

Advanced Waste Management Principles

Environmental Science · Answer Key · 25 Questions

1. What is the primary technical purpose of a 'leachate collection system' in a sanitary landfill?

- A) To produce biogas for energy generation
- B) To prevent groundwater contamination from liquid runoff**
- C) To accelerate the aerobic decomposition of organic waste
- D) To compact waste layers to increase site capacity

2. Which polymer is most commonly identified by the SPI resin identification code '1' and is standard for beverage bottle recycling?

- A) High-density polyethylene (HDPE)
- B) Polyvinyl chloride (PVC)
- C) Polyethylene terephthalate (PET)**
- D) Polystyrene (PS)

3. In the context of the waste hierarchy, what is the fundamental difference between 'upcycling' and 'downcycling'?

- A) Upcycling creates higher-value materials; downcycling degrades material quality**
- B) Upcycling is biological; downcycling is mechanical
- C) Upcycling requires energy input; downcycling generates energy
- D) Upcycling is industrial; downcycling is artisanal

4. What is the main chemical component of 'biogas' produced in anaerobic digesters at waste facilities?

- A) Nitrogen
- B) Oxygen
- C) Carbon monoxide
- D) Methane**

5. Which material is categorized as 'e-waste' due to the presence of hazardous heavy metals like lead, mercury, and cadmium?

- A) Discarded ceramic tiles
- B) Broken glass windows
- C) Printed circuit boards**
- D) Polyester fabric scraps

6. What is the specific role of 'vermicomposting' in waste management?

- A) Using heat to sterilize medical waste
- B) Using earthworms to break down organic kitchen waste**
- C) Using microbes to neutralize toxic chemical spills
- D) Using centrifugal force to separate plastics by density

7. Which of these substances is considered a 'hazardous waste' rather than general solid waste due to its reactive properties?

- A) Cardboard packaging
- B) Spent lead-acid batteries**
- C) Food scraps
- D) Aluminum beverage cans

8. What is the primary reason 'pyrolysis' is used in modern waste-to-energy facilities?

- A) To incinerate paper without producing ash
- B) To convert waste into oil and gas in the absence of oxygen**
- C) To biologically break down plastics into compost
- D) To extract precious metals from seawater

9. In municipal waste management, what is the 'tipping fee'?

- A) A government tax on recycled goods
- B) The cost charged to dump waste at a landfill or facility**
- C) A fee paid to households for sorting recyclables
- D) The salary paid to waste collection drivers

10. Which of the following describes the 'circular economy' model regarding waste?

- A) Designing products to be discarded after a single use
- B) Extracting raw materials to manufacture disposable items
- C) Minimizing waste by keeping materials in use for as long as possible**
- D) Focusing solely on burning waste for electricity

11. What is the technical definition of 'post-consumer waste'?

- A) Waste generated by manufacturers during production
- B) Material discarded by consumers after its intended use**
- C) Waste that has been processed at least twice
- D) Raw materials extracted from recycled industrial scraps

12. What is the primary function of a 'trommel screen' in a Material Recovery Facility (MRF)?

A) To separate materials based on size using a rotating cylinder

B) To use magnets to pull out ferrous metals

C) To melt plastics into uniform pellets

D) To shred paper into small strips

13. Which gas is actively captured at a landfill to prevent it from contributing to the greenhouse effect?

A) Argon

B) Methane

C) Neon

D) Helium

14. What defines the 'calorific value' of municipal solid waste?

A) The amount of weight it loses after drying

B) The energy content available for thermal conversion

C) The rate at which it decays in a landfill

D) The total volume of space it occupies

15. Why are 'expanded polystyrene' (EPS) products often difficult to recycle through curbside programs?

A) They are non-toxic and dissolve in water

B) They are high volume, lightweight, and difficult to transport economically

C) They react violently with common cleaning agents

D) They are classified as organic compost material

16. What is the process of 'gasification' in waste management?

A) Converting waste into a synthetic gas using high heat and controlled oxygen

B) Mixing waste with water to create fertilizer

C) Pressing waste into bricks for construction

D) Filtering liquid waste through sand layers

17. Which material classification does a 'bimetal can' usually fall into?

A) Plastic

B) Paper

C) Ferrous/Metal

D) Composite

18. What is the main objective of a 'Life Cycle Assessment' (LCA) for a product?

- A) To estimate how long a product lasts before breaking
- B) To evaluate the total environmental impact of a product from cradle to grave**
- C) To determine the retail price of recycled goods
- D) To track the popularity of a product among consumers

19. Which of the following contaminants in a recycling stream is most likely to 'downcycle' an entire batch of paper?

- A) Clean cardboard
- B) Food residue (grease)**
- C) Plastic bottle caps
- D) Printer ink

20. What is 'composting' technically considered in the context of waste management?

- A) Thermal treatment
- B) Aerobic decomposition**
- C) Chemical neutralization
- D) Inert disposal

21. What is the primary advantage of 'incineration' (Waste-to-Energy) for municipal solid waste?

- A) It creates zero emissions
- B) It significantly reduces the volume of waste requiring landfill space**
- C) It is the cheapest method of waste disposal
- D) It requires no specialized pollution control equipment

22. In an industrial context, what does 'Extended Producer Responsibility' (EPR) imply?

- A) Consumers are responsible for the disposal of all packaging
- B) Producers are responsible for the entire life cycle of their products**
- C) Retailers are responsible for cleaning up local litter
- D) The government handles all recycling costs exclusively

23. What is the primary environmental risk associated with 'illegal dumping' of chemical waste?

- A) Excessive noise pollution
- B) Groundwater and soil contamination**
- C) Increase in landfill height
- D) Reduced biodiversity in urban parks

24. Which of the following is a 'thermoset' plastic that is notably difficult to recycle?

- A) PET (Polyethylene Terephthalate)
- B) HDPE (High-Density Polyethylene)
- C) Epoxy resin**
- D) PP (Polypropylene)

25. What is the technical term for the final product of an anaerobic digestion facility that is used as a soil conditioner?

- A) Slag
- B) Digestate**
- C) Leachate
- D) Fly ash