The object of this experiment is to determine the effectiveness of standard cleaning materials.

Modern detergents claim to be effective in removing stains from fabrics. These detergents may contain additives such as bleach alternatives, enzymes, or additional substances to not only clean, but to preserve the appearance of your clothes. In some instances, individuals may desire to use a standard detergent without additives and add additional additives as they choose. Some common, additional additives are listed in Table 1.

<table>
<thead>
<tr>
<th>Additive</th>
<th>Composition</th>
<th>Product names</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine bleach</td>
<td>Sodium hypochlorite, NaClO</td>
<td>Clorox bleach</td>
<td>Stain remover for whites</td>
</tr>
<tr>
<td>Non-chlorine bleach</td>
<td>Sodium percarbonate (also called tetrasodium hydrogen peroxide dicarbonate), 2Na2CO3·3H2O, Sodium carbonate, Na2CO3</td>
<td>Oxi-Clean</td>
<td>Stain remover for colors</td>
</tr>
<tr>
<td>Non-chlorine bleach</td>
<td>Sodium carbonate, Na2CO3, Sodium perborate monohydrate, Na2B4O7·H2O, Sodium silicate, Na2SiO3, Polyethylene glycol trimethylnonylether (a surfactant)</td>
<td>Clorox 2</td>
<td>Stain remover for colors</td>
</tr>
<tr>
<td>Washing soda</td>
<td>Sodium carbonate, Na2CO3</td>
<td>Washing soda</td>
<td>Laundry booster</td>
</tr>
<tr>
<td>Borax</td>
<td>Sodium borate decahydrate, Na2B4O7·10H2O</td>
<td>20 Mule Team Borax</td>
<td>Laundry booster</td>
</tr>
</tbody>
</table>

Table 1. Some common laundry additives

Although many detergents do live up to the claims by their manufacturers, variations in washing at home or in a laundry may affect results. Some of these variations include the hardness of the water in your area, the actual temperature of the wash water, and the type and condition of the washing machine.

Materials Needed

- 2 pieces of cotton material 12 x 12 inches (30 x 30 cm)
- Pencil
- Ruler. 12-inch
- Staining materials: (from the following list)
  - Make-up
  - Lipstick
  - Red Wine/grape juice
  - Ketchup or tomato sauce
  - Mustard
  - Egg
  - Butter
  - Baby food or jelly/jam
  - Chocolate or cocoa
  - Tea or coffee
  - Soy sauce
  - Grass or plant leaves
  - Clay or soil (mud)
  - Grease or used engine oil
  - Ink (ball point pen)
**Procedure**

Using a pencil draw a grid on the cloth approximately 3 inches (7 cm) square.

Leave the upper left-hand square empty.

The staining material will be placed in small plastic cup with brushes, as needed.

Place stains in each square according to the chart below:

<table>
<thead>
<tr>
<th>Cut off corner</th>
<th>Make-up</th>
<th>lipstick</th>
<th>grass/plant leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>clay/soil</td>
<td>Engine oil</td>
<td>Butter</td>
<td>Soy sauce</td>
</tr>
<tr>
<td>ink</td>
<td>Tea/coffee</td>
<td>Chocolate</td>
<td>Egg</td>
</tr>
<tr>
<td>baby food</td>
<td>Ketchup or tomato sauce</td>
<td>mustard</td>
<td>red wine or grape juice</td>
</tr>
</tbody>
</table>

Cut off the corner of the cloth to provide a reference alignment.

Allow the cloth pieces to dry.

Wash the cloth pieces as follows:

- One in laundry detergent. You may add this to any standard load of wash. **DO NOT PRE-TREAT ANY STAINS BEFORE WASHING**

- One in laundry detergent with any additives such as a chlorine bleach, a non-chlorine bleach such as Clorox-2 or Oxi-clean, or any other additive you normally use. You may add this to any standard load of wash. **NOTE: You may use a detergent with bleach alternative, OR, if you do not use any additives, use a second brand of detergent OR pre-treat stains with detergent or a product such as Spray and Wash or Shout.**

Save the cloth pieces and attach them to your final report.
Evaluation of Detergents and Cleaning Aids

Data and Results

Name_________________________________________________   Course/Section_________________

Partner’s Name (If applicable) ___________________________________ Date ____________________

Where do you do your wash?

☐ At home (your own machine)   ☐ Laundry room (apartment or dormitory)

☐ Laundromat   ☐ Other: ________________________________

What is the brand of the washing machine you used? ________________________________

The washing machine is a     ☐ Top loader     ☐ Front loader

Sample 1

What detergent did you use? _____________________________________________________________

What were the water temperature(s) in the wash and rinse?

Wash temperature:     ☐ Hot     ☐ Warm     ☐ Cold

Rinse temperature:     ☐ Hot     ☐ Warm     ☐ Cold

Did you use a second rinse?     ☐ Yes     ☐ No

Which stains were removed? _____________________________________________________________

Which stains were only partially removed? ________________________________________________

Which stains were not removed? _________________________________________________________

Sample 2

What detergent did you use? _____________________________________________________________

What additive did you use? _____________________________________________________________
What were the water temperature(s) in the wash and rinse?

Wash temperature:  □ Hot  □ Warm  □ Cold
Rinse temperature:  □ Hot  □ Warm  □ Cold

Did you use a second rinse?  □ Yes  □ No

Which stains were removed? ___________________________________________________________
_____________________________________________________________________________________

Which stains were only partially removed? _______________________________________________
_____________________________________________________________________________________

Which stains were not removed? _________________________________________________________
_____________________________________________________________________________________

QUESTIONS:

1. Was the detergent effective at removing stains?

2. Did laundry additives improve the stain removal?

3. Which stains are the most difficult to remove from cloth?