

Waste Water Treatment Quiz

Answer the questions below then check your answers.

1. What is meant by waste water (or sewage)? (1 mark)
2. State two main aims of treating waste water before it is released into rivers or the sea. (2 marks)
3. Give three different sources of waste water and name one possible pollutant that each source may contain. (3 marks - 1 mark for each correct source with a suitable pollutant).
4. At the start of treatment, waste water passes through metal screens and grit/settling channels.
 - a) What is removed by the metal screens? (1 mark)
 - b) What is removed in the grit and settling channels? (1 mark)
5. Define the following terms used in waste water treatment:
 - a) Effluent (1 mark)
 - b) Sludge (1 mark)

6. The stages below are in the wrong order. Number them from 1 to 4 in the correct order for waste water treatment. (2 marks)
- __ Aeration / trickling filter
 - __ Screening with metal grids
 - __ Grit and FOG (fat, oil, grease) removal
 - __ Sedimentation tank (primary sludge forms)
7. In the aeration tanks, which type of microorganisms break down the organic matter, and what process do they use? (1 mark)
8. Explain why releasing untreated sewage directly into a river can quickly reduce the amount of dissolved oxygen in the water. (2 marks)
9. Describe what happens to the sludge in an anaerobic digester. Include the conditions and a useful product that is formed. (2 marks)
10. Spot the mistake in the description below and correct it. (3 marks)

"After sedimentation, the sludge from the bottom of the tank is pumped straight into the nearest river so that it is safely diluted. The clear effluent is stored in large tanks on land for many years, where it slowly rots and releases unpleasant smells."

Answers

1. What is meant by waste water (or sewage)? (1 mark)

Answer: Water that has been used in homes, industry or agriculture and now contains impurities such as sewage, detergents, oils, food waste or other pollutants, so it must be cleaned before release into the environment.

2. State two main aims of treating waste water before it is released into rivers or the sea. (2 marks)

Answer (any two):

- To remove solid materials (e.g. grit, litter, faeces).
- To reduce levels of harmful microorganisms such as bacteria and viruses.
- To reduce the amount of organic matter that could use up dissolved oxygen in rivers and lakes.

3. Give three different sources of waste water and name one possible pollutant that each source may contain. (3 marks)

Answer (example):

- Homes (domestic sewage) – may contain detergents, fats, food waste or human waste.
- Factories/industry – may contain oils, dyes or heavy metal ions.
- Farms/agriculture – may contain fertilisers (nitrates, phosphates), pesticides, herbicides or animal waste.

(1 mark for each correct source with a suitable pollutant).

4. At the start of treatment, waste water passes through metal screens and grit/settling channels.

a) What is removed by the metal screens? (1 mark)

b) What is removed in the grit and settling channels? (1 mark)

Answer:

(a) Large solid objects such as plastics, nappies, litter and other debris.

(b) Heavier particles such as grit and silt (and fats/oils/grease are skimmed from the surface).

5. Define the following terms used in waste water treatment:
- a) Effluent (1 mark)
 - b) Sludge (1 mark)

Answer:

(a) Effluent – the partially treated liquid that flows from one stage of treatment to the next.

(b) Sludge – the semi-solid material that settles to the bottom during sedimentation, mainly made of organic matter and microorganisms.

6. The stages below are in the wrong order. Number them from 1 to 4 in the correct order for waste water treatment. (2 marks)
- __ Aeration / trickling filter
 - __ Screening with metal grids
 - __ Grit and FOG (fat, oil, grease) removal
 - __ Sedimentation tank (primary sludge forms)

Answer (correct order):

1 Screening with metal grids

2 Grit and FOG removal

3 Sedimentation tank (primary sludge forms)

4 Aeration / trickling filter

(2 marks for the fully correct order, 1 mark if two adjacent stages are in the correct sequence).

7. In the aeration tanks, which type of microorganisms break down the organic matter, and what process do they use? (1 mark)

Answer: Aerobic bacteria, using aerobic respiration.

8. Explain why releasing untreated sewage directly into a river can quickly reduce the amount of dissolved oxygen in the water. (2 marks)

Answer: Untreated sewage contains a lot of organic matter. Bacteria decompose this organic matter and use up dissolved oxygen from the river during respiration. This reduces the oxygen available for fish and other aquatic organisms.

9. Describe what happens to the sludge in an anaerobic digester. Include the conditions and a useful product that is formed. (2 marks)

Answer: Sludge is broken down by bacteria in the absence of oxygen (anaerobic conditions), at around 37 °C. This anaerobic digestion produces a mixture of gases called biogas, which contains methane that can be used as a fuel.

10. Spot the mistake in the description below and correct it. (3 marks)

"After sedimentation, the sludge from the bottom of the tank is pumped straight into the nearest river so that it is safely diluted. The clear effluent is stored in large tanks on land for many years, where it slowly rots and releases unpleasant smells."

Answer:

Mistake 1: Sludge is NOT pumped straight into rivers. It should be sent to anaerobic digesters for treatment.

Mistake 2: The effluent is NOT stored for many years to rot. Instead, it is sent on for further treatment (aeration/biological treatment) and then released back into rivers once it is clean enough.

(Allow 1–3 marks depending on how many problems are correctly identified and clearly corrected.)