

## **Do you know the ingredients in the chemical cocktail called Detergent?**

**Fabric care can be challenging if it is the clothing of the School going children or that of persons engaged in works that stain the clothing easily like that of a Mechanic, Cook, Painter or a Sportsperson.**

There are many aids available to us when it comes to Fabric care, the bleaches, the ultramarine (blue), the fabric conditioner and so on. But detergent cakes, soaps and powders tops the list.

### **What are detergents?**

Water alone can't clean clothes because it won't attach to molecules of grease and dirt.

Detergents are substances used to enhance the cleansing actions of water. Often we use the words "soap" and "detergent" interchangeably, but really they're quite different things.

A detergent is a chemical substance you use to break up and remove grease and grime, while soap is simply one kind of detergent.

A detergent is a substance, which penetrates and breaks up the oily film that binds dirt particles and a wetting agent, which help them to float off.

Soap has a long history and was originally made from purely natural products like goat's fat and wood ash. Today, detergents are more likely to be a mixture of synthetic chemicals and additives cooked up in a huge chemical plant.

Detergents are used in everything from hair shampoo and clothes washing powder to shaving foam and stain removers. The most important ingredients in detergents are chemicals called **surfactants** – a word made from bits of the phrase- **surface active agents**.

This active agent contains two groups, viz., “oil loving – lipophilic” and the other “water loving – hydrophilic.” A surfactant a detergent decreases the surface tension of water to help it penetrate soil/ stain.

Thus in surfactants one end is strongly attracted to water; the other is attracted to oily substances like grease.

The first synthetic detergents synthesized were derived from fats by certain chemical processes Sodium lauryl sulphates were the first detergents thus synthesized. But this process was found to be expensive. Within a few years, less expensive synthetic detergents were produced from petroleum products.

In addition the modern detergent formulations contain a number of other substances to improve detergency, to bleach, to lessen re-deposition of dirt, to brighten, or simply to reduce the cost of the formulation.

A substance added to a surfactant to increase its detergency is called a builder. Common builders are the Phosphates. Other builders and fillers added include soda ash, sodium silicate, sodium chloride, sodium sulphate, and Zeolite (special form of clay - hydrated sodium aluminum silicate). Detergents are graded on the basis of their active matter, and poly phosphate content. Detergents can be used in hard water, but removal from fabrics requires a lot of rinsing.

**Detergents used for hand washing should give copious lather.** That would satisfy the aesthetic sense of the customer. But the fact is that the amount of foam is not a measure of the effectiveness of the detergent. However, a small amount of foam is necessary to trap the dirt and carry it away during rinsing.

**The optimum concentration of active matter is found to be 0.05% or 0.5gm/litre or 5 gram in ten liters. 50 g of a popular low priced detergent powder is needed in 10 litres of water for optimum economy and efficiency. For localized cleaning it is better to use a detergent bar.**

### **Other chemicals in detergents**

- **OPTICAL BRIGHTENERS** - which make your clothes, gleam in sunlight.
- **ENZYMES** - which help to break up and remove food and other deposits.
- **Proteases** -which break up proteins
- **Lipases** -which break up fats
- **Amylases** - which attack starch
- **PERFUMES**
- **ABRASIVE SUBSTANCES** - such as chalk to help scour away things like burned-on cooker grease and bath-tub grime.

### **Detergents we use affects the environment -**

We all love clean clothes, but most of us also love a clean planet. Do the two things go together? Look at the ingredients label on a typical bottle of detergent and you'll see a chemical cocktail.

Have you stopped to think what are all these things and what do they do? Do they have any harmful effect on our health or the planet on which we all depend? There's very good reason to think so. That's why some detergent brands deliberately position themselves as eco-friendly, not by comparing themselves to soap and water (the basic dynamic-duo of the detergent world) but by drawing attention to the potentially harmful chemicals used by their rivals.

### **The health hazards of various chemicals in the Detergents**

#### **Surfactants**

As we've already seen, these play a crucial part in helping water to attack and remove dirt. But once they are flushed down the drain, surfactants don't stop working; they start to play similar tricks on aquatic life, for example, attacking the natural oils in the mucus membranes

of fish, stopping their gills from working properly, and increasing their risk of attack from other chemicals in the water.

Some surfactant ingredients produce what are called endocrine-disruptors, which can affect the hormonal balance of animals (including humans), causing a variety of health problems and sometimes changing their sex characteristics. Although surfactants can be toxic to fish and other aquatic life (some are even listed as persistent organic pollutants [POPs] – ones that remain in the environment for many years without breaking down); most surfactants biodegrade relatively quickly in sewage treatment plants before they can do much harm to the natural world.

## **Binders**

Even though phosphates are perfect builders they suffer from one overwhelming defect – they are superb nutrients for the algae and other small plants that grow on the surfaces of lakes and streams. Algae, nourished by a steady supply of phosphates, can cover the surface of body of water and prevent atmospheric oxygen from reaching the marine life below the surface.

The resulting death of fish and other aquatic animals sometimes occurring on a large scale in lakes and rivers covered by algae, has led many countries to ban the use of phosphates as detergent builders. Although phosphates enter water in many different ways, detergents contribute significantly to the problem. This type of water pollution is known as eutrophication.

**In India 80% of the detergents marketed are phosphate free,** hence eutrophication from detergents does not happen. The most promising substitute for phosphates is a class of compounds of aluminum, silicon, and oxygen known as zeolites.

## **Enzymes**

Enzymes are catalysts, which mean they're chemicals that help to make chemical reactions happen more quickly or easily. Generally, they're added to detergents to make them more effective at tackling tricky forms of dirt that ordinary detergents struggle with. They also help to lower the environmental impact of detergents by reducing the need for surfactants. Although it's widely believed that enzymes can cause skin problems, a recent scientific review in the British Journal of Dermatology suggested that it is a myth: "the irritating and allergenic hazards of enzyme raw materials do not translate into a risk of skin reactions."

## **Perfumes**

Fragrances in detergent serve no purpose other than to make your clothes smell nice. But the oils from which they're made can cause rashes and skin allergies.

## **Health and Detergents**

The basic function of a detergent is to remove dirt. In our country most of the people wash clothes using their hands. The detergent which removes the dirt and grime from the clothes also degrades the skin while washing the clothes. Thus natural oils from the skin are removed which may lead to certain skin diseases. Alkaline materials which are also present in

the detergent powders and bars will intensify this condition.. Some chemicals can penetrate, the epidermis causing irritation of the skin. Moreover the alkaline builders and fillers added to the detergents are also harmful to sensitive skin. If the clothes are not washed very well with water, the residual detergent sticking to the cloth also may irritate the skin. Metallic impurities like nickel present in the detergent powders or cakes are also harmful.

### **COMPARATIVE TESTING**

Comparative Testing is a formal process by which different brands of a product category are tested for

- *Conformance to minimum standards laid down by Bureau of Indian Standards*
- *Test how different brands exceed these standards or fall short*
- *An empirical analysis of what you get for your money*
- *Assess the inflated claims of manufacturers to see if consumers get what they pay for*
- *Relative performance of various brands*
- *The test results are published helping the consumer to make an informed choice*

CONCERT has undertaken this project of Comparative Testing for Southern Region under a grant from Department of Consumer Affairs, Government of India. Concert is testing 7 products and 3 services one of the product is Detergent Cake.

### **The brands chosen for testing**

The following 18 brands of Detergent bars were chosen for testing

#### **Tamil Nadu**

1. Active Power
2. Challenge
3. Super Padayappa
4. Super Arasan
5. Ponvandu

#### **Andhra Pradesh**

1. Royal Chakravarthi – Active Wash (This is made by the manufacturers for Ponvandu)
2. Ghari (Ghadi in Hindi)
3. Triple XXX
4. Nirma

#### **Karnataka**

1. MDC (Mysore Detergent Cake)
2. Shashi – Ultra Active Rose Detergent Cake
3. Savaal

#### **Kerala**

1. Chek – No 1 Dirt Fighter
2. More Light – Top Bright Detergent Cake

### **Available in all four States**

1. Tide
2. Rin
3. Surf Excel (Removes Tough Stain)
4. Henko

In addition the following 4 brands of washing soaps that are popular in Kerala and one brand that is very popular in Karnataka were also tested.

### **Kerala**

1. Dr. Wash – Washing Soap
2. Gold Washing bar soap
3. Sunlight
4. 501 Bar Soap

### **Karnataka**

1. NS bar Soap

### **DESIRED QUALITIES OF DETERGENT CAKE**

- Pleasant odor and color
- Aesthetically appealing
- Easy to wash
- Pleasant foaming
- good cleansing actions
- Effective stain removal actions
- Gives brightness on clothes
- Retains clothes texture
- No harsh feel
- Doesn't roughen the skin
- Doesn't cause itching or irritation after use
- Non-allergic
- User friendly
- Environment friendly

**Our Comparative testing was aimed at finding out if the detergents taken for testing comply with the above mentioned qualities.**

### **PARAMETERS TESTED**

#### **1. Packaging and Labelling**

**As per Legal Metrology 2011 and Drugs and Cosmetics Act 1940 and Rules 1945 the label should contain the following information**

- Name of the Product

- Manufacturer's Name – Marketed by
- Batch number
- Date of Manufacture
- Net weight
- MRP

## 2. QUALITY

**pH** : pH value of the detergent cakes generally will be in the alkaline range because saponification will increase the pH. But companies try as much as possible to keep the pH well within control to avoid skin burning or irritation of the end users.

**Foam height** : Foam height has a direct co-relation with cleansing; popular perception, more the foam more the cleansing.

**Free caustic alkali** : Companies normally keep free caustic alkali closure to nil, as the contents will irritate the skin.

**Soap penetration**: Soap penetration is yet another important parameter that helps in cleansing of dirt.

**Active matter** : Active matter is once again attributed to the amount of actives in the detergent bars, which is in direct proportion to cleanse. Active matter determination is a method to determine the anionic surfactants present in the product. It is tested to check the level of surfactants - higher the level, better foam and better cleansing. Nevertheless it should not exceed the limit as it would dry the users' skin. So companies always keep a check on this attribute too.

**Accelerated Stability Test** At - 5° C, RT, and 45° C for 3 months

## SCORING AND RATING

The major criteria are (1) **Packaging and Labelling** and (2) **Quality**.

Every test parameter is evaluated / tested and scored. These are added to give the scoring to the single criterion. Each criterion and parameter is rated individually on a 5-point scale. The rating given is:

- 1 (Poor)
- 2 (Fair)
- 3 (Good)
- 4 (Very Good) and
- 5 (Excellent)

Any parameter, which in our tests, meets the defined standards has been rated as **Good**. When it exceeds the minimum standards substantially, it has been rated as **Very Good**. When it exceeds the standards significantly and shows appreciable innovation, it has been rated as **Excellent**. When it fails to meet the standard it is rated as **FAIR or POOR** based on the deviation from the Standard.

The price of each product tested is also tabulated for a common unit for information to consumer.

We present the results against these major criteria that in our opinion are fair and without any subjective element. The user is encouraged to study these results and make his/her buying decisions based on their requirements and judgment.

#### Detergent Cake – Scoring Table

Brand	Packaging & Labeling	Quality	MRP (Price in Rs)
Active Power	Good	Good	Rs 10/250g
Challenge	Good	Good	Rs 5.50/125 g
Super Padayappa	Good	Fair	Rs 5.50/125 g
Super Arasan	Good	Good	Rs 16/250g
Pon Vandu	Good	Good	Rs 16/250g
Chakkaravarthi Active	Good	Good	Rs 10/200g
Ghari	Good	Good	Rs 10/215g
Triplex XXX	Good	Good	Rs 19/250g
Nirma	Good	Good	Rs 3/84g
MDC (Mysore Det cake)	Good	Good	Rs 10/200g
Shashi	Good	Good	Rs 8/150g
Savall	Good	Good	Rs 6/125g
Chek	Good	Good	Rs 5/100G
More light Top Bright	Good	Good	Rs 5/100G
Tide	Good	Good	Rs 10/150 g
Rin	Good	Good	Rs 5/90g
Surf Excel	Good	Good	Rs 10/100g
Henko Stain Champion	Good	Good	Rs 10/150g

#### Detergent Soaps Bars – Scoring Table

Brand	Packaging & Labeling	Quality	MRP (Price in Rs)
Dr. Wash	Good	Good	Rs 20 / 185 g
Gold Washing bar soap	Good	Good	Rs 30 / 400g
NS bar Soap	Good	Good	Rs 20 /250 g
Sunlight	Good	Good	Rs16 / 150g
501 Bar soap	Good	Good	Rs 15 / 250g

#### WASHING EFFICACY TEST

For a practical and realistic evaluation, it is necessary to determine the actual performance of detergents.

**Detergency is measured by reflectance. In fact there is not much difference in detergency between low grade and high grade detergents.**

To determine the same Washing trials were conducted using the 23 detergent cake/soap specimens to assess their efficacy in removing the stains and also get the feedback from the volunteers who actually washed the clothes.

The clothes to be stained were first cut to a size of 250 mm x 250 mm, rinsed in water to remove starch, and dried. The stains chosen for trials were coffee, ink, mud, shoe polish, and ketchup. The stains were then applied to the dried cloths; these cloths were presoaked for half an hour and washed.

Subsequently the efficacy test was carried out for removing turmeric and coffee stains without presoaking the clothes.

Five panelists evaluated the efficacy of each detergent cake/soap in removing each type of stain by visually examining each washed and dried cloth and scoring them on a scale of 0 to 10 .

**Rating of the washing efficacy**

0 to 10	10.1 to 20	20.1 to 30	30.1 to 40	40.1 to 50	50.1 to 60	60.1 to 70	70.1 to 80	80.1 to 90	90.1 to 100
☒☒☒☒☒☒	☒☒☒☒	☒☒☒	☒☒	☒	*	**	***	****	*****

Detergent cake/Soap Washing Test Results on Different Stains – Efficacy in removing the stains

Brand/Stain	With Soak					without Soak	
	Coffee	Ink	Shoe Polish	Mud	Ketchup	Coffee	Turmeric
Active Power	****	*	☒☒	☒	****	****	☒☒
Challenge	****	**	☒☒	☒	****	****	☒☒
Super Padayappa	****	*	☒	☒	****	***	☒☒
Super Arasan	****	*	☒	☒	****	***	☒☒
Pon Vandu	****	**	☒	☒	****	***	☒☒
Chakkaravarthi Active	****	☒	☒☒	☒	****	***	☒☒
Ghari	****	*	☒	☒	****	***	☒☒
Triplex XXX	****	*	☒☒	☒	****	***	☒☒
Nirma	****	☒	☒	☒	****	***	☒☒
MDC (Mysore Detergent cake)	****	☒	☒☒	☒	****	****	☒☒☒
Shashi	***	☒	☒☒	☒	***	****	☒☒
Savall	****	☒	☒	*	****	***	☒☒
Chek	****	☒	☒	☒	****	***	☒☒☒
More light Top Bright	****	*	☒	☒	****	****	☒☒☒

Tide	****	☒	☒	☒	****	****	☒☒☒
Rin	****	☒	☒	☒	****	***	☒☒☒
Surf Excel	****	☒	☒	☒	****	***	☒☒☒
Henko Stain Champion	****	☒	☒	*	****	****	☒☒☒
Dr. Wash Soap	****	*	☒	*	****	****	☒☒
Gold Washing bar Soap	****	☒	☒	*	****	***	☒☒
NS bar Soap	****	☒	*	*	****	***	☒☒
Sunlight Soap	****	☒	*	*	****	***	☒☒
501 Bar Soap	****	☒	☒	*	****	****	☒☒☒

**Overall Efficacy in removing different stains (including all test specimens)**

Overall Performance	
Coffee	* * * *
Ink	*
Shoe Polish	☒
Mud	☒
Ketchup	* * * *
Coffee (Without Soak)	* * *
Turmeric (Without Soak)	☒☒

**Overall Efficacy in removing different Blood stains (without Soak)**

Overall Performance	
Human Blood	* * *
Chicken Blood	* * *

It is very clear from the test results that there is not much difference in the efficacy of the high priced high grade or the cheaper low grade detergent cakes.

Also the study shows presoaking before the water helps to remove the dirt and stain more easily.

The comparison of coffee stain removal with and without soaking proves this.

Brand/Stain	Coffee (without Soak)	Coffee (Soak)
Active Power	* * * *	* * * *
Challenge	* * * *	* * * *
Super Padayappa	* * *	* * * *
Super Arasan	* * *	* * * *
Pon Vandu	* * *	* * * *
Chakkaravarthi Active	* * *	* * * *
Ghari	* * *	* * * *
Triplex XXX	* * *	* * * *
Nirma	* * *	* * * *
MDC (Mysore Det cake)	* * * *	* * * *

Shashi	* * * *	* * *
Savall	* * *	* * * *
Chek	* * *	* * * *
More light Top Bright	* * * *	* * * *
Tide	* * * *	* * * *
Rin	* * *	* * * *
Surf Excel	* * *	* * * *
Henko Stain Champion	* * * *	* * * *
Dr. Wash	* * * *	* * * *
Gold Washing bar soap	* * *	* * * *
NS bar Soap	* * *	* * * *
Sunlight	* * *	* * * *
501 Bar soap	* * * *	* * * *

It is prudent to make cost effective choices instead of being carried away by the alluring and enticing advertisements. It is our common mind set to believe the costlier the product more effective it will be. The tests on detergent cakes have disproved this!!

Listed below is the price /100g of the soap for easy comparison of the prices

DETERGENT CAKE/SOAP	MRP (Price in Rs) per 100 grams
Active Power	4.00
Challenge	4.40
Super Padayappa	4.40
Super Arasan	6.40
Pon Vandu	6.40
Chakkaravarthi Active	5.00
Ghari	4.65
Triplex XXX	7.60
Nirma	3.55
MDC (Mysore Det cake)	5.00
Shashi	5.30
Savall	4.80
Chek	5.00
More light Top Bright	5.00
Tide	6.65
Rin	5.55

<b>Surf Excel</b>	<b>10.00</b>
<b>Henko Stain Champion</b>	<b>6.65</b>
<b>Dr. Wash soap</b>	<b>10.80</b>
<b>Gold Washing bar soap</b>	<b>7.50</b>
<b>NS bar Soap</b>	<b>8.00</b>
<b>Sunlight</b>	<b>10.65</b>
<b>501 Bar soap</b>	<b>6.00</b>