

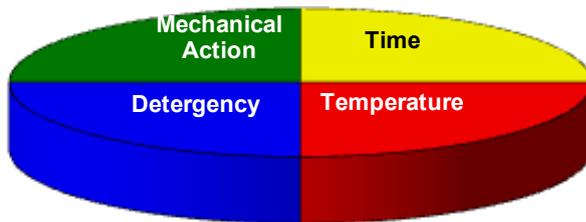
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INTRODUCTION TO DETERGENCY AND AVOIDANCE OF GREYING

Detergency is the name given to processes which remove soiling from an object or surface. Washing is a form of detergency as is dry-cleaning. Substances that assist in the process of cleaning, or removing soil, are called detergents.

Detergency is essentially a physical process, that is, a process which depends upon physical (external) properties; chemical reactions are not primarily involved. There are 4 principle elements – or Mechanisms – that take place in any cleaning process:



Cleaning processes are generally carried out in a liquid medium as this aids the detachment and dispersal of the soiling; in washing, the liquid is water, in dry-cleaning, it is an organic solvent, usually Perchloroethylene.

The surface to be cleaned, albeit a 'hard surface', e.g. Floors, walls, etc., or textiles, e.g. Clothing, carpets, upholstery, etc., are collectively called the 'substrate'.

In any successful cleaning process, the following must take place:

- a) The soil is detached from the surface of the substrate being cleaned;
- b) The loosened soil is removed from the vicinity of the substrate and dispersed into the liquid;
- c) The soil that has been transferred to the liquid is prevented from returning to the substrate.

Amplification of these points

a) Detaching the Soil from the surface of the Article

How easily the soil is removed in a cleaning process depends upon :

- i) the nature of the surface to be cleaned
- ii) the nature of the soiling to be removed
- iii) the attachment between the soiling and the surface of the article.

It is much easier to clean a very smooth surface than a rough one. For instance, an object with a very smooth surface such as a vitreous enamel oven door, or a sheet of glass, can often be cleaned satisfactorily by wiping with a damp cloth, but one could not expect to clean clothes in this way. Soiling is unable to attach itself firmly to a very smooth surface and so it can be removed easily. In the example given, the soiling transfers to the cloth, where it is held more firmly. It is more difficult to get the cloth clean again!

All textile fabrics have a rough surface even though some may appear, at first sight, to be quite smooth. Mostly, they are made from numerous individual fibres which are twisted together to form yarns, which are then interlaced so that the final surface is far from smooth and even. The individual fibres themselves may also have a rough surface.

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Most of the soiling present on our clothes consists of very small dark coloured particles and grease. Many, but not all of the solid particles, are attached to the textile by a thin film of grease. Some water-soluble substances may also be present. Some of this soiling is removed simply by being dissolved in the cleaning liquid, (i.e. the grease in dry-cleaning solvent, or water-soluble substances in water). Thus solubility plays some part in detergency. Most of the dirty appearance is, however, due to the presence of the solid particles that are insoluble in either organic solvents or water.

When the film of grease is removed (by solubility in dry-cleaning solvent, or by the emulsifying/saponification action of soap/detergent and water in washing/wet cleaning), the particle is released from the surface of the textile. The use of detergents in the cleaning process also assists in releasing the soiling particles from their attachment to the non-soluble surface of the textile.

b) Moving the soil from the vicinity of the article into the liquid

Having freed the soiling particles, they must be removed from the surface of the textile and dispersed throughout the cleaning liquid. This is achieved by detergent action and also by mechanical action, usually some form of agitation. For this reason, some form of mechanical action is necessary in all cleaning processes. If a soiled fabric is simply placed in an organic solvent or soap/water and allowed to remain quite still, not much soiling would be removed, although its attachment to the fabric may be broken down.

c) Prevention of re-deposition of the soil particles on to the textile

The soiling particles transferred from the textile to the cleaning liquid are dispersed throughout it by mechanical action. These particles must be prevented from finding their way back to the textile. The re-deposition of soiling in this way, during a cleaning process, is known as 'Greying' because it gives the materials a dingy or grey appearance. In these circumstances, the soiling is, to some extent, being spread out instead of being removed completely. Detergents help to prevent the soil being re-deposited, particularly in water-based processes, by aiding its suspension throughout the liquid.

Greying can also be minimised by removing the dirty cleaning liquid as quickly as possible and replacing it continuously with clean liquid. Care must also be taken to remove, from the textile, the soiling that has dissolved in the cleaning liquid, as well as any detergent used and any insoluble soil which may have remained suspended in the liquid at the end of the process. This applies to both washing and dry-cleaning processes.

Re-deposition of soiling can be prevented, primarily by using sufficient water to dilute the soiling to a level that allows detergents and alkalis to work effectively. This process is controlled, by having correct dip levels and the correct number of stages, within the wash process. Afterwards as much wash liquid as possible must be removed (for example by hydro-extraction), to remove the small amount of dirty liquid which remains within the textile. This rinsing must be carried out efficiently. Any substances left behind on the garments will cause discoloration and may give rise to objectionable odours.

All cleaning processes should be ended with thorough rinsing.