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Design & Technology
AQA GCSE

The modification of properties for specific purposes

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don’t spend too much time on one question

Good luck!

Q1. What is the purpose of seasoning timber?

A To add decorative finishes

B To reduce moisture content and prevent warping

C To make it more flexible

Q2. How does annealing improve the workability of metals?

A By hardening the surface

B By making the metal more brittle

C By softening the material to improve malleability

Q3. What is the function of UV stabilisers in polymers?

A To resist UV degradation and prolong lifespan

B To improve UV conductivity

C To make them biodegradable

Q4. What is the purpose of anodizing aluminium?

A To make it more flexible

B To improve surface hardness and corrosion resistance

C To reduce weight

Q5. Select one of the following materials treatments/additive processes

Papers & Boards	Timber	Metals	Polymers	Textiles	Electronics
Additives to prevent moisture transfer	Seasoning	Annealing	UV stabilisers	Flame retardants	Photosensitive PCB boards

Q5a. What is the purpose of this treatment? **(1 mark)**

Q5b. How does the process work? **(2 marks)**

Q5c. Give one example of a product that benefits from this treatment **(1 mark)**

Answers

Q1. B
Q2. C
Q3. A
Q4. B

Q5.

Option 1: Additives (Paper/Boards – Moisture Prevention)

1. **Purpose:** Prevents water absorption/warping. *(1 mark)*
2. **Process:**
    - Wax/polymer coatings applied to surfaces. *(1 mark)*
    - Blocks moisture transfer between layers. *(1 mark)*
3. **Example:** Food packaging (e.g., cereal boxes). *(1 mark)*

Option 2: Seasoning (Timber)

1. **Purpose:** Reduces moisture content to prevent warping. *(1 mark)*
2. **Process:**
    - Timber air-dried or kiln-dried over weeks/months. *(1 mark)*
    - Moisture evaporates evenly to stabilize fibers. *(1 mark)*
3. **Example:** Hardwood flooring. *(1 mark)*

Option 3: Annealing (Metals)

1. **Purpose:** Softens metal to improve malleability. *(1 mark)*
2. **Process:**
    - Heated to critical temperature, then cooled slowly. *(1 mark)*
    - Relieves internal stresses/grain realignment. *(1 mark)*
3. **Example:** Copper wires for electrical cables. *(1 mark)*

Option 4: UV Stabilisers (Polymers)

1. **Purpose:** Resists degradation from sunlight. *(1 mark)*
2. **Process:**
    - Additives absorb/reflect UV radiation. *(1 mark)*
    - Prevents polymer chain breakdown. *(1 mark)*
3. **Example:** Garden furniture. *(1 mark)*

Option 5: Flame Retardants (Textiles)

1. **Purpose:** Reduces flammability. *(1 mark)*
2. **Process:**

    - Chemicals applied to fibers (e.g., brominated compounds). *(1 mark)*
    - Release flame-smothering gases when heated. *(1 mark)*
3. **Example:** Curtains in public buildings. *(1 mark)*

Option 6: Photosensitive PCB Boards

1. **Purpose:** Transfers circuit designs accurately. *(1 mark)*
2. **Process:**
    - UV light exposes photoresist coating through a mask. *(1 mark)*
    - Unhardened areas etched away to reveal copper traces. *(1 mark)*
3. **Example:** Computer motherboards. *(1 mark)*