

stuff in Smart Materials, Composites and technical textiles

Read Chapter 2 – page 23 to 29

1. Draw out and complete this table

Smart Material	Is it known by another name? If so what?	What does it react to / what does it do	use
Electroluminescent material	EL wire.	It provides a light then exposed to and electrical current.	Mobile phones, car dashboards display.
QTC	Quantum tunnelling composite.	It can be a conductor or an insulator.	Speed controllers, mobile phones and pressure sensors.
SMA	Shape memory alloy.	When a force is applied it will remember the shape.	Braces and medical things.
Polymorph	No other name.	It becomes soft at low temperatures.	Often used in schools.
Photochromic pigment	No other name.	Becomes darker when exposed to UV light.	Used in sunglasses.
Thermochromic pigment	No other name.	Change colour when heated or cooled.	On drink labels to show when they are best temp.
Micro encapsulation	No other name.	The capsules can contain things.	Children's wear, household textiles.
Biomimetics	No other name.	Things which come from the natural world.	Swim wear.

2. Draw out and complete this table

Composite Materials	Full name	Properties	use
CFRP	Carbon fibre reinforced polymer.	Light weight and strong.	Cars and Planes.
GRP	Glass reinforced plastic.	High mechanical strength light temperature resistant.	Storage tank piping protective equipment.
Kevlar	Poly para phenylene.	Tensile strength, high toughness.	Aerospace.

3. Find a sporting use for CFRP, GRP and Kevlar

Kevlar has many uses, for example, it is used for bullet proof vests and bike tyres. GRP is often used for protection because it is so light. CFRP is used in bike frames and hockey sticks because it is so light.

4. Draw out and complete this table

Technical Textiles	Properties	use
Interactive textiles		
Microfibres	Very strong, breathable.	cloths
Phase change materials	Change physical characteristics when absorbing or releasing heat.	

Breathable fabrics	Moisture and heat regulation	Winter clothes
Rhovyl	Hygienic toughness	clothes
Nomex	Strong and tough	clothes
Geotextiles	Tenacity and flexible	Drainage

5. Dupont developed Kevlar and Nomex. What is Dupont? How long have they been in business, what does it do? What other materials have they developed?

<https://www.dupont.com/>

Dupont is an American company founded in 1802. They make many different materials such as Vespel, neoprene, nylon, Corian and Teflon. They also made a new material called Freon, which gets used in the refrigeration industry.

6. Why are composite materials difficult to recycle?

Composite materials are difficult to recycle because of their properties, if it is heat proof then it will take a lot of energy to melt it.

7. Define a smart material

A smart material is a material where it reacts to its environment, for example Nomex, a flame-resistant material.

8. Define a composite material

A composite material is two or more materials combined together to make use of their individual properties.