Design & Technology

Polymers

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try to 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
- Don’t spend too much time on one question

Good luck!

Q1. What is an advantage of all thermoplastics?

A Resist UV degradation

B Can be reheated and reshaped

C Easy to finish

Q2. What might acrylic be used for?

A CD cases

B Piping

C fizzy drinks bottles

Q3. What is an advantage of using Polyvinyl Chloride?

A Scratch resistant

B Easy to recycle

C Available in a range of colours

Q4. ABS is used in motorcycle helmets for what reason?

A Its chemical resistant

B Its heat resistant

C It's tough

Q5. What is epoxy resin used for?

A Adhesives

B Domestic appliances

C Garden furniture

Q6. What is a disadvantage of using Urea formaldehyde?

A Emits toxic gases when manufactured

B Poor heat resistance

C Causes allergic reactions

Q7. What non-renewable resource are polymers made from?

A Natural gas

B Crude oil

C Petrol

Q8. What is a common disadvantage of most thermosets?

A Soft

B Brittle

C Poor corrosion resistance

Q9. Disposable forks can be manufactured from polystyrene. Polystyrene is chosen since it is lightweight and readily accessible in a variety of colours.

List **six** additional characteristics of polystyrene that make it a good choice for throwaway forks **(6 marks)**

Q10. PVC has many characteristics, including strength and the ability to be made in a variety of colours.

Explain **three** additional characteristics that this polymer has that make it a good choice for making drainpipes **(6 marks)**

Q11. Packaging frequently makes use of polymers.

Analyse and evaluate the use of plastics in packaging **(6 marks)**

Answers

Q1. B
Q2. A
Q3. C
Q4. C
Q5. A
Q6. A
Q7. B
Q8. B

Q9.

- Tough (1)
- Easily mass produced (1)
- Inexpensive polymer (1)
- Chemical resistant (1)
- Non-toxic (1)
- Heat resistant to food temperatures (1)
- Recyclable (1)
- Thermal insulator (1)
- Smooth surface finish (1)

Q10.

- Corrosion resistant (1) so that it is not affected by outside conditions (1)
- UV resistant (1) so will not become brittle as quickly as other polymers (1)
- Tough (1) so can withstand knocks (1)
- Sufficiently hard (1) not worn away by flowing contents (1)
- Easily extruded (1) so it can be mass produced economically (1)
- Flexible (1) so can be fitted to uneven surfaces (1)
- Lightweight (1) does not require substantial mountings (1)
- Easily cut/joined (1) so fitting is simple (1)
- Relatively cheap (1) so it can be sold at a high margin (1)
- Self-finishing (1) reducing maintenance procedures (1)
- Recyclable (1) so does not contribute to land fill (1)
- Can be textured (1) to blend with existing architectural styles (1)
- Sufficiently high melting point (1) so is not softened by boiling water/ bright sunlight (1)

Q11.

Advantages (max 5)

- Lightweight so will not increase weight of product (1)
- Strong (1)
- Water resistant (1)
- Can be formed into intricate shapes (1)
- Easily printed on (1)
- Inexpensive in comparison to other materials (1)
- Greater speed of production then other materials (1)
- Impact resistant (1)
- Recyclable (1)
- Can be transparent so contents can be seen (1)
- Does not affect flavour of the contents as they are unreactive (1)
- Self-finishing (1)
- Comes in a wide range of colours (1)
- Chemically resistant (1)

Disadvantages (max 5)

- Consume large amounts of energy in production (1)
- Use up non-renewable resources (1)
- Pollute environment (1)
- Uneconomical (1)
- Add to land fill (1)
- Can be hazardous to health (1)
- Creates toxic fumes when burnt (1)
- Some plastics cannot be recycled (1)