D&T Knowledge organiser

•Textiles & Modern textiles

Sources

Uses / applications

Activities-

•Read and highlight key points

• Make a Mind Map or diagram for each sub heading with names, properties, examples and possible uses / products

- •Smart materials
- •Modern materials
- •Composite materials
- •Modern textiles

Use

www.Technology student . com

https://www.ted.com/talks/catarina_mota_play_with_smart_materials

Textiles Modern Materials

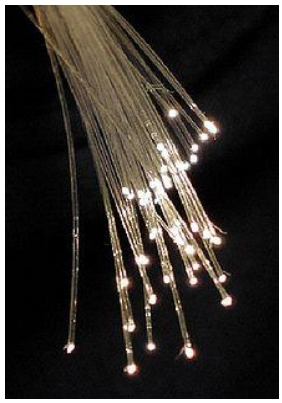
Modern materials are those that are continually being developed through the invention of new or improved processes

Examples include:-

- Fibre Optics
- Neoprene
- Paperfoam
- Cornstarch Polymers
- Lyocell
- Nano Technology
- Synthetic micro fibres
- Lycra blends
- Polartec
- Composite materials
- Cellular materials
- Carbon & Kevlar fibre
- Maplex

Mountain Boots made from Synthetic Micro Fibres

Neoprene Laptop Cover

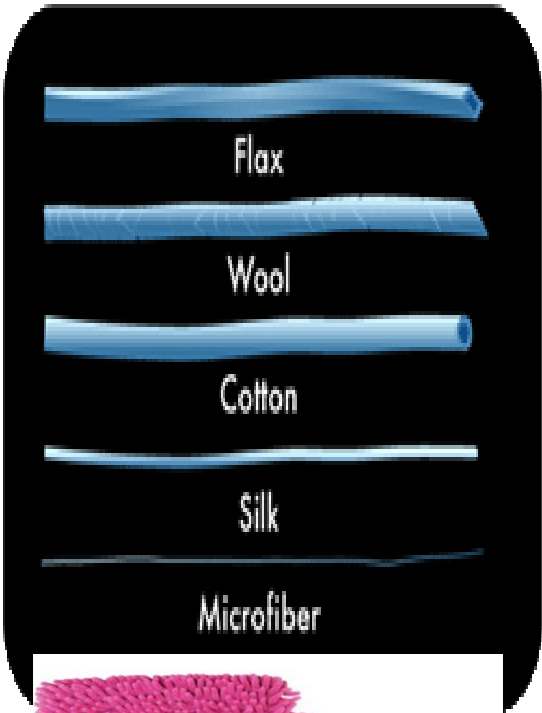


Fibre Optics

Helmet made from Carbon/Kevlar fibre

Micro fibres

- Extremely fine synthetic fibres, mainly polyester and polyamide
- They are very lightweight,
- Soft and drape well
- Lifts and traps moisture allowing it to evaporate quickly keeping the user warm and dry. Used for a variety of clothing products
- Often blended with natural fibres to give high performance fabrics for outdoor and sports use.
- TACTEL-is a polyamide microfibre
- TENCEL-is a regenerated mircofibre classed as LYOCELLS
- Also good for cleaning as it traps dirt better than cotton.

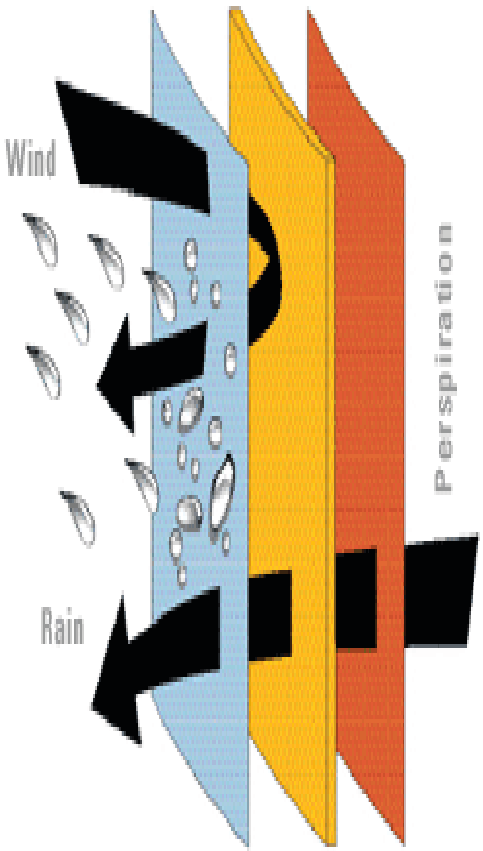


Kevlar – for protective clothing

- heat-resistant and strong
- They are used in aerospace and military applications, for ballistic rated body armour fabric and ballistic composites, in bicycle tires, and as an asbestos substitute
- good resistance to abrasion and cut resistant
- good resistance to organic solvents
- low flammability, no melting point, degradation starts from 500°C

Kevlar protective sleeves provide protection from heat. These sleeves also help prevent getting cut when lifting hot or sharp objects.

Gortex – waterproof & breathable membrane



- Waterproof breathable fabric is engineered to handle two tasks simultaneously: repel precipitation and release perspiration vapor.
- Blocks wind
- Only used with synthetics- naturals absorb but the moisture can go back onto the skin
- Used in tents and waterproof walking gear.
- Wound care- creates a barrier that stop moisture going back onto the skin but allows the skin to breathe

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Nomex – is a fire resistant version of Kevlar

Properties of Nomex make it a perfect protective material for race-car drivers & fire fighters.

•Although **Nomex burns** when you hold a flame up to it, it stops burning as soon as the heat source is removed. In other words, it is **flame resistant**.

•Just as important, the thick woven structure of synthetic fibers is a very poor conductor of heat so gives the wearer good protection from high heat – for a limited time.

Kevlar As a woven material

Is used in bullet proof vests

Can be woven together. Kevlar is often woven with carbon fiber and resin to make light weight stronger than steel panels

.Resistant to stretching or breaking.

.Resistant to abrasion and cuttin

.High strength to weight

Kevlar

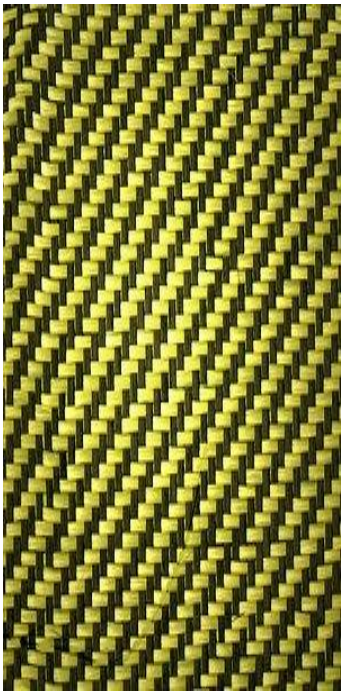
Kevlar®

Kevlar® is a liquid that is converted into a fibre (called aramid fibres) and then woven into a textile material. The resulting textile material is extremely strong, lightweight, corrosion and heat resistant. It is often used in combination with other materials, forming composites. It has a wide range of uses. Kevlar® was developed at DuPont in the 1960s.

Kevlar® has a high tensile strength to weight ratio, far exceeding steel and even specialist metal alloys, such as magnesium alloys, used in aerospace engineering.

For this reason it is used extensively in the manufacture of panels and wings for fighter jets, including the Eurofighter Typhoon. During the manufacture of Formula One racing cars, Kevlar® is used for the bodywork and petrol tank. Kevlar has many other uses.

When woven, Kevlar® forms a strong and flexible material. If layers of the woven Kevlar® are combined with layers of resin, the resulting 'rigid' material is light and has twenty times the strength of steel.

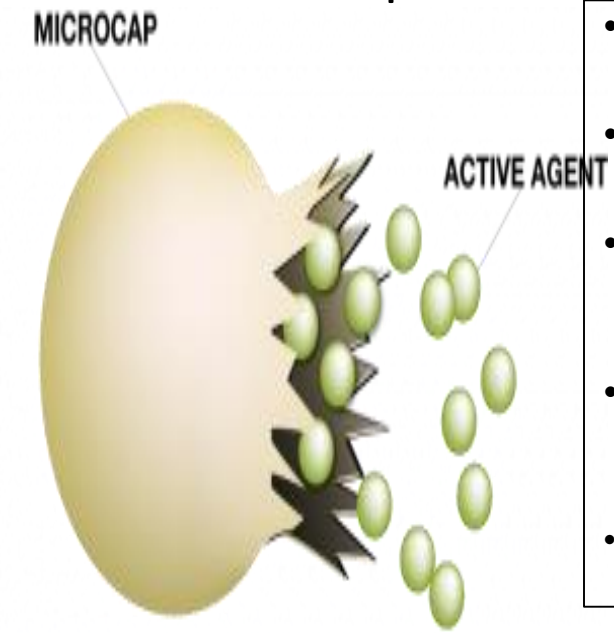


Quantum-tunnelling composite (QTC) is a **flexible polymer which contains tiny metal particles**. It is normally an insulator but if it is squeezed it becomes a conductor.
QTC can be used to make membrane switches like those used on mobile phones, pressure sensors and speed controllers.

The following are possible uses of QTCs:
•Sporting materials such as training dummies or fencing jackets can be covered in QTC material. Sensors on the material can relay information on the force of an impact.
•Mirror and window operation such as gesture, stroke, or swipe can be used in automotive applications. Depending on the amount of pressure applied from the gesture, the car parts will adjust to the desired setting at either a fast speed or a slow speed. The more pressure is applied, the faster the operation will take.
•Blood pressure cuffs: QTCs in blood pressure cuffs reduce inaccurate readings from improper cuff attachment. The sensors tell how much tension is needed to read a person's blood pressure.

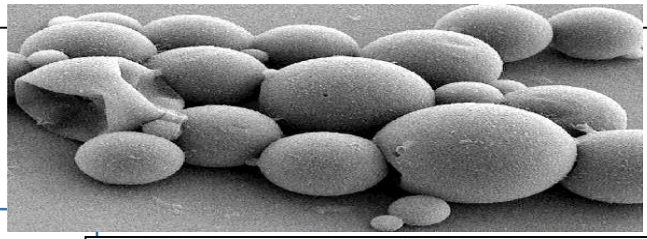
Based on the information above, how can you summarise what QTC does

Microencapsulation



RELEASE OF THE ACTIVE AGENT

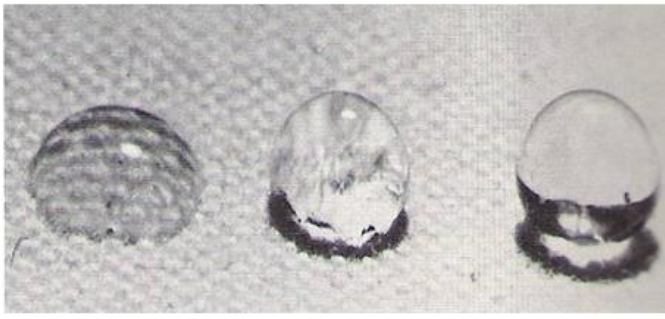
- A way to insert, fragrances, antibacterial substances into fibres
- Capsules are broken through friction and release the scent, or chemical
- You can insert moisturisers into tights to condition the skin, or caffeine to prevent tired legs
- Facemasks at hospitals may have it in to prevent germs spreading, in fabric conditioners,
- Embedded into designer clothes



Water-repellent finishes

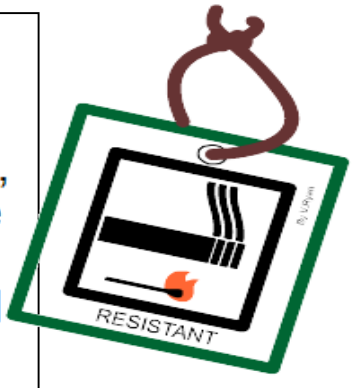
- Nano-technology can be used to make fibres hydrophobic so they repel water and stains, eg NanoSphere®.
- Anti-static finishes are applied to *dry* fibres, eg polyester and polyamide.
- Lubricants and softeners can be applied to the fibres but do not always give a permanent finish.
- Fibres can include carbon or be coated with silver or copper to increase the electrical conductivity.

- Water-repellent finishes prevent water molecules from breaking down and being sucked (wicked) into the fabric.

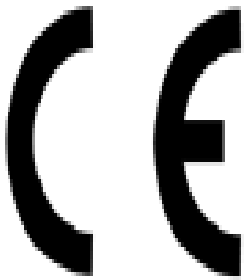


Fire resistant Chemical finishing – Probane & Pyrovatex

- Flame resistant finishes on cellulosic fibres include *Proban* and *Pyrovatex*.
- Both finishes increase the stiffness of the fabric, reduce tearing strength and are expensive. The use of soap detergents, bleaches and high temperature washing can remove the finish and leave the fabric more flammable.

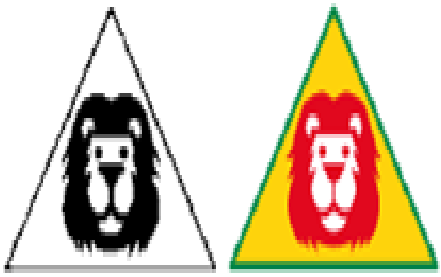


safety – safety and law relating to textile products including toys



The CE Symbol

- Toys must have this on them by law. It indicates the toy meets the European Toy Safety Directive. This is aimed at Trading Standards and tells them the toy is allowed to be sold in Europe. It is less relevant to the average consumer and doesn't necessarily indicate quality and safety for the consumer.



The Lion Mark

- Developed by the British Toy and Hobby Association as a symbol of toy safety and quality. It can only be used by members of the BTHA. This is a voluntary symbol.

Age Appropriate Labels

- One of the principles of the Lion Mark scheme is that toys are used by children of an appropriate age. This symbol indicates the toy is not suitable for a child under 3 e.g. because of a choke or suffocation hazard.

The Kitemark

- Some toys also carry the British Standards Institute Kitemark. This indicates the toy has been independently tested and complies with BS EN 71.