

CUET · HOME SCIENCE · CLASS XI · CODE 315

# Care and Maintenance of Fabrics

CUET unit: Fabric and Apparel — Care and Maintenance of Fabrics

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## Snapshot

- Establishes why care and maintenance of fabric products (clothing, furnishings, household textiles) is essential to retain colour, texture, quality and functionality over the expected life of the material.
- Covers the four pillars of fabric care: **mending**, **laundry** (stain removal, washing, finishing), **dry-cleaning**, and **storage**.
- Explains the chemistry of cleaning (pedesis of water, surfactant action of soaps/detergents) and the classification of stains and reagents.
- Lists the factors that affect fabric care — fibre content, yarn structure, fabric construction, colour and finishes — and shows fibre-wise care requirements.
- Introduces the **care label**: standard symbols for washing, drying, ironing, bleaching and dry-cleaning that travel with the garment for its useful life.

## Detailed Notes

### 2.1 Core concepts

This chapter closes Class XI HEFS Part II with a chemistry-grounded survey of fabric care — converting the Fabrics Around Us (kehe105) and Our Apparel (kehe202) chapters into household practice. It is one of the most chemistry-heavy chapters in Class XI HEFS and a CUET Home Science easy-scoring zone if reagent groups, stain types and care-label symbols are memorised.

- Care and maintenance keep the fabric free of physical damage and retain its appearance — by removing stains/dirt without harming colour, retaining brightness and texture, and managing wrinkles/creases (NCERT §11.1, p. 203).
- **Mending** is the general term for keeping material free of damage from normal use or accident — repairing cuts/tears/holes, replacing buttons/fasteners/ribbons/laces, restitching seams/hems; it must be done **before** laundering, since the strain of washing increases loss to the fabric (NCERT §11.2, p. 204).
- **Laundry** includes stain removal, preparation of fabrics for washing, removal of dirt by washing, finishing (blueing and starching) and pressing/ironing for storage (NCERT §11.3, p. 204).
- A **stain** is an unwanted mark/colouration caused by contact and absorption of foreign matter; it cannot be removed by normal washing and needs special

treatment; identification is done by colour, smell and feel (NCERT §11.3 Stain Removal, p. 204).

- Stains are classified as **vegetable** (tea, coffee, fruits, vegetables — acidic, removed in alkaline medium); **animal** (blood, milk, meat, eggs — protein, removed by detergents in cold water only); **oil** (oils, ghee, butter — removed by grease solvents and absorbents); **mineral** (ink, rust, coal tar, medicine — washed first in acidic, then alkaline medium); **dye bleeding** (colour from other fabrics — removed by dilute alkalis or acids depending on fabric) (NCERT §11.3, p. 204).
- **Techniques of stain removal: scraping** (blunt knife for built-up surface stains), **dipping** (immersing the stained material and scrubbing), **sponging** (reagent applied with a sponge while blotting paper absorbs it from below), **drop method** (cloth stretched over a bowl, reagent applied with dropper) (NCERT §11.3, p. 205).
- **Stain removers/reagents** must be used in liquid form and in recommended concentration: grease solvents (turpentine, kerosene, white petrol, methylated spirit, acetone, carbon tetrachloride); grease absorbents (bran, Fuller's earth, talcum powder, starch, French chalk); emulsifiers (soaps, detergents); acidic reagents (acetic acid/vinegar, oxalic acid, lemon, tomato, sour milk, curds); alkaline reagents (ammonia, borax, baking soda); bleaching agents — **oxidising** (sunlight, sodium hypochlorite/javelle water, sodium perborate, hydrogen peroxide) and **reducing** (sodium hydrosulphite, sodium bisulphate, sodium thiosulphate) (NCERT §11.3, p. 205).
- **Dirt** is grease, grime and dust jammed in the fabric — loose dirt is brushed/shaken/steeped out, while tight grease needs solvents, absorbents or emulsifiers; cleaning by solvents/absorbents is **dry cleaning** while washing with water + soap/detergent is **normal cleaning** (NCERT §11.3 Removal of dirt, p. 207).
- **Water** is the most valuable laundry agent; during steeping it penetrates the fabric, and **pedesis** (movement of water particles) helps remove non-greasy dirt; increase in water temperature increases pedesis and penetration. Water alone cannot remove insoluble dirt or keep it suspended — redeposition causes graying (NCERT §11.3 (i), p. 207).
- **Soaps** are made by reaction of natural oils/fats with alkali (biodegradable, mild on skin and environment) while **synthetic detergents** are made from chemicals; both are **surface-active agents (surfactants)** that reduce surface tension of water. Soaps are ineffective in hard water and lose strength over time; detergents are more powerful and can be engineered for specific tasks/washing machines (NCERT §11.3 (ii), pp. 207-208).
- **Methods of washing: friction** (rubbing — for strong fabrics like cotton; not for silk, wool, pile, looped or embroidered surfaces); **kneading and squeezing** (gentle, for delicate wool/silk/rayon and coloured fabrics — not for heavily soiled articles); **suction washing** (for big/heavy articles like towels — uses a suction washer); **machine washing** (manual, semi-automatic or fully automatic — works by agitation) (NCERT §11.3 (iii), pp. 208-209).

- **Finishing:** after washing, the article is rinsed clean of detergent; the last rinse may include reagents to restore freshness/brightness or improve stiffness (NCERT §11.3 Finishing, p. 209).
- **Blues** counteract yellowness of repeatedly-washed white cottons (and graying of synthetics) — available as **ultramarine blue powder** or **liquid chemical dye**; powder blue tends to settle and give patchy results, liquid blues are more even; must be applied to a thoroughly wet (not dripping) article free of folds (NCERT §11.3 Finishing (i), p. 209).
- **Optical Brightening Agents (Fluorescent Brightening Agents)** are low-grade dyes that absorb light at a shorter wavelength and re-emit it at a longer wavelength — giving intense bright whiteness; they counteract yellowness and grayness, can be used on coloured printed fabrics, but **cannot destroy colour** and should not be confused with bleaching (NCERT §11.3 Finishing (i), pp. 209-210).
- **Stiffening agents** restore body, gloss and shine and prevent direct contact of dirt with fabric: **starch** (from wheat/maida, rice, arrow-root, tapioca — only for cotton and linen; thick cottons need light starching, thin fabrics need heavy starching); **gum acacia/gum arabic** (from babool tree — light stiffening/crispness for silks, fine cottons, rayons, silk-cotton blends); **gelatin** (easy but expensive); **borax** (not a starch — added to starch solution to improve stiffening; on ironing it melts to form a water-repellent film, useful in humid climates) (NCERT §11.3 Finishing (ii), p. 210).
- **Drying** is best done outside in sun with the wrong side facing out — sun also acts as antiseptic and bleach for whites; silk, woolens and synthetics should not be hung long in sun (loss of strength, irreversible yellowing) and are best dried indoors (NCERT §11.3 Finishing (e), pp. 210-211).
- **Ironing** requires three things: **high temperature, moisture, and pressure**. Electric iron (controlled temperature) is preferred over charcoal iron (uncontrolled, can stain). Iron is moved along the length; articles that can lose shape (laces) are **pressed** (lift and place) not ironed (NCERT §11.3 Ironing, p. 211).
- **Dry-cleaning** is cleaning in a **non-aqueous liquid medium**; dry solvents do not cause swelling/shrinkage/wrinkle/colour bleeding (unlike water), so it is safe for delicate textiles. Common solvents: **perchloro-ethylene, a petroleum solvent, a fluorocarbon solvent**. Usually done industrially; items are tagged, inspected and pretreated on a spot board (NCERT §11.3 Dry-cleaning, p. 212).
- **Storage** of textile products: clothes must be clean, dry, mended, with all stains removed; woolens are brushed and dry-cleaned; pockets turned out, sleeves turned up; packing must be loose to avoid permanent creases; shelves must be clean, dry, insect-free, low humidity (NCERT §11.4, p. 212).
- **Factors affecting fabric care:** fibre content, yarn structure, fabric construction, colour application and finishing. For example, cotton fibres are strong (stronger when wet) and tolerate acidic reagents (must be rinsed well); wool is weak fibre that further weakens when wet and felts under mechanical action; silk is weakened when

wet and by sunlight; rayon strength is low and further decreases when wet (NCERT §11.5, pp. 213-215).

- **Yarn structure:** high-twist yarns may shrink; novelty/complex yarns may snag; blends (e.g., polyester-cotton) need care for both fibres — no very hot water for poly-cotton blends (NCERT §11.5 Yarn structure, p. 216).
- **Fabric construction:** simple closely-woven fabrics are easy to maintain; satin/pile/long-float weaves snag; knits stretch out of shape (need re-blocking); sheers, laces, nets, felts, non-wovens need careful handling (NCERT §11.5 Fabric construction, p. 216).
- **Colour and finishes:** dyed/printed fabrics may bleed colour during cleaning and stain other materials; colour-fastness should be tested before use; many finishes may need renewal after every wash (NCERT §11.5 Colour and finishes, p. 216).
- **Care label** is a permanent label/tag with regular care information that stays attached and legible for the useful life of the garment; standard symbols cover washing temperature (cold/warm/hot), wash cycle, rinse, drying (line/flat), pressing/ironing temperature (210°C / 160°C / 120°C), bleach (yes/no) and dry-cleaning (all solvents / white spirit only / do not dry-clean) (NCERT §11.6, pp. 216-217).

Fabric care is a four-stage workflow: mend → launder (stain removal + washing + finishing) → dry-clean (where applicable) → store. Each stage has chemistry, technique and safety considerations. Mending is placed first because washing is mechanically and chemically stressful — fabric weakened by an unmended tear will tear further during agitation. Indian household examples of mending include darning of woollens, patching of cotton kurtas, replacing of buttons, restitching of saree falls, and reinforcing of kurta/pyjama seams.

Stain removal demands a chemistry-aware approach. Five stain classes:

- **Vegetable stains** (tea, coffee, fruit, vegetables) — acidic; removed in **alkaline** medium (borax, ammonia, baking soda).
- **Animal stains** (blood, milk, meat, eggs) — protein; removed by detergents in **cold water only** (hot water coagulates the protein and sets the stain permanently).
- **Oil/grease stains** (oil, ghee, butter) — removed by grease solvents (turpentine, methylated spirit, kerosene, white petrol, acetone, carbon tetrachloride) or grease absorbents (Fuller's earth, bran, French chalk, talcum powder, starch).
- **Mineral stains** (ink, rust, coal tar, medicine) — washed first in **acidic** medium (oxalic acid, lemon, vinegar), then in **alkaline** medium.
- **Dye-bleeding stains** (colour from other fabrics) — removed by dilute alkalies or acids depending on fabric.

Six reagent groups: grease solvents, grease absorbents, emulsifiers (soap/detergent), acidic reagents (acetic acid/vinegar, oxalic acid, lemon, tomato, sour milk, curds), alkaline reagents (ammonia, borax, baking soda), bleaches. Bleaches split into oxidising (sunlight, sodium hypochlorite or javelle water, sodium perborate, hydrogen peroxide)

and reducing (sodium hydrosulphite, sodium bisulphate, sodium thiosulphate). Stain-removal techniques: scraping (blunt knife), dipping (immerse and scrub), sponging (reagent on top with blotting paper below), drop method (reagent applied with dropper to stretched cloth over a bowl).

Water is the most valuable laundry agent. Pedesis — the Brownian motion of water particles — loosens non-greasy dirt. Higher water temperature increases pedesis and penetration. But water alone cannot dissolve grease or keep insoluble dirt suspended, so soap/detergent (surfactants) are needed. Surfactants reduce surface tension, allowing water to wet the fibre and lift dirt into a stable emulsion that rinses away. Soaps are biodegradable, milder on skin/environment, but ineffective in hard water (Indian regions with calcium/magnesium-rich groundwater suffer from soap scum); detergents are more powerful, engineered for specific tasks, and dominate India's modern laundry market.

Methods of washing: friction (vigorous rubbing — only for strong cottons; never for silk, wool, pile, looped, embroidered), kneading and squeezing (delicate fabrics — wool, silk, rayon, coloured), suction washing (big heavy articles — towels, blankets — via a suction washer), and machine washing (manual / semi-automatic / fully automatic). After washing, articles are rinsed thoroughly to remove detergent and finished with blueing (ultramarine blue powder or liquid blues to counter yellowness), stiffening (starch — wheat/maida, rice, arrow-root, tapioca — for cotton/linen; gum arabic/acacia for silks; gelatin; borax additive for water-repellent crispness), and optical brighteners (fluorescent dyes — not bleaches — that give intense whiteness without destroying any colour).

Drying: outdoors in sun (wrong side out) for cottons; indoors for silk, wool, synthetics (which yellow or weaken in sun). Sun also acts as natural bleach and antiseptic. Ironing requires three things — high temperature, moisture, pressure — and is best done with electric iron (controlled temperature); pressing (lift and place) is used for lace and embroidery that would stretch under sliding iron.

Dry-cleaning uses a non-aqueous liquid medium — perchloro-ethylene (perc, the industry workhorse), petroleum solvent, or fluorocarbon solvent. Because water is absent, fibres do not swell, shrink, wrinkle, or bleed colour — making dry-cleaning ideal for silk, wool, polyester sarees, suits, and structured tailored garments. Dry-cleaning is generally an industrial activity (not household) involving inspection, tagging, spot-board pretreatment, dry-cleaning machine wash, and finishing-press.

Storage requires articles to be clean, dry, mended, stain-free, brushed and (for woollens) dry-cleaned; pockets turned out, sleeves turned up, packing loose to avoid permanent creases; shelves clean, dry, insect-free, low humidity. Mothballs (naphthalene), neem leaves, lavender sachets and silica-gel desiccants are common Indian additions.

The care label (introduced at the end) is the consumer's working contract with the manufacturer: it spells out washing temperature (cold  $\leq 30^{\circ}\text{C}$ , warm  $40\text{-}50^{\circ}\text{C}$ , hot

60-90°C), cycle (normal/permanent press/gentle), bleaching permission, drying method (line/flat), ironing temperature (210°C for cotton/linen, 160°C for wool/polyester, 120°C for silk/acrylic/nylon) and dry-cleaning permission (A = all solvents; F or P = special; ☒ = do not dry-clean). Indian Standard IS 4943 governs textile care labels in India.

## 2.2 Definitions to memorise

Term	Definition	Page
Mending	General term for keeping fabric free of damage from normal use/accident — repairing tears, replacing fasteners, restitching seams; done before laundering	204
Stain	Unwanted mark or colouration caused by contact/absorption of foreign matter; cannot be removed by normal washing	204
Vegetable stains	Acidic stains from tea, coffee, fruits, vegetables — removed by alkaline medium	204
Animal stains	Protein stains from blood, milk, meat, eggs — removed by detergents in cold water only	204
Mineral stains	Stains from ink, rust, coal tar, medicine — washed first in acidic then alkaline medium	204
Dye bleeding	Colour transferred from other fabrics — removed by dilute alkalis or acids depending on fabric	204
Pedesis	Movement of water particles that helps remove non-greasy dirt from fabric	207
Surfactant	Surface-active agent (soap/detergent) that reduces surface tension of water	207
Dry cleaning	Cleaning of fabrics in a non-aqueous liquid medium (perchloro-ethylene, petroleum or fluorocarbon solvent)	207, 212
Optical Brightening Agent	Low-grade fluorescent dye that absorbs short-wavelength light and re-emits it at longer wavelength, giving intense whiteness; not a bleach	209
Borax	Added in small quantity to starch solution; on ironing forms a water-repellent film, maintaining crispness in humid climates	210
Care label	Permanent tag with regular care information that remains attached and legible for the useful life of the garment	216
Oil stain	Grease stain — removed by solvent or absorbent	204
Scraping	Stain technique using blunt knife to remove built-up stain	205
Sponging	Stain technique with reagent on top and blotter below	205
Drop method	Stain technique with reagent dropper over a bowl	205
Oxidising bleach	Bleach removing chromophore by oxidation (sunlight, NaOCl, H <sub>2</sub> O <sub>2</sub> )	205

Term	Definition	Page
Reducing bleach	Bleach removing chromophore by reduction (Na hydrosulphite, Na bisulphate, Na thiosulphate)	205
Javelle water	Sodium hypochlorite — common oxidising bleach	205
Fuller's earth	Common grease absorbent	205
Methylated spirit	Common grease solvent	205
Blueing	Use of ultramarine/liquid blue to counter yellowness of repeatedly washed whites	209
Starch	Stiffening agent for cotton/linen	210
Gum arabic	Stiffening agent for silk and fine cottons	210
Pressing	Lift-and-place ironing for lace/embroidery	211
Perchloro-ethylene	Main dry-cleaning solvent	212
Saponification (context)	Chemical reaction forming soap	India context

### 2.3 Diagrams / processes to remember

- **Classification of stains** (vegetable, animal, oil, mineral, dye bleeding) with the correct chemical medium for each (p. 204).
- **Reagent groups** — grease solvents, grease absorbents, emulsifiers, acidic reagents, alkaline reagents, and oxidising vs reducing bleaches (p. 205).
- **Specific stain treatments table** (p. 206) — e.g., blood: soak in cold water immediately; ink: starch paste or borax/salt/hot water; tea/coffee: borax and hot water etc.
- **Methods of washing** flow: Friction → Kneading & Squeezing → Suction → Machine (p. 208).
- **Care label symbols** table — washing temperatures (cold/warm/hot), wash cycle (normal/permanent press/gentle), rinsing, drying, pressing temperatures (210°C/160°C/120°C), bleach permitted/not, dry-cleaning (A = all solvents; F = special care; S = white spirit only; ☒ = do not dry-clean) (p. 217).
- **Fibre-wise care table (Table 2)** — cotton, wool, silk, rayon, nylon, polyester — listing fibre property and corresponding care requirement (pp. 213-215).

### 2.5 Key data / textile-care processes table (Indian context)

Item	Value / fact	Source
Five stain classes	Vegetable; Animal; Oil; Mineral; Dye bleeding	NCERT p. 204
Vegetable-stain medium	Alkaline	NCERT p. 204

Item	Value / fact	Source
Animal-stain medium	Cold water + detergent	NCERT p. 204
Mineral-stain medium	Acidic first, then alkaline	NCERT p. 204
Six reagent groups	Grease solvent; Grease absorbent; Emulsifier; Acidic; Alkaline; Bleach	NCERT p. 205
Oxidising bleaches	Sunlight; sodium hypochlorite; sodium perborate; H <sub>2</sub> O <sub>2</sub>	NCERT p. 205
Reducing bleaches	Na hydrosulphite; Na bisulphate; Na thiosulphate	NCERT p. 205
Stain techniques	Scraping; Dipping; Sponging; Drop method	NCERT p. 205
Pedesis	Movement of water particles	NCERT p. 207
Surfactant	Surface-active agent (soap/detergent)	NCERT p. 207
Methods of washing	Friction; Kneading-squeezing; Suction; Machine	NCERT pp. 208–209
Friction wash suitability	Strong cottons only	NCERT p. 208
Delicate wash method	Kneading and squeezing	NCERT p. 208
Blueing agent	Ultramarine blue powder or liquid blue	NCERT p. 209
Optical brightener	Fluorescent dye — NOT a bleach	NCERT pp. 209–210
Starch sources	Wheat/maida; rice; arrow-root; tapioca	NCERT p. 210
Gum arabic source	Babool tree	NCERT p. 210
Borax function	Water-repellent film on ironing	NCERT p. 210
Ironing needs	Temperature + Moisture + Pressure	NCERT p. 211
Ironing temperature (cotton/linen)	210°C	NCERT p. 217
Ironing temperature (wool/polyester)	160°C	NCERT p. 217
Ironing temperature (silk/acrylic/nylon)	120°C	NCERT p. 217
Dry-cleaning solvents	Perchloro-ethylene; petroleum solvent; fluorocarbon solvent	NCERT p. 212
Care-label Indian standard	IS 4943	India context

## 2.4 Common confusions / NTA trap points

- **Optical brighteners ≠ bleach** — they give a visual whiteness by fluorescence but **cannot destroy a colour**; bleaches actually oxidise/reduce the chromophore (p. 210).

- **Animal stains (protein) need COLD water only** — hot water sets the protein and makes blood/egg stains permanent (p. 204).
- **Vegetable stains are acidic** → **removed by alkali; mineral stains need acid first, then alkali** — don't reverse this (p. 204).
- **Borax is not a starch** — it is an additive to the starch solution that forms a water-repellent film after ironing (p. 210).
- **Friction washing is for strong fabrics (cotton)** and must NOT be used on silk, wool, pile, looped or embroidered surfaces — kneading-squeezing is the delicate-fabric method (p. 208).
- **Dry-cleaning uses non-aqueous solvents (perchloro-ethylene, petroleum, fluorocarbon)** — not water; that is why it does not cause shrinkage/colour bleeding (p. 212).
- **Wool is weaker when wet** and felts under mechanical action — needs gentle handling and lukewarm water; never friction wash (pp. 213-214).
- **Silk weakens on prolonged sunlight** — should not be dried in sun (p. 214).
- **Cotton is stronger when wet** (a key fact used in laundering) — most other fibres weaken when wet.
- **Mending must be done BEFORE laundering**, not after — NTA distractors often reverse this.
- **Powdered ultramarine blue** tends to give patchy results; liquid blues are more even — a CUET nuance.
- **Borax is alkaline** but is grouped under stiffening additives, not bleaches.
- Ironing temperatures — cotton/linen 210°C > wool/polyester 160°C > silk/acrylic/nylon 120°C — descending order.

## Practice MCQs

## PYQ Alignment

Care and Maintenance of Fabrics is a high-yield chapter in CUET Home Science (Class XI), typically yielding 5-8 MCQs per year. NTA favours direct factual recall on stain classification, reagent identification, definitions (pedesis, surfactant, dry-cleaning, optical brightener), method-fabric matching (friction vs kneading), and care-label/symbol interpretation — with a steady appearance of assertion-reason questions on optical brighteners vs bleach and on fibre-specific care.