1.15 Responsive materials: 10-minute Pack

AQA 8552 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 A strip made from fictional material LumaFlex becomes paler under ultraviolet (UV) light and returns to its original colour in indoor shade. Identify the stimulus and the response. [2 marks]

(Total for Question 1 is 2 marks)

2 For a fictional shape-responsive panel, the same sample was tested once at each temperature. Mean measured bend was 1 mm at 20 C and 8 mm at 40 C. Explain what the results suggest and give two limitations when predicting performance in a product. [4 marks]

(Total for Question 2 is 4 marks)

3 A fictional sheet called ThermoWeave curls when warmed and lies flat again when cooled. Explain what makes this a reversible response and state one observation that would indicate that it was not fully reversible. [3 marks]

(Total for Question 3 is 3 marks)

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Mark scheme · 1.15 Responsive materials: 10-minute Pack

Question 1

Stimulus: ultraviolet light or change in UV exposure	**B1**
Response: the strip becomes paler (and returns to its original colour in shade)	**B1**

Answer: Stimulus: UV light. Response: the LumaFlex strip becomes paler; it returns to its original colour in shade.

Question 2

States the panel bent more at 40 C than at 20 C	**B1**
Links this difference to a possible temperature-responsive change under the stated test	**B1**
Identifies one limitation: only one sample or no repeat tests/uncertainty information	**B1**
Identifies a distinct limitation: only two temperatures, or no information about recovery, duration, ageing or finished-product conditions	**B1**

Answer: The panel bent more at 40 C (8 mm) than at 20 C (1 mm), suggesting a temperature-associated change under these test conditions. Confidence is limited because only one sample and no repeats are reported. Two test temperatures also do not show the response between them or whether the panel returns after cooling.

Question 3

Identifies warming or temperature increase as the stimulus	**B1**
Explains that cooling restores the original flat form after curling	**B1**
Gives a relevant sign of incomplete return, such as remaining curled, cracking or not returning to the original shape	**B1**

Answer: Warming is the stimulus and curling is the response. The behaviour is reversible because cooling returns the sheet to its original flat form. A remaining curl after cooling would show incomplete return.

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