

1. Finite ones are limited and will run out. Renewable ones will not run out
2. Coal, crude oil, natural gas, metals
3. Solar energy, wind, biofuels, crops, wood, hydroelectric, geothermal
4. Might be easier to adjust the properties of the tire e.g. resistance to wear, strength. Could be easier to acquire and manufacture, could require less space to manufacture starting resources.
5. Could be more expensive to produce, production could result in release of harmful gases – same for disposal.
6. –
 - a. A mixture of different hydrocarbons formed from the remains of ancient dead biomass
 - b. C_2H_4
 - c. Polymer
 - d. Cracking
 - e. $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$
 - f. Greenhouse gas, contributes to global warming and climate change
7. –
 - a. Exothermic
 - b. Finite
 - c. Coal forms over millions of years and we are using it at such a rate that reserves will be depleted
 - d. Because wood chippings are renewable as they can be re-grown. They are also carbon neutral as they take in carbon dioxide when growing
8. –
 - a. Iron oxide + carbon \rightarrow iron + carbon dioxide
 - b. $2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$
 - c. Reduction with carbon
 - d. Iron is less reactive than carbon
 - e. Iron oxide reserves will eventually run out so it is non-renewable
9. They may have harmful microbes or high levels of salts
10. Because unsterilized water can contain harmful microbes
11. Because it contains other safe chemicals (like minerals)
12. Potable water can still contain other substances whereas pure water contains just water
13. Not always as there may still be microbes in the water
14. Rainwater – riverwater can have sediments, salts and microbes whereas rain does not
15. Argument for renewable is that we can always clean the water and reuse, most water can be processed to be potable, the Earth's natural water cycle regenerates water. Argument for finite global warming could result in more water being in the atmosphere (but only a tiny bit), only renewable based on industrial processes of desalination or cleaning, we only have as much as there is – it just can be reused.
16. Because it will turn blue in the presence of anything containing water
17. –
18. Because it requires a lot of energy and can be expensive
19. Because there are other sources of water which are easier to extract potable water from
20. Distillation or reverse osmosis
21. It has dangerous salt levels
22. Because it contains minerals in it
23. –
 - a. Process by which pathogens and microbes are killed or removed
 - b. As most water is taken from sources that can contain **harmful** microbes
 - c. Chlorine, ozone or UV
 - d. Because it is pure so contains no microbes (also once water has been boiled it is sterilised)
24. No because it requires energy mostly from fossil fuels (but you could get from renewable sources). Yes because all water flows back to the sea so it will run out, no products are lost (salts can be sold), alternative is using depleting stores of fresh water
25. Large items like dead animals, twigs, branches
26. Sedimentation
27. Solids have different uses, require different treatments, could be harmful to ingest, large objects might disrupt machinery
28. Difficult to do large and small pieces at the same time, the different sized solids can be used again but for different things
29. Respiration in the absence of oxygen
30. The solids left over from sedimentation
31. The gas produced from the anaerobic digestion of sewage sludge
32. –
33. Because waste water can harm the ecosystem, also the amount of water suitable to drink would be reduced
34. –

- a. Waste water: sewage treatment process followed by sterilisation
Ground water: screening and sterilisation
Salt water: distillation or reverse osmosis (desalination)
 - b. Salt water requires the most energy, ground water is easiest as requires fewest steps, waste water is inbetween
35. Started charging 5p for plastic bags sold by large stores
 36. Because the majority of it ends up in landfills
 37. Polymers (from hydrocarbons)
 38. –
 - a. Water resistant, flexible enough to shape, sturdy enough to hold its shape
 - b. Air tight, tougher in order to withstand pressure
 - c. Rigid, durable, resistant to water/harsh chemicals
 - d. Light, spongy so shock resistant
 - e. Tough, difficult to scratch, doesn't blunt knives (potentially high melting point)
 39. Because different plastics have different properties
 40. Steel is magnetic, aluminium is not (except under very special circumstances)
 41. Non-renewable, would end up in a landfill otherwise, would need to use more energy to make new steel (associated disadvantages with mining)
 42. Trees/wood pulp
 43. Because of deforestation
 44. Separating materials
 45. –
 - a. Because less energy is required to melt it
 - b. This takes time, money and energy
 - c. Weight/density
 - d. Giant covalent structure, each atom is bonded to other atoms by strong covalent bonds
 - e. Because the covalent bonds are strong and therefore require a lot of energy to break
 - f. See indicative content:

Reused

- saves raw materials / crude oil
- unable to reuse many times
- bags easily split
- saves energy / fuel / transport
- fewer bags needed / made
- reduces carbon / CO2 emissions
- reduces use of landfill
- saves cost of a new bag
- no waste

1

Recycled

- saves raw materials / crude oil
- has to be collected / transported / washed / separated / melted
- saves energy / use of fuel
- reduces carbon / CO2 emissions
- reduces use of landfill
- can be used for new products

ignore uses energy

1

Burned

- heat / energy released can be used (for heating / generating electricity)
- has to be collected / transported
- reduces use of landfill
- wastes the resource / plastic
- releases harmful gases / toxic gases / CO₂

1

Dumped

- collected / transported with household waste
- wastes the resource
- plastic uses landfill
- (slowly) biodegrades or produces methane which can be used as a fuel
- produces methane which is a greenhouse gas / could cause explosions
- (not biodegradable so) does not release CO₂ / green house gas into the air
- not biodegradable / take years to decompose

ignore cost / litter / waste / global warming / habitats unless mentioned above

1

46. –

(a) Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

5–6

Level 2: Some logically linked reasons are given. There may also be a simple judgement.

3–4

Level 1: Relevant points are made. They are not logically linked.

1–2

No relevant content

0

Indicative content

raw materials

- crude oil finite or will run out (so will be unavailable for other uses)
- wood is a renewable resource
- wood involves land use for forestry (so less available for agriculture / food)

- wood may involve deforestation (so reduces biodiversity)

manufacturing

- both require energy which may be derived from finite fuels (so they run out more quickly)
- paper more energy intensive (so more pollution is possible)
- the need for more energy for paper potentially releases more carbon dioxide to the atmosphere (so increases global warming)
- paper involves higher water usage (so increases the potential for water pollution)
- paper cups are heavier to transport (so have higher energy requirement)
- packaging requirements similar (so neither has an advantage)

usage

- both single-use (so neither has an advantage)

disposal

- paper releases more energy if incinerated (so more energy can be used for other purposes)
- paper will decompose (so will not remain in landfill)
- poly(styrene) could release toxins on incineration
- poly(styrene) will not decompose (so will remain in landfill)
- poly(styrene) can be used to manufacture other products (so conserves energy or finite resources)
- both can cause litter or visual pollution

47. –

Level 2 (3-4 marks):

A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

Level 1 (1-2 marks):

Relevant points are made. These are not logically linked.

Level 0

No relevant content.

Indicative content

raw material

- wood will not run out
- aluminium (ore) will run out
- more expensive to process aluminium from its raw material

mass of frame

- wooden frame more expensive to transport
- wooden frame uses more fuel to transport
- wooden frame more difficult to handle / erect

useful lifetime

- wooden greenhouse would need replacing more often
- fewer aluminium greenhouses needed over time

end of useful life

- both materials can be put to further use
- aluminium can be recycled repeatedly

4

$$48. \quad \frac{12000}{80}$$

1

= 150

1

an answer of 150 scores 2 marks

49. any two from:

- conserves finite ores

allow ores will last longer

- uses less energy
- lower energy costs
- reduces landfill

allow less waste

2

50. *pending*

51.

all points correct

±1 small square

allow 1 mark for 6 or 7 plots

2

Year	Percentage (%) of bottles made from other materials
1975	5
1980	10
1985	22
1990	42
1995	70
2000	72

2005	90
2010	95

1

52. Level 3 (5–6 marks):

A detailed and coherent argument is provided which considers a range of issues and comes to a conclusion consistent with the reasoning.

Level 2 (3–4 marks):

An attempt to describe the advantages and disadvantages of the production and uses is made, which comes to a conclusion. The logic may be inconsistent at times but builds towards a coherent argument.

Level 1 (1–2 marks):

Simple statements made. The logic may be unclear and the conclusion, if present, may not be consistent with the reasoning.

0 marks:

No relevant content.

Indicative content

- glass – 2 stages in production of soda-lime glass
- glass – second stage, heating sand, limestone and sodium carbonate
- HDPE – 3 stages in production
- HDPE – second stage, cracking of naphtha to obtain ethene
- HDPE – third stage, polymerisation of ethene
- fewer stages in glass production, may be quicker
- higher temperature in glass manufacture, therefore maybe higher energy requirement
- glass bottle can be reused
- consideration of collection / cleaning costs to reuse glass bottles
- other glass products can be made from recycled glass
- plastic has greater range of sizes
- both produced from limited raw materials
- higher percentage recycled materials in glass conserves raw materials

This indicative content is not exhaustive, other creditworthy

responses should be awarded marks as appropriate.

53. –

a. Reduction with carbon

b. Electrolysis

54. A rock/material with another metal in it to be worth extracting
55. Because it is unreactive
56. Because mining and extraction requires a lot of energy
57. Grow plants on or near the low-grade ore, trees are harvested and burned, ash contains metal compound, ash can be purified (by electrolysis)
58. The CO_2 taken in during the plants life is equal to the amount released when it is burned
59. Because electrolysis requires energy. If the energy is provided by fossil fuels that releases CO_2
60. Bacteria are grown on or near the low-grade ore, produce a solution called leachate containing the metal compound, can be purified using electrolysis