

Paper code and Title: H04FO Front Office and Housekeeping

*Module Code and Name: H04FO25 Laundry Agents, Stain Removal, Occupational Hazards
and Environmental Concern*

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LAUNDRY AGENTS, STAIN REMOVAL, OCCUPATIONAL HAZARDS AND ENVIRONMENTAL CONCERN

1. Introduction

Laundry agents or aids are the materials used to improve laundering results (bleaches, optical whiteners) or to accomplish specific functions or effects (soaks, stain removers, softeners and stiffeners). The important laundry agents or aids are water, laundry soap, detergents, stiffeners, bleaches, alkaline agents, acid agents, organic solvents and absorbents.

2. Objective:

After learning this module you able to

1. Uses of laundry agents, stain removal , dry cleaning ,
2. Discuss the handling guest laundry and valet service
3. Explain the importance occupational hazards and environmental concern in the laundry departments.

3. LAUNDRY AGENTS

3. 1. WHAT IS USED IN THE LAUNDRY?

A. WATER: water is the most important material for the laundry process. It just be available in large quantities in the laundry. Hard water should not be used because the compounds in hard water react with soap or detergent. Which form a thick paste that re-deposits on the fabric and made the fabric look dull and dirty. Only soft water should be used for the laundering process; if hard water has to be used, it must be chemically treated to free it from compounds before using.

B. SOAP: Soap' is technically also a type of detergent is being used from ancient period. In older times, ashes of wood fire under the cooking pot were mixed with left over fat which was then used for washing clothes. Now a-days soap is made of fatty acid and alkali combined at different temperature.

Soap-free detergents have properties similar to soap-such as foaming, wetting, and cleaning- but they are able to make soluble salts out of the calcium, magnesium, and other metal salts that make water 'hard' and render ordinary soap insoluble. While selecting laundry soaps, the following criteria must be kept in mind:

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- The soap should be a clear, pale colour as dark-coloured soaps may contain impurities that aren't easily visible.
- The soap should feel firm when pressed if it is soft, it may contain excessive amounts of water and will be wasteful in use.

C. SYNTHETIC DETERGENTS: Detergent (cleaning agent) “refers to mixtures of chemical compounds including alkylbenzenesulfonates, which are similar to soap but are less affected by hard water.

While rinsing, attention must be given so that no trace of detergent remains in the fabric because they may react with the fibers and damage the clothes. Clothes should not be dipped in synthetic detergent for a long time as soiling or dirt gets redeposited.

D. ALKALI: Alkali gives better results if used with soap and detergent. Alkali is added before adding soap or detergent as it helps in converting hard water into soft water. For cotton fabric, strong alkali should be used while for wool, silk or similar fabric mild alkali should be used. Common alkalis used are washing soda, sodium phosphate, sodium hydroxide, sodium metasilicate.

4. STIFFENERS AND SOFTENERS

Fabric softeners are added with soaps in the final wash cycle.

4.1. BLEACHES

These are chemicals capable of whitening fabrics and removing stains by destroying pigmented matter. Various types of bleaches and the fabric to be used safely is indicated in table -1

TABLE 1- Types of bleaches and their uses

Name of the bleach	Nature	Fabrics on which used
Bleaching powder	Oxidizing	Cotton
Sodium chlorate	Oxidizing	Cotton
Sodium chlorite	Oxidizing	Cotton
Sodium hypochlorite	Oxidizing	Cellulosic
Sodium perborate	Oxidizing	All
Sodium percarbonate	Oxidizing	Cellulosic
Sodium peroxide	Oxidizing	Cellulosic

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Hydrogen peroxide	Oxidizing	All
Potassium permanganate	Oxidizing	Cotton
Sodium hydrosulphide	Reducing	Proteinic
Sulphurous acid	Reducing	Proteinic
Oxalic acid	Oxidizing/reducing	Cellulosic and proteinic

4.2. TYPES OF BLEACH

Bleach can be classified into the following categories:

A. OXIDIZING BLEACHES: These bleaches release oxygen, which combines with the stains to form a colorless compound. The bleach left in contact with the fabric until the stain is removed, or else the fabric will be weakened.

B. OPEN AIR AND SUNLIGHT: This is the world's oldest and cheapest method of bleaching. Hanging clothes out in the sun to dry keeps white clothes sparkling.

C. SODIUM HYPOCHLORITE (JAVELLE WATER): This is made using the following ingredients: 277g washing soda; 57 g chloride of lime; ½ liter boiling water and 1 liter cold water.

To make Javelle water, dissolve the washing soda in boiling water, mix the chloride of lime with cold water, allow settling and straining off the clear liquid without stirring and then mix this filtrate with the washing soda solution. Allow the precipitate of calcium carbonate that is formed to settle and again strain off the clear liquid and store the residue in dark-colored bottles as it is unstable to light. Used to bleach white cottons and linen and never on any other fabric. Javelle water should not be used in silk and wool as these fabrics are dissolved on it. Dilute the Javelle water with an equal amount of hot water and dip the stain into the bleach until it is removed. A small amount of ammonia in the rinse water will help to remove the smell of bleach from the fabric.

D. SODIUM CHLORIDE: This is suitable for cellulosic and synthetic fibres. It is a finely divided crystalline powder obtained when chlorine peroxide reacts with sodium peroxide. Sodium chloride is used in its anhydrous form for bleaching. The bleach is not hygroscopic and is extremely stable. Cold aqueous solutions have only a mild oxidizing power. On heating or acidification, they develop a strong oxidizing power.

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E. HYDROGEN PEROXIDE: This is an effective bleach, yet not harmful to most fabrics. Teaspoon of concentrated ammonia solution or of sodium perborate may be added to each gallon of the diluted solution to make the action stronger.

F. SODIUM PERBORATE: This is made from borax, caustic soda and hydrogen peroxide. It is used in many 'oxygen' washing powders. To prepare the bleach, sodium perborate is dissolved in water.

G. POTASSIUM PERMANGANATE: This has a high content of oxygen which enables it to combine with and remove obstinate stains such as perspiration and mildew. It can be used on animal as well as vegetable fibres. During bleaching, the articles will be stained a characteristic brown due to the formation of manganese dioxide. This is removed by dipping the fabric in one of the following solutions:

- Sodium hypochlorite
- Oxalic acid (diluted)
- Two volumes of hydrogen peroxide acidified with a teaspoon of vinegar (acetic acid) to one volume of bleach.
- The brown stain disappears almost at once. The fabric is then thoroughly rinsed.

H. BLEACHING POWDER: This has been the traditional bleach for cotton fabrics. It has now been superseded by sodium chloride and other bleaches. A good bleaching powder contains 38% available chlorine. Bleaching powder solutions are alkaline in nature due to the presence of free lime.

I. REDUCING BLEACHES: Reducing bleaches work by removing oxygen from the colouring matter of the stain.

J. SODIUM HYDROSULPHITE: This is a valuable agent for bleaching all fibres, particularly wool and silk which cannot be treated. Sodium hydrosulphite should be stored in an airtight container in a moisture free place away from heat as it can decompose by absorbing oxygen and evolving sulphur dioxide gas. It can be used in its concentrated form to remove spots caused by grass, faecal matter, leather polish, mildew, ink, potassium permanganate and dye stains.

K. SODIUM BISULPHITE: This is a mild reducing agent produced by the partial neutralization of sulphurous acid by caustic soda. Neutralization or thorough rinsing must follow

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the bleaching process, otherwise sulphuric acid will appear in the fabric through the action of oxygen.

L. SODIUM THIOSULPHATE: This is bleach for cottons, it is made by mixing 7 gm sodium thiosulphate, 3.5 kg of 36% acetic acid and 8 cups of water.

M. OVER BLEACHING: The over bleaching of cotton and linen during laundering is one of the main causes of general weakening of the fabrics. The fibres then become brittle and harsh, emitting a distinct 'crackle' when rubbed together to guard against over bleaching, always use a bleach of known strength.

Keep the temperature below 60°C (140°F) and add measured quantities of dilute bleach gradually. Chlorine bleach especially should not be used at temperature above 71°C (160°F).

5. THE RIGHT WAY TO BLEACH

5.1. NEVER USE BLEACH DIRECTLY ONTO THE FABRIC: Never pour bleach, whether liquid or powder, directly onto the fabric. It must first be diluted in a small container and then added to the water in the tub before the fabrics are immersed. Fabric is pre-soaked in bleach for 10-15 minutes. Hot water and agitation help to dissolve the bleach and hasten its action.

5.2. USE THE RIGHT AMOUNT OF BLEACH: Bleach should be used according to the manufacturer's directions or as per the guidelines given above. All measurements should be precise.

5.3. WASH OFF THOROUGHLY: Washing the fabrics thoroughly after bleaching is important because if the bleach remains in the fabric it will weaken and degenerate.

5.4. ANTICHLORS: These are used during the after-wash/bleach rinse to ensure that all the chlorine in the bleach has been removed.

5.5. ALKALINE AGENTS/ALKALINE BUILDERS

Some alkaline agents/builders used in laundering are discussed below:

5.6. WASHING SODA (SODIUM CARBONATE, $Na_2CO_3 \cdot 10H_2O$): This is the most commonly used additive in detergents. It is usually purchased in the form of soda crystals that readily dissolve in boiling water.

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5.7. BORAX (sodium tetra carbonate, $Na_2B_4O_7 \cdot 10H_2O$): This compound occurs naturally and is sold as a white powder. It is a mildly alkaline substance, readily soluble in cold water and can be used safely on any fiber.

5.8. AMMONIUM HYDROXIDE (NH_4OH): This is sometimes purchased as a concentrated solution. It must be used with care as its pungent vapors may cause coughing and choking.

6. ACIDS AGENTS

These are useful for neutralizing alkalis and for stain removal. Mild acids used to neutralize any residual alkalinity in fabrics after washing and rinsing are called 'sour's'

6.1. OXALIC ACID : This is a poison and should be kept in jar labeled as such. It is sold in the form of white crystals. Its uses include the removal of obstinate fruit stains, bleaching of brown stains left after the use of potassium permanganate and removal of the tannin base of ink stains together with hydrogen peroxide,

6.2. SALT OF LEMON: This is a compound of potassium oxalate and oxalic acid, referred to as potassium binoxalate.

7. ORGANIC SOLVENTS

Solvents are applied to the most delicate fabrics either to remove stains or to dry-clean them.

7.1. CLEANING BENZENE (C_6H_6) or PETROL: This is obtained from the distillation of shale oil or petroleum. It is highly inflammable and should not be kept or used indoors in large quantities; of course, it must never be used, even in small quantities near an open fire either.

7.2. CARBON TETRACHLORIDE (CCl_4): This is more expensive than cleaning benzene, but is similar in action and has the advantage of being non-flammable. It is, however, very toxic and should be used only near an open window or in well-ventilated rooms as it is extremely volatile and evaporates quickly.

7.3. ACETONE: This is a useful solvent for many stains. Acetone is an effective spot-cleaning agent for stains caused by cosmetics, nail polish, lipstick, paint, varnish, and shoe polish. Acetone is highly inflammable.

7.4. METHYLATED SPIRIT: This is ethyl alcohol (C_2H_5OH) mixed with methyl alcohol (CH_3OH), which makes it poisonous.

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7.5. PARAFFIN: This is mixture of hydrocarbons. It is a white, waxy solid obtained as a residue from the distillation of petroleum and shale.

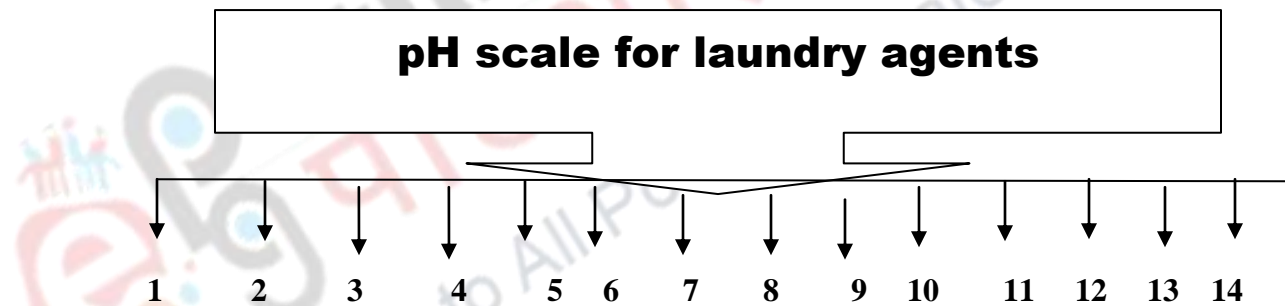
7.6. TURPENTINE (C₁₀H₁₆): This is solvent is more expensive than paraffin. It has a distinctive smell and is both inflammable and volatile. It acts as a solvent for grease, varnish, paint and printers' ink.

8. ABSORBENTS

These are substances suitable for removing grease spots from all fabrics and for the general cleaning of light-colored fabrics that are evenly soiled.

8.1 pH SCALE FOR LAUNDRY AGENTS

This is a scale used to determine the pH of the sud in the washing so that it that may be possible to adjust the pH of the sud with the use of chemicals to maximize cleaning efficiency.



9. STAIN REMOVAL

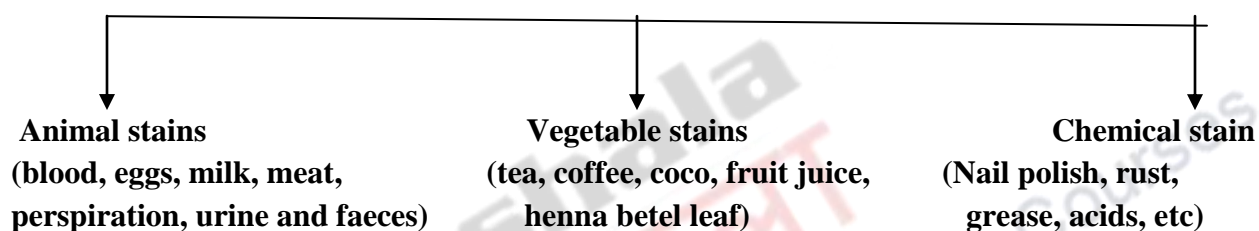
Stain is mark or discoloration caused by the absorption of foreign substance on a textile. Stain removal method aims at treatment and removal of coloured spot from the fabric. Stain removal or spot cleaning is a skill that demands special attention, specific techniques and experience.

9.1. IDENTIFICATION OF A STAIN

- **Sight:** By looking carefully at the stain, to see if it's absorbed or built up stain.
- **Odour:** To smell the stain, especially after giving it a light steam treatment, we come to know what type of stain it is.

- **Colour:** It also gives an important clue of the nature of stain and the agents causing it.
- **Feel:** Ton run the hand/fingers over the stain to feel its stiffness, especially of a built- up stain.
- **Location:** it helps to pinpoint the cause of stain. Perfume stains with usually be located on the lapels of garments or under the arms.

9.2. CLASSIFICATION OF STAINS



9.3. PRINCIPLES OF STAIN REMOVAL

Stains should be treated immediately so as to prevent them from spreading as we as from being absorbed by the fabric. The action involves sponging or washing the stain with water or mild detergent solution.

9.4. GENERAL RULES OF STAIN REMOVAL

1. Always treat the stain immediately.
2. If a stain is not removed after immediate action, the specific removal may be required. Before attempting specific removal first ascertain the nature of the fabric, the nature of the stain, age of the stain, colour of the fabric, etc.
3. Select appropriate stain removal reagents and methods accordingly. Before attempting stain removal, check the reaction on the fabric and the reagent also.
4. Always start with the mildest method and reagent, gradually progression to stronger methods and reagents.
5. Stretch the stain over a pad of clean white absorbent cloth with a piece of clean cotton wool, apply the reagent on the stain.

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6. Start applying the reagent to the outer edge of the stain and work toward the centre. This will prevent the stain from spreading as well as formation of a ring.
7. Sponging is preferable to soaking and rubbing with the reagent.
8. Rubbing and washing instantaneously is preferred to soaking and the washing.
9. Always neutralize the effect of every chemical used by thoroughly rinsing the reagent at each step before attempting the use of another method or reagent.
10. The need of professional help if required should be ascertained at the time of stain removal.

9.5 .GENERAL RULES FOR REMOVAL OF UNKNOWN STAIN

1. Soak stain in Luke warm salted for minimum half an hour.
2. If stain persists, wash in luke warm synthetic detergent solution.
3. If stain still persists, wash in luke warm enzyme detergent solution.
4. If stain still persists, use hot synthetic detergent solution to activate solution per borate, Which is an oxidizing bleaching agent.
5. Use solvent on still persisting stains.
6. If stain is not removed work with mild acidic solution progressing towards strong acidic solution.
7. If stain does not go, use alkaline progressing towards strong alkaline solution.
8. If stain sill persists, appropriate bleaching treatment should be done.

9.6. IMPORTANCE POINTS TO BE KEPT IN MIND

1. After every step, thoroughly rinse in water to neutralize the effect of each cleaning agent.
2. Temperature may be adjusted accordingly keeping in mind the nature of fabric and the stain.

Type of chemicals used and the time of application should be accordingly to the nature of the fabric

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10. CLASSIFICATION OF STAIN REMOVERS

There are two type of stain removal method they are

1. Physical method
2. Chemical method

10.1. PHYSICAL METHOD

- a. Reagent used, which absorbs the stain from the fabric surfaced, e.g., chalked powder, fuller's earth, starch pad.
- b. Use of grease absorbents
- c. Heat application method used generally on fresh stains.

10.2. CHEMICAL METHOD

Basic chemical reagents used to wash stain are salts, solvents, acids, alkalies. Some chemicals can be mild. Flammable and toxic ones have to be used with care and not on plastic, vinyl or nylon , e.g., benzene, acetone, CCl₄, amyl acetate etc. These are used for old or stubborn stain, e.g., bleaching method of stain removal.

Stain removal agents

10. A. ORGANIC SOLVENTS

A	B
Benzene, white spirit, turpentine	Carbon tetra chloride, per chloro ethylene

Both type dissolve grease and require care when use group A is inflammable and should not be used near a naked flame. Group B through non inflammable should be used in ventilated areas as they are harmful when they are inhaled and used for removal of chewing gum stain, grease stain, oil, lipstick, ball point stain, etc.

10. B. ACIDS

Oxalic acids , potassium oxalate, salts of lemon acid are frequently used as removers. All these are poisonous and must be carefully handled. Acid must be diluted before use. Some dyes are affected by acid; so acid should be used only one fast colours. Washing with detergent are

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through rinsing is essential to neutralize excess acid and prevent any damage to the fabric. They are used for removal of metal stain, rust, blood and iron stain etc.

10. C. ALKALINE

Washing soda, ammonia dye and animal fibre are adversely affected by alkalies so they should be used only on cotton and linen fabric used for removal of old and heavy vegetable stains like tea and coffee.

10. D. BLEACHES

The process of changing a colored fabric or substance into a colorless one is known as bleaching. As they weaken the fabric, extreme care should be taken while using them. They whiten the coloured substance either by oxidizing or reducing.

OXIDIZING BLEACHES

They liberate oxygen, which combine in colour pigments to form a colorless compound.

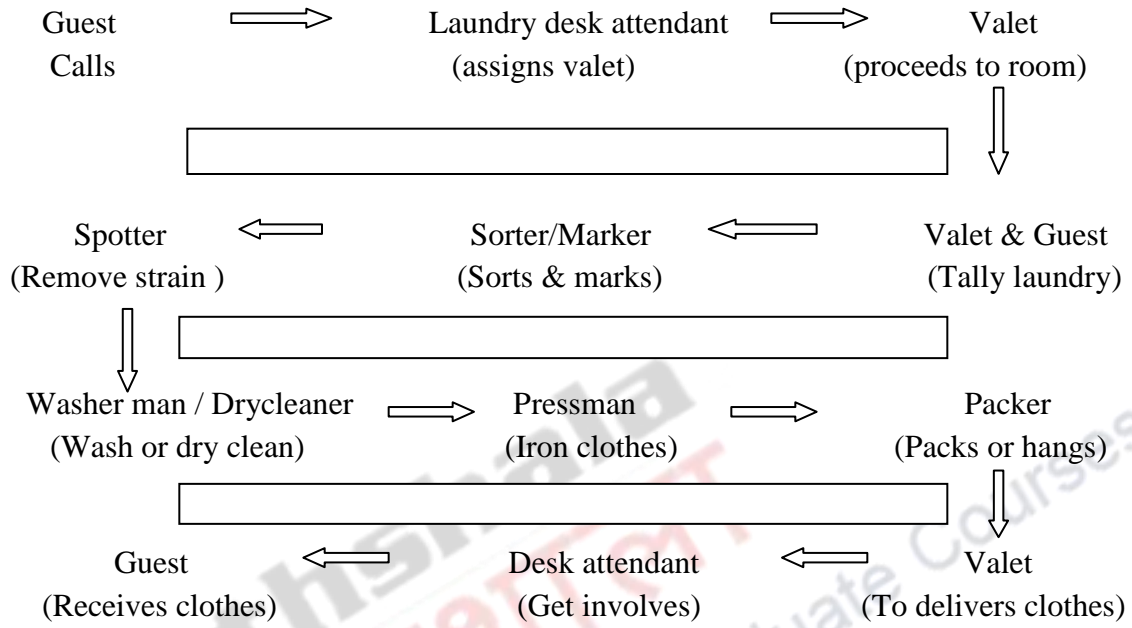
- a. Sodium hydrochloride,
- b. Hydrogen peroxide
- c. Sodium per borate

A. SODIUM HYDROCHLORIDE: This is household bleach which damages animal fiber; it must not be used on silk and woollen articles used for removal of obstinate stain on cotton and linen fabrics, it fixes iron and rust stain. All articles should be thoroughly rinsed with water.

B. HYDROGEN PEROXIDES: This is a lower acting that the above it decomposes readily after adding little ammonia to the solution can be used on white fabric.

C. SODIUM PER BORATE: It is a safe and quick acting agent present in powdered soap and soap less detergent.

11. HANDLING GUEST LAUNDRY



GUEST CYCLE

11. A. GUEST CALLS

Dealing with guest laundry is one of the major responsibility of the house keeping department. Guest may avail of laundry service by their telephoning the housekeeping desk and room attendant is to sent to collect the laundry , if the laundry is on premise valet runner will collect the laundry. Generally laundry must picked up on time, laundered and delivered back to the guest on time without any mix ups .Usually guest laundry clothes collected in the morning and given back evening. In hotels, which offer this service, the lists are left in the bedroom, together with laundry bags. .The guest is expected to place the soiled linen in the laundry bags ,fill the laundry forms and handover to valet .

11. B. VALET SERVICE

Most hotel provide valet service for the to and fro transfer of guest laundry .valet collect the soiled guest laundry bag and laundry list. Valet verify himself against the list if they does not match , the guest is requested by the valet to rectify the mistake .Valet are the responsible for returning the clean guest clothes.

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The usual laundry service for in house guests is referred to as normal service and entails laundry being collected from guest before 10.a.m and being returned by in evening. On week days ,there are no additional charges for this service apart from the rate specified in the laundry list. On Sundays and holidays ,the normal service rate is charged at 25 % extra .Hotels have a provision for an express service, which takes about 2-3 hours ,guests are usually paid 50 % extra or double the laundry list rate.

12. Occupational Hazards

The most common accidents in industrial laundries involve chemical exposure, sharp objects left in soiled linen, slips from wet floors, exposure to pathogens in contaminated linen and body parts being stuck in machinery. While these problems can usually be avoided by standard precautions and a little common sense, they can and do happen.

Exposure to soil and pathogens can be limited by two things. One, of course, is the use of personal protective equipments like barrier gowns, gloves, eyewear, foot coverings and face masks. These items should be worn when handling soiled linen. Infections can also be eliminated by proper hand washing with antibacterial soap. Employees should wash their hands after handling any linen, whether soiled or clean.

Since the noise levels in industrial laundries can be quite high, earmuffs and disposable earplugs are often issued, hearing protection is essential.

Exposure to chemicals is also common. Since washers require a constant stream of detergent, bleach and other chemicals, the supply must be constantly replenished. Laundries are required to provide a material safety data sheet or **MSDS** for all chemicals used. Many laundries require their machine operators to be familiar with **HAZMAT**, if not fully certified.

With the constant workload and harsh working conditions, employees can easily become short-tempered. This occasionally leads to problems in work place bullying. For this reason, laundry managers must be competent disciplinarians, ready to deal with employees who have attitude problems.

Laundry machines use high pressure steam and dangerous chemicals. Poor maintenance can cause injuries such as severe burns and chemical exposures. Hoses, steam lines and other machine parts must be checked properly and replaced regularly.

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13. ENVIRONMENTAL CONCERNS

A more profound problem arises from the heavy use of sodium triphosphate which can comprise up to 50% by weight of detergents. The discharge of soluble phosphates into natural waters has led to problems with eutrophication, or the growth of living things, of lakes and streams, often where it is not desirable. The replacement of sodium triphosphate by zeolites offers some relief to this problem. With respect to the phosphate additives, between 1940 and 1970 "the amount of phosphates in city wastewater increased from 20,000 to 150,000 tons per year." They can also indirectly cause oxygen depletion at greater depths, through microbial breakdown of dead algal cells. Many country started phasing out phosphates in the 1980s in their washing procedures.

In 2004, the European Union introduced regulations to require biodegradability in all detergents, and intends to ban phosphates in domestic products from 2013. Australia began phasing out the use of phosphates in its detergents in 2011, with an all-out ban expected to take effect in 2014. Pursuant to findings published in 2006 by the Shenkar College of Engineering and Design indicating that liquid detergents are "much more environment-friendly" than powdered detergents. Israel's Ministry of the Environment began recommending that consumers prefer liquid detergent over powdered ones for laundry which is not heavily stained.

Recent studies have revisited the question of whether existing household phosphate bans are effective in reducing phosphorus concentration in waterways, and subsequent algal blooms. A 2014 case study of Vermont phosphate policies showed that while the bans reduced the phosphate contribution by treated wastewater from households to five percent of the total contribution, algal blooms have still continued to worsen for other reasons.

14. SUMMARY

Laundry agents and stain removal or spotting is important functions in the laundry. The section on stain removal is exhaustive as this is a specialized skill. A trial and error method does not work here and there can be no short cuts for the stain removal. It should be understood that the term dry cleaning is misnomer. The actual process dose use liquids apart from the dry powders and agents but these liquids are non aqueous. Dealing with the guest laundry is another important responsibility of the house keeping department ,this type of service is done by valets at a stipulated time and need to returned by normal or express service as desired by the guest. Laundry personnel have to interpret certain symbols on the care labels.