

Detergents

Soaps are very good washing agents to get rid of/dissolve/remove fatty dirt. But they also have disadvantages, e.g. they are alkaline and do not work in hard water.

So scientists have developed **very special washing agents (detergents)** for very special uses, e.g. alkali-free soaps, washing powders, emulsifiers...

Composition of detergents:



up to 15 % washing-effective substances for cleaning action (tensides)

up to 50 % water softening agents

up to 25 % bleaching agents

up to 10 % alkalies

up to 10 % accessory agents, enzymes, optical brighteners etc.

Surface-active agents ("surfactants"; Tensides): These are substances that work on the same basis as soaps. Surfactants, however, do not have the same disadvantages as soaps!

Water softeners: Sasil; Without water-softening substances, precipitating insoluble salts (lime) would settle on the heating units (and eventually cause them to blow) when we heat hard water. Also, sharp-edged crystalline deposits would settle on the fabric and dirty or even tear the garment.

Years ago, people used phosphates as water softeners which unfortunately acted as fertilisers in ground water at the same time (eutrophication).

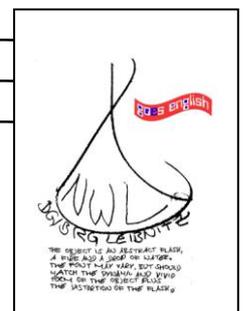
Bleacheners: Sodium Perborate releases atomic oxygen at elevated temperatures, and thus destroys coloured stains via oxidation.

Enzymes: Small volumes of enzymes are added in order to remove dirt containing protein (milk, blood...).

Optical brighteners: They make your laundry "whiter than white". They have the property of converting invisible ultra violet light (from the sun) into visible blue light. This reflection of more light than normal makes the clothes look brighter than they actually are.

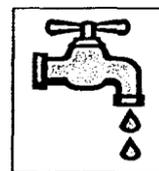
Auxiliary agents: foam-control agents, corrosion protection, scents etc.

Any kind of washing process pollutes the environment. How can we keep pollution as low as possible?



E 1 : Let's examine the **water hardness** of your local tap water with a test-kit:

Result: The hardness of my local tap water is _____ °d. Therefore, we may call it _____ water.



E 2: We analyse some washing powder. Please enter your observations into the chart:

	Observation	Evidence for
Put about 1 cm of washing powder in a test tube and add a few millilitres of diluted hydrochloric acid (HCl). Dip a glowing wooden stick into the tube!		
Put a little washing powder on a magnesia stick and bring it into the flame of your burner!		
Make a solution of washing powder and determine the pH-number.		
Add a few millilitres of diluted sulphuric acid to the washing powder solution. Finally, add 1 ml of Potassium permanganate!		

E 3: Action of bleachers:

Heat (DO NOT cook) some perborate solution in a test tube. Then add some solid perborate and immediately dip a glowing wooden stick into the tube.

Observation:

Repeat the test with some washing powder.

Add a drop of ink to a perborate solution and heat!

E 4: Optical Brighteners:

Dip half a tissue in some washing powder solution and look at the tissue in UV-light.

Observation: _____

E 5: Let's make our own tooth paste:

First, mix 10 g CaCO₃ with 2.5 g dry medicinal soap in a mortar. Then, add 1g peppermint oil, 6g glycerol und 6 ml water! Finally, stir well; fill in a labelled container and use!