Detergents for Home Laundering
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Issued July 1956
Slightly revised October 1963

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price 5 cents
Detergents
for Home Laundering

Good results in laundering depend largely on the correct use of detergents—both soaps and synthetic detergents—in relation to the nature of the fabric being washed and the amount and kind of soil to be removed. Stores offer many cleaning agents of these kinds, but little specific information is available as to their suitability for different kinds of fabrics and various types of soilings.

To help supply such information, the Clothing and Housing Research Division, Agricultural Research Service, United States Department of Agriculture investigated the ability of detergents, of types widely available for household use, to remove soil from various kinds of fabrics under different conditions. It also investigated the effects of the detergents on certain properties of the fabrics. The results of these investigations are given in the following pages.

Detergents available to homemakers

SOAPS

The detergent probably most familiar to everyone is soap, made from fat and lye. As soap dissolves in water, the solution becomes alkaline; and any acid present from soiled garments reacts with the soap, thus reducing its effectiveness. To provide greater alkalinity to counteract both this acid and the effect of minerals in hard water, manufacturers often “build” their soaps with alkaline products. Homemakers may purchase either “light-duty” (unbuilt) or “heavy-duty” (built) soaps in retail stores. Both types are alkaline in solution.

A partial list of brands of laundry soap on the retail market in 1963 includes—

<table>
<thead>
<tr>
<th>Light-duty</th>
<th>Heavy-duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivory Flakes</td>
<td>Duz</td>
</tr>
<tr>
<td>Ivory Snow</td>
<td>Instant Fels Napthla</td>
</tr>
<tr>
<td>Lux Flakes</td>
<td>Rinso</td>
</tr>
</tbody>
</table>

1 The mention in this publication of any commercial product does not imply its endorsement by the United States Department of Agriculture over other products not named.

Unbuilt. Unbuilt soap products consist of 93 to 97 percent soap. They also contain a little moisture (water), a small amount of sodium chloride (common salt), and sometimes a “brightener” (a fluorescent dye) for whitening clothes. Such a dye becomes fixed on fabrics during washing; then in sunlight, the dye gives off a blue fluorescence which makes white fabrics a brighter, bluer white.

Unbuilt soaps are intended for laundering fine fabrics and lightly soiled garments (lingerie, stockings, blouses). They are recommended for cotton, linen, and mammade fibers; they are relatively safe for most dyes and are mild on hands.
Built. Built soaps contain at least 50 percent soap and varying amounts of alkaline chemicals. The chemicals, or "builders," increase sudsing, improve the cleaning action of the soap, and help to soften hard water so that less soap scum forms. Chemicals used as builders include sal soda (washing soda), borax, sodium silicate (water glass), trisodium phosphate, and various other phosphates.

Common brands of built soap contain from 55 to 80 percent soap, from 10 to 30 percent builder, about 5 percent moisture, and usually a fluorescent-dye brightener.

Built soaps are general-purpose soaps for the family wash and for laundering heavily soiled cloth—rugs, grimy play clothes, and greasy overalls. They are less mild on hands and may be harder on some dyes than the unbuilt soaps. The increased alkalinity makes them hard on wool and silk.

Other mixtures of soap and builders are soap powders or washing powders which contain only 10 to 15 percent soap. These should not be confused with powdered soaps, which are true soaps in powdered form instead of bar, chip, flake, or bead. Soap powders are sometimes used for laundering but more often for dishwashing.

SYNTHETIC DETERGENTS

Synthetic detergents (often called "syndets") are made from such materials as petroleum, and animal and vegetable fats and oils, by chemical processes more complicated than the reaction of fat and lye which makes soap. The resulting chemicals are complex; each has a value as a cleaning agent, distinct and different from that of the others. The synthetic detergents are neutral in solution, and they do not depend on alkalinity for their cleaning ability.

Synthetic detergents dissolve readily in water, hot or cold, soft or hard. They do not form scum in hard water. Their pronounced ability to emulsify oil and grease is an advantage in getting clothes clean. In hand laundering, however, this property may become a disadvantage—the detergents tend to remove oil from the skin and so may be drying, or even irritating, to the hands.

Some synthetic detergents form suds readily, like soap, whereas others clean with little or no suds. Many of them contain large amounts of neutral salts—sodium sulfate and sodium chloride—which are byproducts of the manufacturing process. These salts are somewhat helpful in cleaning, but they have no effect in softening water as do the alkaline salts and the complex phosphates used as builders.

Like soaps, synthetic detergents packaged for the retail trade come in two types—light-duty (unbuilt) and heavy-duty (built) in liquid, powdered, and tablet forms. Some powders are also available in pre-measured packages. A partial list of brands of synthetic detergents on the retail market in 1963 includes—

### Light-duty

- Chiffon (liquid)
- Dreft
- Gentle Fels (liquid)
- Glim (liquid)
- Ivory (liquid)
- Joy (liquid)
- Lux (liquid)
- Octagon (liquid)
- Swan (liquid)
- Thrill (liquid)
- Trend (liquid and powder)
- Vel (liquid and powder)
### How a Detergent Works

The essential steps in cleaning a fabric are wetting the material and the dirt, removing the dirt from the fabric, and holding the removed dirt in suspension—that is, keeping it from redepositing or settling back on the fabric before it is rinsed away.

Water alone has little cleaning ability. The addition of a soap or other detergent increases both its wetting power and its suspending power. When soiled fabric is agitated during the washing process, oily dirt is broken up into small particles, each of which is surrounded by a film of the detergent solution. As the dirt is lifted off the fabric, the detergent holds it suspended in the solution so that it does not settle back and make the cloth look gray.

### Using Detergents

**SUING THE DETERGENT TO THE WATER**

The type of detergent to use depends in part on whether the water for washing is soft or hard.

In soft or softened water, soap—either unbuilt or built—does an excellent job of cleaning and is economical to use. Hard water wastes soap. The soap reacts with the "hardness" minerals—calcium and magnesium compounds—to form soap scum or curds that stick to washer parts and settle on clothes in gray specks that are almost impossible to remove.

If used in sufficient amounts, synthetic detergents cause no such

<table>
<thead>
<tr>
<th>Heavy-duty</th>
<th>High-sudsing</th>
<th>Low-sudsing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Breeze</td>
<td>Ad</td>
</tr>
<tr>
<td></td>
<td>Cheer</td>
<td>All (liquid, powder, and fluffy)</td>
</tr>
<tr>
<td></td>
<td>Dynamo (liquid)</td>
<td>Dash</td>
</tr>
<tr>
<td></td>
<td>Duz</td>
<td>Salvo (tablets)</td>
</tr>
<tr>
<td></td>
<td>Felso</td>
<td>Vim (tablets)</td>
</tr>
<tr>
<td></td>
<td>Oxydol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rinso Blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silver Dust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Super Suds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surf</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tide</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wisk (liquid)</td>
<td></td>
</tr>
</tbody>
</table>

**Unbuilt.** Unbuilt synthetic-detergent products may contain only 30 to 40 percent detergent. In addition, the powdered products have from 50 to 60 percent neutral salts; the liquids may be 50 percent water. Both contain a fluorescent brightener.

Like unbuilt soaps, unbuilt synthetic detergents are intended for washing fine and lightly soiled fabrics. Their efficiency with heavily soiled clothes is limited. Because they are nonalkaline in solution, they are safe for dyed fabrics and for wool and silk which an alkali might harm.

**Built.** Built synthetic detergents, like built soaps, contain alkaline salts that increase their cleaning ability. These added salts make the products alkaline in solution. The built synthetics also contain a fluorescent brightener and an additional product, such as carboxymethyl cellulose, that helps prevent redeposition of soil.

Manufacturers recommend built synthetics as general-purpose detergents for washing heavily soiled clothes. Both high-sudsing and low-sudsing products are available. The latter are produced especially for use in certain types of automatic washers where high suds interfere with mechanical action.
When hard water causes a laundering problem, the homemaker may either select a synthetic detergent, or soften the water and use soap. In the latter instance, it pays to soften both the wash water and the water for the first rinse. A water-softening system installed in the water-supply line is a great convenience. Or a water-softening chemical may be used.

**Types of softeners.** Water-softening chemicals, packaged for the retail market under various trade names, are of two types. Some precipitate, or settle, the water-hardness minerals. Others, the nonprecipitating type, keep the minerals in solution but in such form that they cannot cause soap scum. Packaged products may contain only one water-softening chemical, or they may be mixtures of various chemicals.

A partial list of water softeners on the retail market in 1963—

<table>
<thead>
<tr>
<th>Precipitating type</th>
<th>Nonprecipitating type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climalene</td>
<td>Calgon</td>
</tr>
<tr>
<td>Sal soda</td>
<td>Oakite</td>
</tr>
</tbody>
</table>

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**SUITING THE DETERGENT TO THE FABRIC**

What the cloth is made of and the type of dye used also influence the choice of a detergent.

**Wool and silk.** Wool and silk are damaged by alkali. Therefore for the best conservation of fabrics made wholly or in part of these fibers, a nonalkaline detergent—one of the unbuilt synthetic detergents—is preferred. Although they are not quite so effective in removing soil as are built synthetics and soaps, they are less harmful to wool and silk fibers and do a satisfactory job of cleaning if the fabric is not grimy. They are mild on most dyes, too.

The degree of shrinkage in wool fabrics in laundering depends more on the agitation during the washing process than on the kind of detergent used. In the laboratory study, differences in shrinkage due to the detergent were apparent only when agitation was severe; then the built synthetic deter
gents caused slightly more shrinkage than the unbuilt synthetics or the unbuilt or built soaps.

**Cotton, linen, and manmade fibers.** Fabrics of cotton, linen, and manmade fibers (acetate, Acrilan, Dacron, Dynel, nylon, Orlon, and rayon) are more resistant to alkalies than are wool and silk and therefore are not readily affected by the alkalinity of detergents.

For white cloth of these fibers, the amount of soil is the best guide in choosing the detergent to use. For lightly soiled fine fabrics, unbuilt products are recommended; for the regular wash and heavily soiled fabrics, the built products are more effective.

In laundering colored fabrics, the kind of dye needs to be considered in deciding on the type of detergent to use. Some fabric dyes, especially the vat dyes, are relatively fast to washing. Others may be affected by alkaline detergents—the colors often run and fade. If no information is available as to the colorfastness of a fabric, it is safest to use an unbuilt synthetic detergent.

In the laboratory study of cottons washed in soft-water solutions, both the unbuilt and built soaps were slightly more effective in removing soil than were the unbuilt synthetic detergents. Some of the high-sudsing built synthetics, however, removed as much soil as the soaps. The soaps removed about one-third more soil in hot water (140°F.) than in warm (100°F.). The synthetic detergents also were generally more effective in hot water. In hard water, both unbuilt and built synthetics were more effective than the soaps.

When fabrics of manmade fibers were washed under similar conditions, the order in which the detergents ranked in soil-removing ability was much the same with the different fabrics: the unbuilt and built soaps and the high-sudsing built synthetic detergents in soft water were slightly more efficient than the unbuilt or the low-sudsing built synthetics. All the detergents removed more soil from the acetate and nylon samples than from the others.

The Acrilan, Dacron, Dynel, nylon, and Orlon fabrics showed little shrinkage; and for all the fabrics of manmade fibers, differences in shrinkage due to the detergent were small. Laundering these fabrics 75 times caused only slight loss in strength. Most of the fabrics showed no significant change in whiteness due to repeated washings with any of the soaps or synthetic detergents. The Orlon test samples yellowed slightly.

**SUITING THE DETERGENT TO THE WASHER**

In machine washing, the kind of detergent to use depends somewhat on the kind of washer. Some machines, because of the washing action, give much better results with low-sudsing than with high-sudsing detergents. For information about what is recommended for your washer, consult the manufacturer's directions.

The amount of detergent needed depends on the volume of water, the quantity of clothes being washed, the amount of dirt in the clothes, the hardness and temperature of the water, and the type of detergent.

**Soaps.** When washing with soaps, enough should be used to maintain good suds. The more soiled the
clothes, the more soap will be needed. Hot water requires less soap than warm water to do the same cleaning job. Specific directions are sometimes given on the package.

**Synthetic detergents.** When washing with synthetic detergents, the volume of suds is not necessarily an indication of the amount of detergent to use. Some synthetics clean with little or no suds. Others form suds readily—even when the amounts are too small to clean well. Usually, the manufacturer recommends how much to use. Less synthetic detergent is generally required in hot water than in warm.

### Pointers on detergents

The recommendations that follow take into account the various factors to be considered in the use of detergents in home laundering—how soiled the fabric is, the kind of fiber of which it is made, the colorfastness of the dye, and whether the water is soft or hard. No one type of detergent is best on all counts. In deciding what type to use, the homemaker may have to weigh one consideration against another. For example, if a heavily soiled wool garment is to be washed, which is more important—to remove the greatest possible amount of soil, or to guard against possible damage to the fabric?

**For laundering lightly soiled fine fabrics**—

Use unbuilt soaps or unbuilt synthetic detergents.

**For general laundering and for heavily soiled fabrics**—

Use built soaps or built synthetic detergents.

**For fabrics of cotton, linen, and manmade fibers**—

*If white or colorfast*, use either soaps or synthetic detergents—unbuilt for lightly soiled materials, built for those more heavily soiled.

*If not colorfast*, use unbuilt synthetic detergents.

**For wool and silk, and for blends of these with other fibers**—

Use unbuilt synthetic detergents.

**In soft water**—

Both soaps and synthetic detergents, unbuilt or built, are suitable.

**In hard water**—

Built synthetics are the most efficient. Or soften the water and use soap.

**If fabrics and colors will stand it**—

Wash in hot water instead of warm, since detergents are generally more efficient at high temperatures. (Remove stains first, for some are set by hot water.)

**When using soaps**—

Maintain a good suds.

**When using synthetic detergents**—

Use the amount recommended by the manufacturer. Some synthetics are high-sudsing; others clean with little suds. The low-sudsing types are especially suited to certain designs of washing machines.