

8. LAUNDRY REAGENTS AND DRY-CLEANING

Do You Know ?

Why do we need to wash our clothes regularly?

What is fixed dirt?

What is dry cleaning?

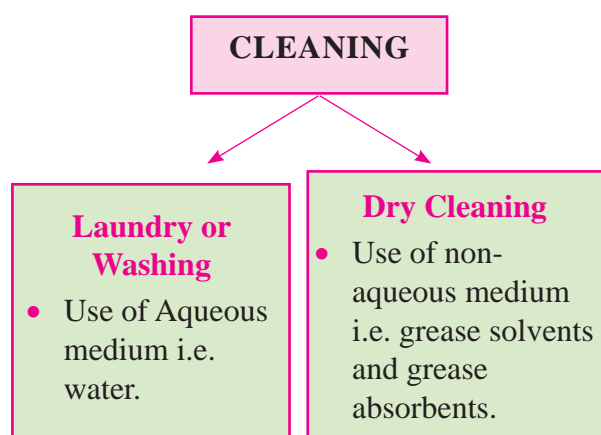
Why do we give our expensive clothes to commercial laundry outlets for dry cleaning?

What is the difference between laundry & dry cleaning?

Clothes require cleaning after they are used so that they can be worn again. The dirt, perspiration and stains (if any) need to be removed, otherwise they will damage the fabric. The outcome of successful cleaning are clean, fresh, hygienic and spotless clothes. The dirt present in the clothes are of two types – **Loose dirt** and **Fixed dirt**. The loose dirt can be brushed off from the clothes easily. The fixed dirt can not be easily removed as it is greasy and so sticks on the clothes. To remove this dirt, cleaning is required.

Cleaning of cloths is done by two different types of processes: -

Chart 8.1 Method of cleaning clothes



Do you recall what we learnt in XIth standard?

Objectives of Laundry :

1. To improve serviceability.
2. To retain attractiveness.
3. To study various reagents used in laundry.
4. To develop skills regarding the use of various laundry equipment.

8.1 Laundry Reagents

In this chapter we will learn about the laundry agents, water, soap and synthetic detergents.

The different laundry reagents can be classified in the following manner –

Chart No. 8.2 Different Laundry Reagents

Cleaning Agents	Stiffening Agents	Whitening Agents
<ul style="list-style-type: none"> • Water • Soap & Detergent 	<ul style="list-style-type: none"> • Starches • Gums 	<ul style="list-style-type: none"> • Blues • Optical Brighteners



You Should Know ?

Stiffening Agents are now available in the form of commercial ready to use starch .

Optical Brightness are now component of detergents.

Internet my friends

Find out about some more commercially available laundry reagents and their specific functions.

Water

Water is the prime laundering agent. All over the world water has been used for laundry purpose since the civilizations developed and mankind started to use clothes. The popularity of water as a prime laundry reagent is due to the certain outstanding qualities -

Functions of water in laundering:

- 1) As a **wetting** agents: Water penetrate into the fabric and causes wetting.
- 2) As a **solvent**: Water is a good solvent and is able to dissolve most of the dirt. Cold water is the best solvent for protein matter and hot water helps to remove greasy matter.
- 3) It is neutral. Does not chemically react with other laundry reagents.

For laundry purpose, water is classified into two types – Soft water & Hard water.



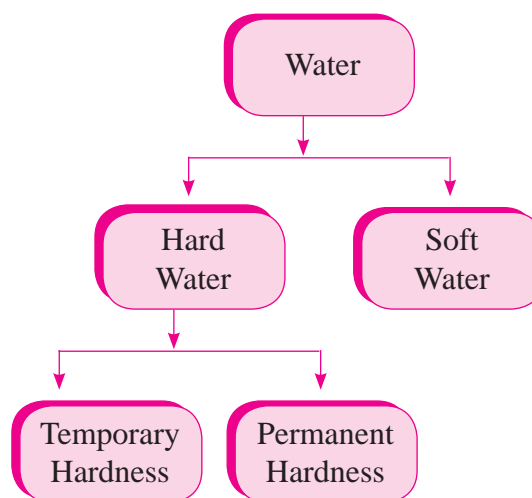
You must know

Pedesis is the movement of water particles. They move in and out of the fabric and with every movement they remove some amount of dirt, thus cleaning the fabric..

Can you tell?

What are the sources of water?

Chart No. 8.3 Types of Water



Soft water is considered suitable for laundry. It contains **Sodium salts** which do not interfere with the action of soap. It gives lather freely when soap is added and clothes get clean satisfactorily. Hard water is not suitable for washing because it contains **Magnesium(Mg) or Calcium (Ca)salts** which interfere with the action of soap. It does not give lather easily when soap is added and clothes do not get cleaned satisfactorily. The amount of these salts present in the water decide how hard the water is. All these salts are perfectly soluble in water and so it is not possible to filter them out.

Some interesting facts !

Hardness of water is measured in degrees from 1-10 and is expressed as Part Per Million or PPM.

Water having up to 3⁰ hardness is considered soft water.

Water having more than 3⁰ of hardness is considered hard water.



You Should Know ?

If water contains Bicarbonates of Ca or Mg, it is considered **Temporary hardness**.

If water contains Sulphates, Nitrates or Chlorides of Ca or Mg, it is considered **Permanent hardness**.

Disadvantages of Hard water in Laundry:

- Hard water does not form lather with soap.
- When soap is added in hard water the Magnesium and Calcium salts react with the soap and use it up so soap is not able to clean the fabric.
- As a result of the reaction of these salts with soap, **scum** is formed which is deposited on the fabric and spoils the appearance.
- Soap is wasted.
- Clothes do not get clean.

Scum is a sticky, curd like precipitate which has no cleaning power and gets deposited on the fabric making it even more dirty.

Due to these disadvantages, it is not advisable to wash clothes with hard water but unfortunately, soft water is not easily available everywhere and so the hard water has to be made soft for making it suitable for laundry. There are many ways of doing it –

Methods of softening hard water:

- Boiling Method:** Temporary hardness can be removed by boiling water. Due to the heat, the soluble Ca or Mg bicarbonates break into insoluble carbonates which gets precipitated at the bottom and can be filtered out making the water soft.
- Chemical Method:** Permanent hard water does not become soft by boiling and so chemicals have to be added in it to make it soft. Water is treated by any of the following chemicals –
 - **Ammonia** – Used at commercial level. Not safe to be used at household level.
 - **Caustic soda** – Used at commercial level. Not safe to be used at household level.
 - **Base Exchange method (Zeolite Softeners)** – used in big cities.
 - **Washing soda** – Most commonly used at household level.

In all the above methods the temperature of the water and amount of chemical should be properly controlled. Too little will not have the desired effect and too much will make the water alkaline and spoil the clothes.

Table No. 8.4 Difference between Soft Water and Hard Water.

	Soft Water		Hard Water
1)	Does not have any Ca or Mg Salts	1)	Ca and Mg salts are present in the form of bicarbonates, sulphates, nitrates and chlorides.
2)	When soap is added it forms lather.	2)	When soap is added it forms scum.
3)	Makes the fabric whiter and brighter.	3)	Makes the fabric hard and destroys the appearance.
4)	Fabrics last longer.	4)	Fabric does not last longer.
5)	Suitable for laundering.	5)	Not suitable for laundering.

Soaps

Along with water, soap is a common cleaning agent used at household and commercial level. The cleaning power of soap is known as detergency. The type of soap should be chosen according to the type of fabric and the amount of dirt present in it. Soap is available in powder, bar or liquid form. There are many kinds of soaps available in the market. You can make soap at home too.

Soap is a compound formed from a Fatty Acid and an Alkali.

Sodium, potassium or ammonium salts of fatty acids that are soluble in water and have good cleaning power and used for laundry work are known as soaps.

The process of mixing fatty acid and alkali to make soap, is known as Saponification.

Manufacturing :

Oil and caustic soda are mixed in a fixed quantity and heated for some hours. Saponification takes place and the soap mixture is ready.

To separate the soap from this mixture, common salt is added. This results in separation of four layers –

- Upper first layer of foam which is removed.
- Second layer of soap liquid which is taken out.
- Third layer of unused alkali called ‘spent lye’.
- Fourth layer of impurities.

The soap liquid is boiled to reduce water content. Colour, perfume and other additives are added and it is poured into moulds. By the next day, it solidifies. It is then stamped, wrapped, packed and sold.

A peek in history.

The word **sapo** is a Latin word. It has come from mountain called **Mount Sapo** within the Roman World .

According to one Roman legend , Roman housewives noticed that a strange yellow substance in the water of River Tiber flowing near Mt. Sapo made their cloths cleaner and brighter than ordinary water.

Mt. Sapo was an ancient location for animal sacrifice. Animal fat mixed with wood ashes and rain water created an excellent Soap mixture having great cleaning power. This mixture was named ‘**Soap**’, as it was found near Mt. Sapo.



You Should Know ?

The history of soap manufacturing in India by the organized sector can be traced to as far back as 1879, to the North West soap company at Kanpur by the British and Kerseve soap company at Meerut in 1897. By 1918 there were as many as eleven large soap manufacturing units in India which started the production of modern type of soaps.

Raw material required for soap manufacture are as follows :

Table No. 8.5 Raw Materials for Soap Making

	Components	Examples
1)	Alkali	Caustic Soda, Caustic potash.
2)	Fats and oils for fatty acids.	<u>Animal Fat</u> : Tallow, Lard. <u>Vegetable fat and oil</u> : Palm oil, castor oil, cotton seed oil, etc.
3)	Builders	Sodium silicate, borax.
4)	Fillers	Starch, clays and chalks.
5)	Anti-oxidant	Sodium hydrosulphite.
6)	Perfumes	Natural, semi-synthetic or synthetic perfumes.

Function of Soap in laundry:

- Soap acts as wetting agent: by making the penetration of water into fabric easier.
- Soap increase Pedesis thus helping to remove non-greasy dirt by the action of water molecules.
- Soap helps in emulsification of greasy dirt and breaks the bond between the greasy dirt and fabric thus removing it from the fabric.

- Soap makes a film around each dirt particle and does not allow them to deposit on the fabric again. That is why usually after washing clothes we see that the soap water has become dark and dirty as the dirt from the clothes is now in the soap solution.

Types of Soaps :

- **Neutral Soaps:** These are natural detergents. They are dried fruits and berries of certain plants and have been in use as cleaning agents since very ancient time. They have very good detergency.



Pic. No. 8.1 Ritanut

They do not contain free alkali. They are used for washing Silk and wool. Eg. Ritanut. They are also used in place of shampoo to wash hair.

Something Interesting!

Rita is one fruit which lathers even in hard water. It is a fruit like berry which contains saponin a substance which produces lather, when soaked in water.

There is one more neutral soap occurring in nature. Find out about it.

- **Built Soaps:** Has a mixture of added alkalinity and soap. Can be used for cotton and linen only as other fibres are not able to tolerate such high amount of alkali. Certain alkalis known as builders are added in the soap mixture. Some common builders are washing soda, borax etc. They have better detergency than normal soap.

- **Hard Soaps:** These have firm physical form. Less soluble in water. Do not give lather easily. Require more labour and time. Eg. Sodium Soaps.
- **Soft Soaps:** These are soft in touch. More soluble in water. Give free lather. Soap gets used up quickly. Eg. Potassium and Ammonium Soap.
- **Mild Soaps:** These soap has correct balance of fat and alkali. Suitable for delicate fabrics like silk, wool. Eg. Soap Flakes and Bath Soap.

Think & tell

1. Why Hard soap requires more labour and time for laundry work.
2. Why soft soap turns out to be more expensive in laundry.

Table No. 8.6 Difference between Neutral Soap and Built Soap.

Neutral Soap	Built Soap
<ul style="list-style-type: none"> • Neutral soap does not contain free alkali. • Suitable for washing silk and woolen fibers. 	<ul style="list-style-type: none"> • Built soap has added alkalinity to increase detergency. • Suitable for washing cotton and linen fibers.

Table No. 8.7 Difference between Hard Soap and Soft Soap.

Hard Soap	Soft Soap
<ul style="list-style-type: none"> • Less soluble in water. • Less wastage in laundry work. • Does not give free lather. • Eg. Sodium Soaps 	<ul style="list-style-type: none"> • More soluble in water. • More wastage while washing fabrics. • Gives free lather. • Eg. Ammonium Soaps and Potassium Soaps

Synthetic Detergents

Manufacturing of soaps require fatty acids obtained from fats and oils which were needed as food too. Therefore scientists were trying to find out a substitute for fatty acids. They discovered that a chemical called LAS obtained from petrochemicals has a chemical structure similar to fatty acids and so can replace fatty acids in the making of soap. They called this material **Surfactant**. As this new substance was made from synthesized raw materials, it was named as **Synthetic Detergent**. It proved to be far superior to soaps and hence replaced soap in many households as the favourite cleaning agent. It can be available in powder, bar or liquid form.

A peek in history.

During World War I, there was acute shortage of fats and oil. The surfactant was discovered at that time and synthetic detergent was first made in Germany. It came into markets after world war II.

In India, the production of detergent started in 1958.

Table No 8.8 Components of Synthetic Detergents

Components		Functions	
1)	Surfactant	1)	Basic Cleaning ingredient.
2)	Builder	2)	Softens water. Adds detergency.
3)	Foam Boosters	3)	To stabilize foam.
4)	Optical brightening agent	4)	To give an optical illusion and make the fabric look brighter.
5)	Perfumes and colors	5)	To mask the bad odour and white color of the surfactant.

Advantages of synthetic detergents in laundry:

- 1) Equally effective in hard water as well as in soft water.
- 2) Has more detergency than soaps.
- 3) Stable to acidic and alkaline conditions.
- 4) Equally effective in cold and hot water.
- 5) Prevents redeposition of dirt on fabric.
- 6) Makes the fabrics look brighter.

Table No. 8.9 Difference between Soap and Detergent.

Soap	Detergent
<ul style="list-style-type: none"> • Alkaline. • Detergency of soap is low. • Not effective in hard water. • Effective in alkaline medium. • Superior washing in hot water. • Can not make fabrics look brighter. 	<ul style="list-style-type: none"> • Neither Alkaline nor Acidic. • Detergency is superior. • Effective in hard as well as soft water. • Effective in acidic as well as alkaline medium. • Equally effective in hot as well as cold water. • Can make fabrics look brighter.

Internet my friends

Find out about the different detergents available in the market and their components.

Find out which two men discovered the chemical process of making Soap.

Do you wash your expensive clothes at home?

Can fabrics with pleats or embossed design be washed with ordinary laundering?

Dry Cleaning

Dry-cleaning is also known as “**Chemical Cleaning**” or “**French Cleaning**”. Dry cleaning is based on the fact or principle that most of the dirt to fabric is because of grease. When this grease is removed or dissolved by suitable reagent, the fabric is free from dirt. Hence the greasy dirt is removed in Dry-cleaning.

The term ‘**Dry Cleaning**’ is somewhat misleading. The fabrics are not cleaned by dry reagents but they are cleaned with substances other than water. As water is not used, it is called Dry cleaning.

A peek in history.

The modern history of dry cleaning began with a funny accident in the 1840s. French textile maker Jean-Baptiste Jolly’s maid accidentally knocked over a kerosene lamp onto a linen tablecloth. Jolly was surprised to find that the linen in that spot became much cleaner. Jolly quickly turned this revelation into an extension of his business, and the firm of **Jolly-Belin** in Paris is historically credited as the first dry cleaning business, using kerosene as its primary cleaning material.

As it was discovered by a French person, the process was known as ‘French Cleaning’.

• Dry Cleaning Substances:

Dry-cleaning is done by following substances -

- Grease absorbents** – These are dry powder like substances which are used to clean grease spots from light coloured fabrics. Eg. Fur, Lace, Shawls, Hats.
- Grease Solvents** – These are liquids which are used to clean either stains or entire garments. These can be inflammable or non-flammable.

Chart No. 8.10

Dry Cleaning by Grease Absorbents	Dry Cleaning by Grease Solvents
Brush the garment well to remove the loose dirt	Brush the garment well to remove the loose dirt
↓	↓
Place Blotting paper on both sides of soiled fabric	Pour sufficient solvent in Dry-cleaning pump
↓	↓
Spread a thick layer of absorbent powder.	Soak the garment in the solvent
↓	↓
Rub in circular motion	The pump is used up and down for 15-20 minutes.
↓	↓
Leave for ½ Hr.	The garment is removed and the solvent is drained
↓	↓
Shake off powder and brush the garment.	The garment is dried in shade for 2-3 days
↓	↓
What are French chalks, Talcum powder, bread crumbs, starch, fuller’s earth. These are grease absorbents .	Flammable solvents - petrol, kerosene, benzene, methylated spirit. Non-flammable solvents - Carbon tetrachloride, tri-chloro ethylene, tetrachloroethane etc.

• Dry-cleaning pump:

The dry cleaning pump is a round tin with a lid made of a rust free metal. A tap at the lower side and fitted in suction washer, with a handle. The lid has 3 screws, which make it air-tight. The tin is filled with the solvent.

The clothes to be cleaned are put in the solvent, the screws are tightened to make the lid air tight. The clothes are moved in the solvent with the help of the handle for 10-15 mins.

At the end of the process the tap is opened and the solvent is filled in a bottle to be reused again. The clothes are taken out and the solvent drained out. The clothes are dried in shade for 2-3 days or till the smell of the solvent is gone.



Pic. No. 8.2 Dry cleaning Pump

The dry cleaned clothes are never dried in direct sunlight as the solvent present in them may catch fire due to the heat of sun.

Dry cleaning is best suited for the following types of clothes –

Silk & wool, Zari fabrics, Fur, Clothes in which colour may bleed, Lace fabrics, Permanent pleated dresses, Embossed or embroidered fabrics.

Advantages of Dry cleaning :

1. Can be used for cleaning garments like fur, felt, crepe, silk, woolens, velvets and corduroy.
2. Colours of fabric does not bleed.
3. Pile of fabrics does not flatten.
4. Does not affect the colour, texture, and luster of the fabrics.

Disadvantages of Dry cleaning :

1. It is costly.
2. The smell of solvents remains in the fabric for longer time.
3. Can clean only greasy dirt.
4. Use of flammable solvents is dangerous and requires caution.

Internet my friends

Find out about latest trends in dry cleaning, dry cleaning soap and spirit soap.

Table No. 8.11 Difference between Grease Absorbent and Grease Solvents

Grease Absorbents	Grease Solvents
1. Dry powder like substances.	1. Liquids.
2. Used for removing greasy spots.	2. Used for cleaning entire garment.
3. Non-flammable.	3. Some of them are highly inflammable.
4. No smell.	4. Strong smell.
5. No equipment required.	5. Dry cleaning pump required.
6. Can be done at home.	6. Should not be done at home.

Table No. 8.12 Difference between Washing and Dry Cleaning

Laundry or Washing	Dry Cleaning
1. Water and soap are used.	1. Grease absorbents and grease solvents are used.
2. Done for all kinds of regular clothes.	2. Done for special kinds of clothes.
3. Safe for regular use.	3. Can be dangerous for regular use.
4. Tub, scrubbing brush etc. are used.	4. Dry cleaning pump is used.
5. Cheaper	5. Costly

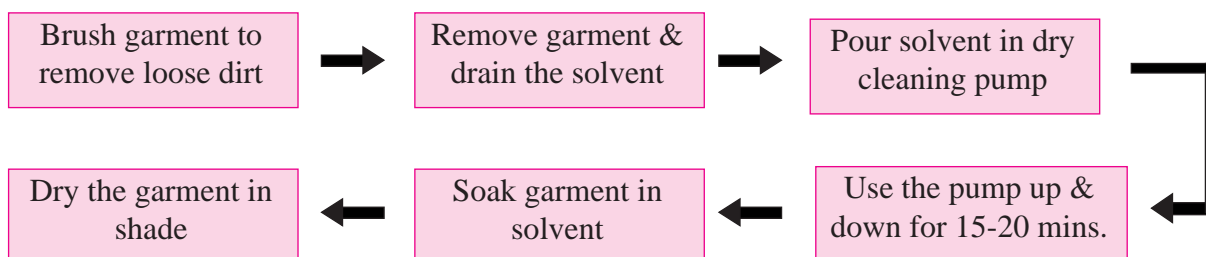


Use Your Brain Power !

I. Find out 5 types of soaps in the grid given below :

B	U	I	L	T	S	M	N	P
A	R	Y	T	M	O	I	D	S
N	E	U	T	R	A	L	F	O
L	W	Q	I	T	E	D	P	F
H	A	R	D	M	X	U	E	T

II. Arrange the given dry cleaning process in proper sequence :



EXERCISE

Objective Type Question

1. Match the following.

	A		B
1)	Soap	a)	Use of non-aqueous medium.
2)	Soft water	b)	Movement of water particles.
3)	Dry cleaning	c)	Petrochemicals.
4)	Detergents	d)	Salts of fatty acids.
5)	Pedesis	e)	Suitable for laundry.
		f)	Starching.

2. Select and write the appropriate answer from the given alternative for each sub questions:-

- Hardness of water is measured in
 - Centimeter
 - Degree
 - Kilogram

- The process of manufacturing Soap is called as
 - Saponification
 - Distillation
 - Boiling.
- Synthetic detergents are synthesized from
 - Vegetable oils
 - Petrochemicals
 - Animal Fat
- Dry-cleaning solvent is
 - Water
 - Petrol
 - Oil
- Dry-cleaning absorbent is
 - Starch
 - Salt
 - Mud

3. Write whether given statements are true or false.

- Temporary hardness can be removed by boiling.
- When soap is added in soft water scum is formed.

3. Hard water is suitable for laundering.
4. Dry-cleaning can be done for silk & wool.
5. Water is used as a dry-cleaning solvent.

4. Name the following:

1. Neutral soap found in nature.
2. Substances which increase the alkalinity and cleaning power of soap.
3. Cleaning method which does not use water.
4. Movement of water particles.
5. Most commonly used water softener at household level.

Short Answer Type Question

1. Define the following terms:

1. Pedesis
2. Dry-cleaning
3. Saponification
4. Mild soap
5. Neutral soap

2. Give Reasons:

1. Hard water is not suitable for laundering.
2. Soda should be used in proper quantity while softening the water.
3. Neutral soaps are suitable for laundering silk and wool garments.
4. Detergents are better than soap.
5. Dry-cleaning is more suitable for fabrics like fur.
6. Dry cleaned clothes are always dried in shade.

3. Give two examples of each :

1. Salts present in permanent Hard water.
2. Grease absorbents.
3. Types of soaps.
4. Components of synthetic detergents.
5. Chemicals used for softening water.

4. Answer in short:-

1. Functions of water in laundering.
2. Advantages of detergent in laundering.
3. Differentiate between Grease Absorbents & Grease solvents.
4. Functions of soap in laundering.
5. Dry-cleaning pump.
6. Disadvantages of hard water.
7. Differentiate between Washing & Dry cleaning.

Long Answer Type Question

1. A. Explain the types of water.
B. Explain the methods used for softening water.
2. Explain the types of soap used in laundering.
3. A. Explain what is dry-cleaning.
B. Explain the methods of dry cleaning.

Project / Field Visit

1. Collect the information about various types of laundry soaps.
2. Collect information about the various forms of detergent available in the market.
3. Collect information about the dry-cleaning commercial products available in the market.
4. Collect information about stain removal liquids and solutions found in the market.

