Detergents Committee Reports Progress

*Character and Scope of Committee's Activities Described, Although No Recommendations Offered at Present**

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DURING the past several years, we have been investigating washing processes. This effort has been directed only toward developing a test which shall properly evaluate and compare detergent materials applicable to laundry practice. The problem has proved to be a difficult one, owing to the large number of factors which enter into cleansing processes.

When one considers the wide variety in fabrics, the still greater number of kinds of dirt, the differences due to time, mechanical action, temperature, and concentration of liquids, the complexity of the matter becomes evident. Reduction of these variable factors to a minimum has been the first objective. Selection of a single uniform type of cloth, and of standard grades of pure soap, was comparatively simple. Not so, however, have been the questions relating to the character of the soil, the methods of applying it the treatment of the soiled cloth, and the judging of the results.

Character of the Soils

DURING the earlier part of the work, it was felt that a soiling material should resemble many types of ordinary dirt in containing a pigment and an oily material, either animal, vegetable or mineral. It was soon realized, however, that any given oil or grease could not be depended on to be identical at different times and places. Starchy materials were tried, but were open to the same objection as the oils. The trend of sentiment recently has been in favor of simple pigments, not because any one of them would closely represent ordinary dirt, but because of their constancy. This feeling of preference has been strengthened by the fact that the really difficult part of clean washing is in removing the last traces of pigments, which hold on long after all signs of oily or starchy vehicles have passed away.

Two pigments have received more attention than any others—carbon black and raw umber. Both of these have sufficient coloring power and are closely related to materials encountered in laundry practice. The former is open to the objection that many commercial grades do not disperse well in pure water, and so give a spotted effect instead of an even color when applied to cloth. Moreover, it is very difficult to remove the last traces of a well-dispersed black.

Methods of Soiling

WHEN oily and starchy soiling materials were being tried, attempts were made to apply them to cloth by printing or by suspending in a mobile vehicle such as carbon tetrachloride. These were not entirely satisfactory. Two methods of applying simple pigments in pure water have been found to give fairly even colors. In one, a suspension of about 5 gm of umber in 100 ml of water is made by stirring in the pigment. A strip of cloth, say 5 x 12 inches, is wet with water, stirred for a moment in the umber suspension, and passed between the rolls of a household clothes-wringer. The treatment is then repeated until the color of the cloth no longer changes. This is effected in 3 or 4 passes. The cloth is then shaken by hand with successive portions of water until the liquid comes away clear.

If a lighter shade is desired, it is better to have less umber in the suspension, and repeat the treatment until the desired color is attained.

The second method involves the use of the Launderometer, to be described under Methods of Washing. A piece of cloth, 3 x 5 inches, is folded once and sewed along the edges to

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form a bag of 3 x 2½ inches. Inside the bag are placed 50 balls of Monel metal (described below). Fifty more balls, the bag, and a suspension of 1 gm of umber in 100 ml of water, are placed in a jar and rotated for an hour with the temperature held at 60° C. It is thought that this method can be depended on to produce uniform results, time after time.

Methods of Washing

IN considering these, it has been recognized that many factors enter into the washing process. Detergents may operate in part by emulsifying oils, altering interfacial tensions, and in other ways. Determination of any one or more of these effects does not give the desired answer. The committee has felt that the only convincing test of detergent power is one based on the results of actual washing.

Many of the variable factors in the washing process have been brought under control in the Launder-ometer, made by the Atlas Electric Devices Co. of Chicago. This machine has a metal tank with rounded bottom, supported in an open framework. Through the middle of the tank extends a shaft, bearing 16 threaded posts. By means of clips and wing-nuts, twenty "lightning" jars may be attached. A motor with speed-reducing mechanism, rotates the shaft at about 40 r.p.m. The tank is filled with water to about the level of the shaft, when in use. Heat is applied by a perforated-pipe gas-burner underneath the tank. Rubber or metal balls may be placed in the jars to increase the mechanical action. Balls of Monel metal, ¼ inch in diameter have been found satisfactory.

The temperature, time of contact with the detergent solutions, their concentration and relative volumes, and the amount of mechanical action, within limits, can all be arranged at will. A temperature of 60° C is convenient to work with. There may well be a doubt, however, as to whether any one temperature is best for all detergents. To avoid the development of too much pressure, with consequent danger of leakage, it is well to heat the solutions before placing them in the jars. When a flat piece of cloth is used, it sometimes attaches itself to the lid of the jar and thus escapes the intended agitation. To avoid this, the piece may be made into a bag, as described above. An objection to this is that the seams, and parts close to them, do not wash as rapidly as the main part of the bag.

Judging the Results

EARLY in the work of the Committee it was thought that a numerical statement of the relative efficiency of two or more detergents might be obtained by noting the number of washings required to produce a given shade. A color chart was devised, for comparison. The results by several experimenters did not agree well enough to encourage adoption of this method. Another plan was to print the color in stripes across the cloth. Washing was to be continued until the marks ceased to be visible. Difficulties were encountered in judging when the stripes actually disappeared.

These two methods serve as illustrations of two different standards of judgment. To some it seems that, since clean washing is what is demanded commercially, perfect cleanness should be attained in any evaluation test. Others hold that practical value is shown better by the results secured during the early stages of washing. There is some hope that these views may be harmonized by plotting the early changes and from them deducing when perfect cleannness would be reached if washing were continued long enough. As worked out thus far, it has been found that the last traces of pigment persist with remarkable tenacity. To remove them an expenditure of time is required which some consider excessive and impractical. It has also been found very difficult to decide just when the last traces have disappeared. A help in this direction has been the use of an unsoiled blank which receives just the same treatment, in its own jar, as the soiled specimen. The end is reached when the two become indistinguishable. Even this is not as easy as might be expected. An interfering feature is the fact that detergents do not all give the same shade of white on unsoiled cloth. The last traces of pigment may harmonize better with one blank than with another.

If judging is done during the early stages of washing, some form of colorimetric device seems to be essential. It would also be of value in determining the end-point, if complete cleanness or agreement with blanks, becomes the accepted standard of judgment. Members of the Committee have used the Ives tintometer, the Taylor photometer as modified by Rhodes, and other instruments, in judging the specimens of cloth. At present, no form of apparatus has been adopted.

From the foregoing it will be clear that the problem is far from solved. It is felt however, that progress has been made and that further cooperative effort may lead to valuable results.