>0</td>
</tr>
<tr>
<td>Sodium perborate</td>
<td>14.5</td>
<td>0</td>
</tr>
<tr>
<td>Activator</td>
<td>0.4</td>
<td>0</td>
</tr>
<tr>
<td>Sodium silicate</td>
<td>1.24</td>
<td>0</td>
</tr>
<tr>
<td>Enzymes</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>Anti-redeposition agents</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>Optical brighteners</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>Artificial colours</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td>Soap</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>Water</td>
<td>100</td>
<td>200</td>
</tr>
</tbody>
</table>

Source: Consumer Voice, Mar-Apr 2001

### Eutrophication

- Water bodies gradually become more productive. In nature, this process might take thousands of years to progress, but human activities accelerate this process tremendously. The presence of large quantities of nutrients can cause an algal bloom in a lake or pond. This can cause oxygen to be depleted in the water, leading to fish kills. The nutrients can also be carried to the ocean, where they can cause a similar effect. This process is normally a natural process by which water bodies become more productive. In nature, this process might take thousands of years to progress, but human activities accelerate this process tremendously. The presence of large quantities of nutrients can cause an algal bloom in a lake or pond. This can cause oxygen to be depleted in the water, leading to fish kills. The nutrients can also be carried to the ocean, where they can cause a similar effect.

### Phosphates and water pollution

- Phosphates are a major source of water pollution in India. In India, per capita consumption of detergents in 1994 was 2.8 kg per annum. This is projected to rise to over 4 kg capita by 2005. In rural households, the use of detergents is more frequent and frequent use of detergents is related to the use of fast food.

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### Packaging and the environment

- The Law of Environment Protection in India (EMP) regulates phosphates on a pollution basis. Despite its usage, it is projected to rise to over 4 kg capita by 2005. In rural households, the use of detergents is more frequent and frequent use of detergents is related to the use of fast food.

### Detergents damage your washing machines

- Detergents and water pollution

### Packaging

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<th>Function</th>
<th>Environmental Effect*</th>
<th>Biodegradability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfactants</td>
<td>Alkyl benzene, ethoxylated fatty alcohols, cationic surfactants</td>
<td>Wetting, emulsifying and dispersing properties, enable removal of dirt from fabrics and keep the soiled fabrics suspended in the washing water.</td>
<td>Causes slight to moderate eye and skin irritation.</td>
<td>Slower to biodegrade.</td>
</tr>
<tr>
<td>Optical brighteners</td>
<td>Same as above.</td>
<td>Provides bright result in clothes</td>
<td>Causes cancer.</td>
<td>Biodegradable</td>
</tr>
<tr>
<td>Builders</td>
<td>Sodium tripolyphosphate (STPP)</td>
<td>Increases load of water solubility of calcium and magnesium ions to increase effectiveness of detergents. Acts as defoaming agents to prevent dirt redeposition.</td>
<td>Increase turbidity of atmosphere particles, family of antifungal agents.</td>
<td>Biodegradable</td>
</tr>
<tr>
<td>Builders</td>
<td>Polyethylene glycols</td>
<td>Reduce hardness of water hardness in water. Also prevents bio-degrading agents from getting active before entering the water.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-redeposition agents</td>
<td>Same as above.</td>
<td>Prevents dirt from settling back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical brighteners</td>
<td>Same as above.</td>
<td>Provides bright result in clothes. Also prevents bio-degrading agents from getting active before entering the water.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Builders</td>
<td>Phosphate-based, when used with soap as a detergent, can be effective</td>
<td>Increase turbidity of atmosphere particles, family of antifungal agents.</td>
<td>Biodegradable</td>
<td></td>
</tr>
<tr>
<td>Builders</td>
<td>Surfactant-based</td>
<td>Increase turbidity of atmosphere particles, family of antifungal agents.</td>
<td>Biodegradable</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: A typical phosphate-based detergent formulation

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentrational Percentage</th>
<th>Compact Powder Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium tripolyphosphate (STPP)</td>
<td>0.25</td>
<td>0</td>
</tr>
<tr>
<td>Organic phosphates</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>Sodium silicate</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Sodium carbonate</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Surfactants</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Sodium percarbonate</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Activator</td>
<td>0.2</td>
<td>3</td>
</tr>
<tr>
<td>Sodium sulphate</td>
<td>0.2</td>
<td>24</td>
</tr>
<tr>
<td>Enzymes</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Anti-redeposition agents</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Optical brighteners</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Synthetic detergents</td>
<td>8.2</td>
<td>1</td>
</tr>
<tr>
<td>Optical brighteners</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Fortune</td>
<td>18</td>
<td>0.2</td>
</tr>
<tr>
<td>Water</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>


### Biodegradability

*Biodegradability* (ISO 13193 – 2001) is the ability of a material to give a result of greater than 60 per cent field of carbon dioxide within 28 days. Chemical compounds made from synthetic materials are valued due to their biodegradability.

- The reduction and migration rates of soap are invaluable to waterway cleanliness.
- Soaps are not as readily soluble in hard water as detergents. This property of soap is due to the fact that soap molecules are intrinsically present in the water leading to the formation of colloids, ions, or soap, that makes them stable in water.

### Environmental and Health Effects

- **Detergents and water pollution**
  Phosphates are a major cause of water pollution which in turn, accounts directly for 40 per cent of human and animal diseases. According to Prof. Siddharth K. Kanakad, Professor, Chemistry Department, Panjab University, Chandigarh, “The main problem with phosphate-based detergents is that they promote the eutrophication of aquatic environments.”

- **Detergents cause skin irritation**
  Phosphate in detergents is a major cause of water pollution which in turn, accounts directly for 40 per cent of human and animal diseases. According to Prof. Siddharth K. Kanakad, Professor, Chemistry Department, Panjab University, Chandigarh, “The main problem with phosphate-based detergents is that they promote the eutrophication of aquatic environments.”

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### Standards

Despite the laying down of an Ecomark plan by BIS, which encourages phosphate-free environment-friendly detergents, not a single compliant product has made its way to the consumer market.
Detergents

Counting the cost of cleanliness

Clayton has been an important consideration for human being since civilization began, but few see the relationship between personal and environmental issues.

**Detergents**

With detergent spreading in soaps, it is impossible that we understand what they are and how they affect our environment. Detergents are hazardous chemical cleaning compounds used for household and industrial cleaning. They contain varying amounts of surfactants and other chemicals that can form a soap-like material in our bodies as well as the natural environment.

**Soap vs Detergents**

- **Soap:** are made from natural resources such as fats and oils, while detergents are made from toxic chemicals that can cause environmental harm.
- **Detergents:** can never be a totally non-polluting activity. The consumer needs to be informed that the smaller detergent products can also be the least polluting ones.

**Waste-to-Energy Technologies**

**AWARENESS**

Detergent use can be never be a totally non-polluting activity. The consumer needs to be informed that the smaller detergent products can also be the least polluting ones.

**HANDS-ON**

Make your own detergent

- Laundry Detergent Basic Mix
  - 2 cups soap flakes
  - ½ cup washing soda
  - ½ cup bar soap
- Laundry Kit
  - 2 cups soap flakes
  - 2 cups washing soda
  - 1 cup bar soap
- Liquid Laundry Detergent
  - 1 cup of the above mixes
  - ½ cup glycerin
  - 2 cups warm water

Mix ingredients and store in a sealed glass container which has already been used for storing detergents. To use, measure ½ to ¾ cup of the mix and pour your clothing in warm or cold water. Use cold water for the time cycle.

Detergent use can never be a totally non-polluting activity. The consumer needs to be informed that the smaller detergent products can also be the least polluting ones. By using ‘green detergents’ that do not contain non-biodegradable chemicals which are used to inform the consumer about potential dangers. This is even truer of non-biodegradable ones which are forced to follow much stricter norms in Western countries.

**FACTFILE**

- **Soap making** dates back to about 1500 BC, when a combination of animal fats and oils was cooked with alkali to form a soap-like material. 1 In ancient India, people used soap preparations made from fats, ash and water. The first soaps were made from the ashes of burned herbs and plants. 2
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Detergents

Counting the cost of cleanliness

Cleanliness has been an important consideration for human beings since civilisation began, but few see the relationship between personal and environmental cleanliness.

"What are detergents?"

With detergents spreading in usage, it is important that we understand what they are and how they affect our environment. Detergents are household chemical cleaning products, which break dirt into microscopic particles so that water can wash them away. In addition, they contain surfactants, fillers, and how they affect our environment.

"Soap versus Detergents"

- Detergents are made from natural resources such as fats and oils, whereas soap is not.
- Detergents are more effective at cleaning clothes, whereas soap is not.
- Detergents are more effective at removing grease, whereas soap is not.
- Detergents are more effective at removing dirt, whereas soap is not.
- Detergents are more effective at removing odours, whereas soap is not.

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Toxics Link Factsheet Number 16 / June 2002

AT A GLANCE

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