

RAINCOAT IS A WATERPROOF ARMOUR OF FABRICS TO PROTECT THE BODY FROM RAIN

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ABSTRACT

Raincoats are made of waterproof or water-resistant synthetic and natural fabrics treated with plastic, rubber, or specialized breathable membranes. A raincoat is a waterproof or water-resistant outer garment designed to protect the body from rain. **Overview & Materials:** Definition: A protective coat worn over clothing to keep the wearer dry during wet weather. **Common Materials:** Usually made from synthetic fabrics like polyester and nylon, often enhanced with waterproof coatings (such as DWR or polyurethane) or breathable membranes like Gore-Tex. **Design Styles:** Ranges from waist-length rain jackets and ponchos to full-length coats and two-piece rain suits.

KEYWORDS: PVC, Nylon, Polyurethane, Polyester.

INTRODUCTION

Raincoats are primarily made from a combination of a woven base fabric, waterproof coatings or membranes, and chemical water repellents. The exact "ingredients" vary depending on whether the raincoat is designed to be

a cheap disposable poncho, a high-performance breathable hiking jacket, or a classic fashion trench coat. The modern waterproof raincoat was invented by the Scottish chemist **Charles Macintosh** in 1823.

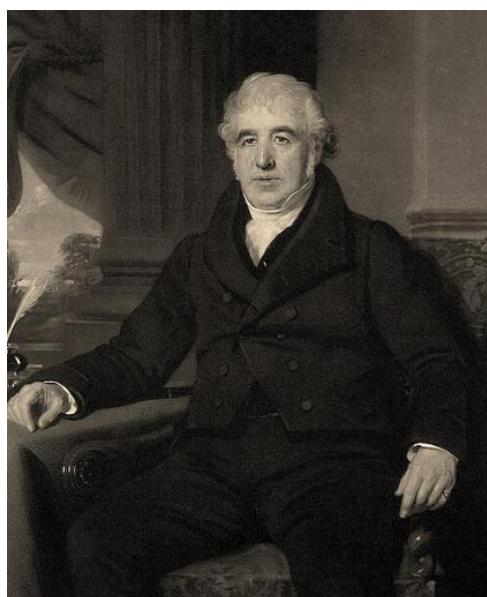


Figure-1: Charles Macintosh [Inventor of raincoat].

How It Was Made

The Discovery: He found that coal-tar naphtha (a waste product from gasworks) could dissolve rubber.

The Technique: He painted this liquid rubber onto a layer of wool cloth.

The Sandwich: He placed a second layer of wool cloth on top to seal the rubber inside.

The Name: Raincoats made this way became known as "mackintoshes" (often spelled with a "k"). Charles Macintosh FRS (29 December 1766 – 25 July 1843) was a Scottish chemist and the inventor of the modern waterproof raincoat. The Mackintosh raincoat (the variant spelling is now standard) is named after him.



Figure-2: Raincoat of Men, Women and Child.

The Base Fabrics (The Structural Layer)

Most raincoats start with a woven textile that provides strength, structure, and flexibility

Polyester: The most popular choice. It is highly durable, lightweight, affordable, and dries quickly.

Nylon: Often preferred for rugged outdoor apparel. It is exceptionally strong, lightweight, and has high abrasion resistance.

Cotton or Wool Blends: Commonly used in traditional outerwear like trench coats. They are heavier but provide a premium look and comfort.

Waterproof Elements (The Invisible Barrier): Standard fabrics are porous, so manufacturers rely on

coatings or specialized layers to create a barrier against water:

Polyurethane (PU) Coating: A thin liquid plastic layer applied directly to the underside of the fabric. It is flexible, highly waterproof, and relatively inexpensive.

Polyvinyl Chloride (PVC): A heavier, completely non-breathable plastic polymer used for heavy-duty industrial or low-cost rainwear.

Gore-Tex (ePTFE Membrane): A high-performance, microporous film made from expanded polytetrafluoroethylene. It contains billions of microscopic holes that are too small for water droplets to pass through but large enough to let sweat vapour escape.

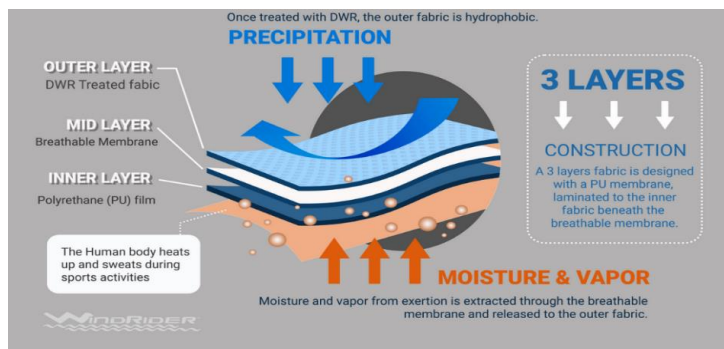


Figure-3: Raincoat layers.

Natural Wax or Lanolin: Used in heritage style or oilskin coats. Cotton or wool fabrics are thoroughly saturated with paraffin, beeswax, or oils to repel moisture.

Surface Finishes (The Repellent): To prevent the outer layer of the jacket from absorbing water and feeling heavy, rainwear is treated with a chemical wash.

Durable Water Repellent (DWR): A finish applied to the exterior face fabric that causes water to bead up and

roll off. Historically, these were formulated using fluorochemicals like PFAS ("forever chemicals"), though modern manufacturing is actively shifting toward eco-friendly, PFAS-free alternatives like silicone, wax, or dendrimer-based finishes.

Some of the most famous and trusted raincoat companies in India include Duckback, Zeel Rainwear, and Wildcraft.Top



Figure-4: Duckbak, Zeel & Wildcraft raincoat.

Famous Raincoat Brands in India:

- **Duckback:** Recognized as India's oldest and a deeply historic rainwear brand established in the 1920s, famous for classic heavy-duty and durable rubberized raincoats. Over the years, Duckback raincoats became a familiar sight during monsoons across the country.
- **Zeel Rainwear:** One of the largest climate-comfort clothing and rainwear manufacturers in India, offering a wide range of affordable, 100% waterproof jacket-and-pant sets.
- **Wildcraft:** A leading outdoor gear brand in India providing lightweight, technical rain jackets and

ponchos designed for trekking and urban commuting.

Hardware and Structural Elements: A raincoat is only as good as its weakest seam. The assembly also requires:

Seam Sealing Tape: Polyurethane tape melted over the stitched needle holes on the inside of the jacket to keep water from leaking through the seams.

Fasteners: Plastic or heavy-duty marine-grade metal snaps, zippers, and eyelets.

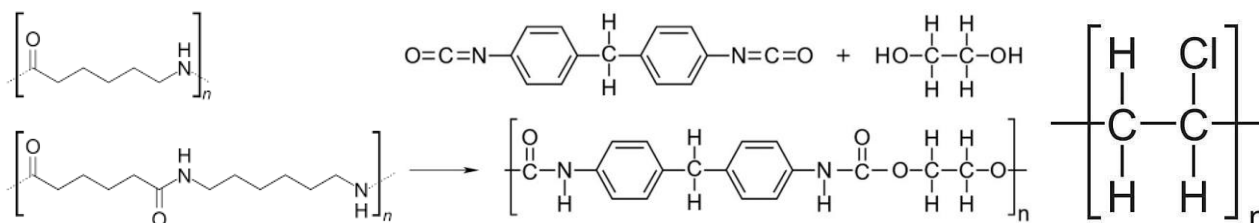


Figure-5: Nylon, Polyurethane, Poly Vinyl Chloride fabrics.

Rainwear fabrics are specialized textiles treated or constructed to prevent water penetration while balancing durability, weight, and breathability.

Common Rainwear Fabrics

Nylon: Lightweight and strong, nylon is a popular choice for high-performance outdoor jackets and windcheaters. It is often treated with a Durable Water Repellent (DWR) coating.

Polyester: Softer and quicker to dry than nylon, polyester resists UV rays well and is often coated with polyurethane (PU) or thermo-polyurethane (TPU) for waterproofing.

PU / PVC Coated Fabrics: Traditional heavy-duty rainwear uses a woven base (like polyester or nylon) coated with polyvinyl chloride (PVC) or polyurethane (PU) for 100% waterproof protection, though with lower breathability.

Membrane Fabrics (Hard Shells): Advanced 2-layer, 2.5-layer, or 3-layer constructions bond a waterproof, breathable membrane between outer fabrics and linings to block rain while letting body vapour escape.

CONCLUSION

A raincoat is a waterproof or water-resistant garment worn on the upper body to shield the wearer from rain. The term rain jacket is sometimes used to refer to raincoats with long sleeves that are waist-length. A rain jacket may be combined with a pair of rain pants to make a rainsuit. Rain clothing may also be in one piece, like a boilersuit. Raincoats, like rain ponchos, offer the wearer hands-free protection from the rain and elements; unlike the umbrella.

REFERENCES

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