THE EFFECT OF PREPARED SAMPLES OF SEQUESTERING AGENTS AND CHELATING SURFACHTANTS ON MODEL WASHING

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Abstract

It is well known that water plays an irreplaceable role in textile industry. Any textile production is dependent on water and sufficient supply of water of good quality and it is a basic precondition for textile plants. Water is almost the only solvent which is used in textile industry for washing and dissolution of finishing agents, dyes and sizes and it also is used for steam production.

An adverse effect of alkaline earth metal ions (Ca$^{2+}$, Mg$^{2+}$), which make for water hardness and also the effect of heavy metal ions (Fe$^{3+}$, Cu$^{2+}$, Mn$^{2+}$) on fundamental processes of textile industry has generally been well known. An important property of sequestering agents is disabling of CaCO$_3$ precipitation. This slightly soluble compound precipitates at high temperature as limescale on equipment and may affect its functioning, temperature regime etc. Besides of this, CaCO$_3$ can deposit on treated textile causing a rough handle. It also affects the efficiency of textile auxiliary agents and the run of other textile finishing processes. Besides CaCO$_3$, calcium silicate can also have a negative effect which is created if water glass is present. Therefore the usage of sequestering agents is recommended even in pre-treatment. Sequestrants are the most frequent agents used as components of detergents, not only in areas of textile finishing (mainly in pre-treatment) but also in further areas, e.g. dyeing cellulose materials and water softening. Sequestering agents are generally compounds creating chelates, which are specific kinds of complex compounds surrounding the cation. [1,2]

Prepared samples of sequestering agents and chelating surfactants were determined under the conditions for model washing. The chosen detergent consisted of an anion-active and a non-ionogenic surfactant, and of further common components, such as water glass (soln. of sodium metasilicate), carboxymethylcellulose, sodium carbonate, and sodium sulphate [3]. The prepared samples were added into this basic mixture when the washing filling had contained 7 g/l model washing agent. The washing material was then a portion of 20 grams of cotton textile, at a bath ratio of 1:20.

After 20× repeated washing in hard water of 22 °dH (given in German degrees of hardness) for 30 min at 90 °C, the content of ash and Ca$^{2+}$ ions were determined. After 20× repeated washing, the textile was incinerated in a platinum crucible and...
the amount of calcium was evaluated in ash. The titration was accomplished with Chelaton III (13.270 g/l) following the recommended procedure [4]. Finally, the image of fabric after the model washing was evaluated by the means of imaging with a scanning electron microscope. The washing with model detergent without sequestering ingredients increased the content of inorganic deposits in cotton textile. The content of ash and calcium in textile is relatively high (Fig.1). With an addition of samples prepared with sequestering effect the result was improved (Fig.2).

**Figure 1.** Picture of the fibre surface of cotton textile washed without the sequestering agent with a model detergent (enlargement 500×)

**Figure 2.** Picture of the fibre surface of cotton textile washed with the prepared sequestrating agent (enlargement 500×)
References


