**Design & Technology**

**AQA GCSE** Logo

Description automatically generated with low confidence

**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)*