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DETERGENCY AND CLEANING SYSTEMS

The term detergent is derived from the Latin 'deta geri' which roughly translated means '**to make clean**'. Today, detergents have come a long way since soaps were first developed and we now have a very large range of products that over the years have become increasingly specific. For example, in the domestic market we now have detergents for white-work, for coloureds, for black garments and silks etc, not to mention the wide range of specialised products used throughout industry. One has only to look at the range of cleaning products designed for cleaning the interior and exterior of cars to get some idea of the wide range of detergent products that are now available.

As professional cleaners we are of course mainly interested in the detergent products we use in our business. These fall into two main groups, aqueous detergents and dry cleaning detergents. Aqueous and dry cleaning products have to perform rather different functions to enable them to enhance the cleansing properties of water and dry cleaning solvents. Let us first look at why we need detergents in wet cleaning and washing.

WETCLEANING AND WASHING

Starting around 1995 the cleaning industry, largely because of environmental pressures on dry cleaning, began to further develop the process of wet cleaning. Although wet cleaning had been in use long before J. Baptiste Jolly came on the scene in the 1820's, it has not been used extensively by dry cleaners and those that did employ wet cleaning processes for the most part used hand cleaning techniques in conjunction with low titre soaps. These methods were of course labour intensive and time consuming. Unit shops have for many years used hand washing and domestic washing machines for processing the small amounts of work that needed a water based process. This however should not be confused with wet cleaning which can be defined as a cleaning process using cold or tepid water with very low levels of mechanical action and employing specialised detergents.

Most of today's washing detergents are highly complex products that are extremely effective in terms of removing and suspending soil. Both domestic and commercial detergents will, in most cases, also contain one or more of the following:- stain removal agents - in the form of oxidising bleaches; softening agents; enzymes and optical brightening agents.

The primary functions of washing/wetcleaning detergents are ;-

Washing

1. To reduce the surface tension of water and wet out the fabric.
2. Promote the removal of soiling.
3. Suspend soiling and prevent re-deposition .

Wet Cleaning

1. To reduce the surface tension of water and wet out the fabric.
2. Protect moisture sensitive textiles against the effects of mechanical action.
3. To inhibit the migration and bleeding of dyestuffs.
4. Promote the removal of soiling.
5. Suspend soiling and prevent re-deposition.

Detergents have two main components these being an oleophilic part (oil liking) and a hydrophilic part (water liking). Most detergents ionise when dissolved in water, the molecules collect at the water surface where the hydrophobic tails 'stick out' and break down surface tension, whilst the negatively charged hydrophilic head remains in the water. The positively charged tails are also attracted to, and collect at any surface with which the water is in contact and break down what is known as interfacial tension. This important property of aqueous detergents enables them to wet out textiles quickly and efficiently. Detergents that ionise in this way are known as anionic. In cationic detergents the charges are reversed with the tail carrying a positive electrical charge. Cationic products are generally used as fabric softening agents.

In water based processes it is of course the oily soils and stains which do not dissolve in water alone. The hydrophobic - oil liking - tails of the detergent molecule are strongly attracted to the soiled textile fibres and particularly to oily soils and stains which readily absorb the oleophilic tails. Once soil particles or oily soiling have been surrounded by detergent molecules, the water soluble heads of the detergent having a negative charge electric charge, (like charges repel), form a mutually repellent layer around the soiling effectively holding it in suspension and preventing re-deposition.

To obtain the maximum benefit from your detergent product, it is vital that the wash process is properly structured, particularly in terms of wash times. If wash stages are unduly protracted for example over 15 minutes depending on the process, detergency can start to break down as the electrical charge weakens, leading to soiling being re-deposited on the load. It is also worth remembering that more is not necessarily better in terms of the quantity of detergent you use.

Continued on page 2

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DRY CLEANING DETERGENTS

As experienced dry cleaners will know, compared to water based processes, dry cleaning solvents on their own are very poor at removing stains from textiles, this is partly due to the fact that stains in particular tend to be water based rather than oil based.

Today many dry cleaning detergents designed for use in the machine not only act as detergents but can often provide additional benefits such as retexturing, anti-static, softening, anti-bacteria and odour eliminating properties.

Drycleaning detergents are synthetic products available as three major types, anionic, non-ionic and cationic which may sometimes be blended together.

Dry cleaning detergents also have oleophilic (oil liking) and hydrophilic components (water liking). In the process of soil removal from textiles the hydrophilic part of the detergent molecule seeks out moisture and moisture soluble soil/stains. The oleophilic component, assists the solvent in dissolving oily soils and facilitates the suspension and dispersion of oily soils and also particulates in the cleaning bath.

In terms of water based staining and the suspension of soiling even the best of today's dry cleaning detergents do not perform well when compared to detergents designed for washing. This makes good colour classification particularly important in dry cleaning. Because dark garments normally carry much heavier soil loadings than light or white garments there can be a very high risk of re-deposition (greying) if, due to pressures of work or a mistake, a white or light garment is cleaned with a load of darks. A very common classification error is to clean a black garment with white trim in a dark load. This frequently leads to re-deposition and discolouration of the white component. Here, if this happens it is the cleaners responsibility.

Over the years the dry cleaning industry in the U.K. has used three mainstream dry cleaning processes, these being the Charge System, the Batch System and the Hybrid System. A minority of cleaners use straight solvent with no detergent. The first two systems have been largely replaced by the Hybrid System, mainly because it is very easy to control and is relatively safe. The charge and the batch system both involved the introduction of controlled amounts of water into the machine. In the case of the Batch System this could easily lead to severe shrinkage on moisture sensitive garments if there were other garments in the load that were above their normal textile regain.

In the Hybrid System, the load is cleaned in a dip, or circulating dip, of solvent drawn from the machine base tank. The base tank solvent is normally charged with between 3 - 5gms/ltr of dry cleaning detergent. The dip is discharged to the still carrying with it the bulk of the soiling. Solvent for the second stage of the process is taken from the distilled tank and the load cleaned over the filter for around 8 minutes. Between 3 - 5 gms/ltr of dry cleaning detergent is added to the second stage of the process usually by means of an automatic injector. The second stage is drained and extracted to the base tank, thus maintaining equilibrium within the system. Total cleaning time is normally between 11½ - 12 minutes. There is no separate controlled water addition to the machine in the Hybrid System. In some systems two different detergents are employed. In the first bath a detergent with good water carrying properties is used. A cationic detergent, which improves the handle and helps to reduce static, being added to the filtration stage of the process.

Although water is not introduced into the machine in a controlled way, nearly all cleaners use pre-spotting detergents and spotting chemicals, which in the case of pre-spotting agents may be mixed with large quantities of water. Furthermore the textile regain of garments when deposited for cleaning can vary considerably and under certain conditions garments may be well above their normal regain when accepted for cleaning. The capacity of the dry cleaning detergent to solubilise water can therefore be critical to the safety of moisture sensitive garments in particular during the dry cleaning process. It is important to recognise the difference between water that is held in solution in the solvent and water that is in a free state or emulsified. Water that is in solution in the solvent is safe and will promote the safe removal of water solubles during cleaning. However free and/or emulsified water in the system (giving rise to cloudy solvent) may cause serious shrinkage and/or re-deposition of soiling.

Although the **P** symbol allows for up to 2% of water to be added to the machine, based on the weight of the load, the cleaner needs to bear in mind that it is unlikely that every garment in the load will carry a circle P care label. In fact it is true to say that probably most of them will not have been tested against the BS/ISO standard. Furthermore even garments that carry the label may not have been tested by a testing house against the relevant standard and may therefore be adversely affected by any moisture addition as high as 2%.

Water carrying detergents can generally solubilise around 10% of their own volume of water in dry cleaning solvent. It will be evident, bearing in mind the low detergent charges normally used in the hybrid system, that for some loads the cleaner will need to be very careful about how much water is introduced into the machine by pre-spotting. Some cleaners use pre-spotting soaps diluted 1/1 with water, which if applied in a liberal and random manner, can easily lead to excessive quantities of water being introduced into the machine. This may give rise to a high risk of shrinkage or re-deposition.

A good detergent will minimise the risk of shrinkage during the cleaning process and will promote the removal of water based stains and soiling. In the past extensive trials have proved conclusively that the use of a good detergent combined with the correct process structure can, load on load, improve stain removal in the machine by at least 20%.

There are many aqueous and dry cleaning detergent products on the market and it is therefore only possible to mention in a limited way the properties of the products in the complex and extensive world of detergents.

If you are thinking of trying a new, or alternative dry cleaning detergent, it is important to check if the product you intend to trial is compatible with the other products you use such as pre-brushing soaps. Contact the Company's sales department who will normally be able to arrange for their technical representative to call and ensure the product is correctly installed in your machine. Remember as with most things in this life you get what you pay for. Invest in a good quality product, and in the long run it will save you time and money.