

SULIT



Second Semester Examination
2020/2021 Academic Session

July/August 2021

EAP414 – Industrial Waste Management

Duration: 1 hour

Please ensure that this examination paper contains **FIFTEEN (15)** printed pages before you begin the examination.

Instructions: Answer **ALL** questions **IN THIS PAPER**. Ensure that your **DETAIL** is complete [with your index number, course code, answers to the questions, etc.].

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1. Choose the most appropriate container for storing chloroform.
 - A. Jerrican
 - B. Carboy
 - C. Intermediate bulk container
 - D. Steel bunghole drums
 - E. Flexible intermediate bulk containers

2. Choose a writing form that must be filled in by the waste generator for application of special management of scheduled waste to exclude the scheduled waste generated from their facility or process from being treated, disposed of or recovered at the prescribed premises.
 - A. Prescribed form
 - B. Notification form
 - C. Form AS 11 – A
 - D. AS. PBT.2005
 - E. AS WM 1/2005

3. Choose the best sequence that demonstrates the Physical Unit Operations (PUO) in wastewater treatment methods.
 - A. Precipitation, disinfection, and sedimentation.
 - B. Adsorption, coagulation, and oxidation.
 - C. Screening, flow equalization and sedimentation.
 - D. Flow equalization, floatation and dichlorination.
 - E. Grit chamber, activated sludge, oxidation.

4. Determining how organic matter affects the concentration of dissolved oxygen (DO) in a stream or lake is crucial to water-quality management. The decay of organic matter in water is measured as biochemical oxygen demand (BOD) or chemical oxygen demand (COD). Choose the most appropriate statement to indicate the TRUE meaning of the BOD.
- A. The amount of DO needed by anaerobic biological organisms in water to break down the organic material.
 - B. The amount of DO needed by anaerobic biological organisms in water to break down the inorganic material.
 - C. The amount of DO needed by aerobic biological organisms in water to break down the organic and inorganic materials.
 - D. The amount of DO needed by aerobic biological organisms in water to break down the organic material.
 - E. The amount of DO needed by anaerobic biological organisms in water to break down the organic and inorganic materials.
5. The followings are the basic methods for waste classification, EXCEPT:
- A. Origin compound
 - B. Amount of materials
 - C. Hazardous characteristics
 - D. Chemical properties
 - E. Biohazard properties
6. The following classifications are TRUE about scheduled waste code, EXCEPT:
- A. SW 1 Metal and metal-bearing wastes.
 - B. SW 2 Asbestos wastes in sludges, dust or fibre forms.
 - C. SW 3 Flux waste containing a mixture of organic acids and solvents.
 - D. SW 4 Wastes containing principally organic constituents.
 - E. SW 5 Any residues from treatment or recovery of scheduled waste.

7. Determine the TRUE statement concerning Sustainable Development Goal (SDG) based on the E-waste processing flow shown in **Figure 1**:

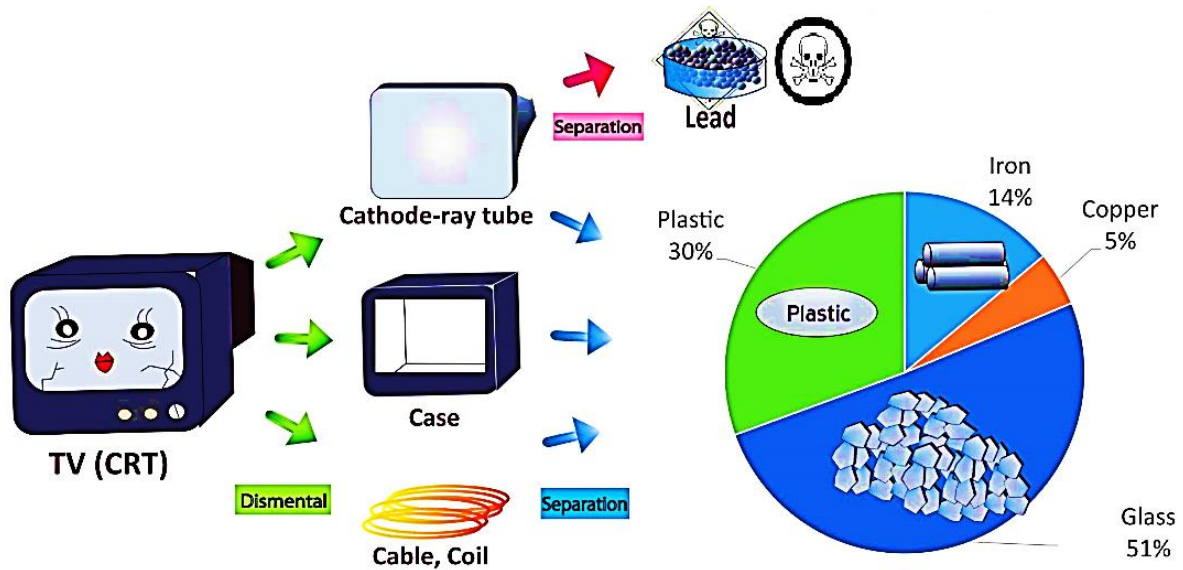


Figure 1 E-waste processing flow

- A. Electronic waste is categorised under the code SW 101 of scheduled waste.
- B. E-Waste can be disposed of at a sanitary landfill.
- C. The dismantled and separated compartments of e-waste for resource recovery.
- D. The lead compound from the e-waste part can be recycled.
- E. Landfilling is the best option for iron, copper, plastic and glass waste.

8. The SBR system and conventional activated sludge system are identical because aeration and sedimentation are carried out in both systems. Select the most significant difference between the conventional plant and the SBR system.
- A. The SBR performs equalization, biological treatment, and secondary classification in the same tank.
 - B. The conventional plant process is carried out in the same tank.
 - C. The conventional plant effluent quality is better than in the case of the SBR system.
 - D. The conventional plant uses low land requirement than the SBR.
 - E. The SBR system requires less automation than the conventional plant.

9. Based on the location of BG POME Sdn. Bhd as shown in **Figure 2**, which statement is TRUE regarding the regulation that the company needs to comply for the wastewater generated from the treatment system.

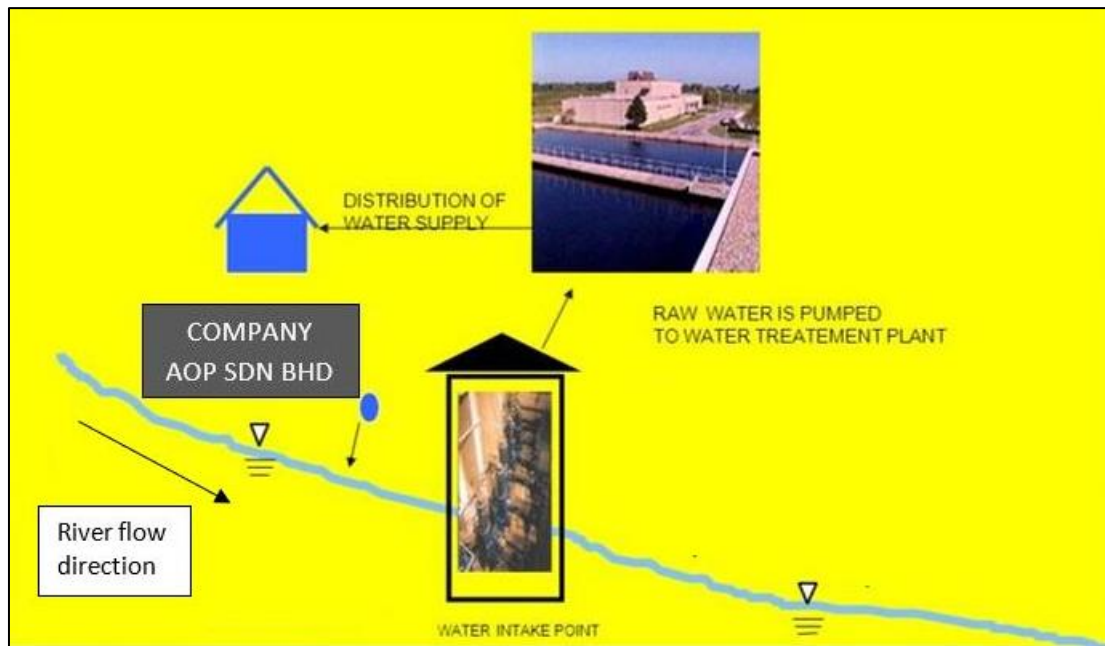


Figure 2 Location of BG POME Sdn. Bhd and water intake point

- A. Effluent is discharged downstream needs to comply with Standard A.
- B. Effluent is discharged upstream needs to comply with Standard B.
- C. Effluent is discharged in between of water supply intake.
- D. Effluent is discharged after water supply intake point needs to comply with the standard.
- E. Effluent is discharged upstream needs to comply with Standard A.

10. Select which of the following statements is TRUE about E-WASTE management in Malaysia:
- A. The administration of E-WASTE is managed by the Solid Waste Cooperation (SWCorp).
 - B. The enforcement of E-Waste is governed by Environmental Quality Act 1974 (EQA 1974).
 - C. Televisions and mobile phones are among the largest contributors to E-waste in Malaysia.
 - D. E-Waste has no serious impact on human health and the environment.
 - E. The best management option for e-waste is by throwing it into the garbage bin.
11. Choose the **MOST** significant impacts in Life Cycle Assessment (LCA) for the use of copper slag as a supplementary cementitious material.
- A. Global warming
 - B. Acidification
 - C. Eutrophication
 - D. Abiotic deterioration
 - E. Smog creation
12. The following examples of the recycling process are TRUE, EXCEPT:
- A. Rainwater for toilet flush.
 - B. Vermicomposting of kitchen waste.
 - C. Fly ash as supplementary cementitious material for mortar.
 - D. Autoclaving of sharps.
 - E. Composting of lignocellulosic biomass.

13. Scheduled wastes transported outside the waste generator's premises should be accompanied by a waste card. The following are the lists of information that should be included in the waste card, EXCEPT:
- A. Properties of scheduled waste.
 - B. Handling of waste.
 - C. Risk behaviour in case of a spill or accidental discharge.
 - D. Precautions in case of a spill or accidental discharge.
 - E. Steps to be taken in case of a spill or accidental discharge.
14. Solids in industrial wastewater can be classified by their chemical composition or physical characteristics. The followings show the physical characteristics-of solids, EXCEPT:
- A. Floatable
 - B. Colloidal
 - C. Settleable
 - D. Non-Settleable
 - E. Inorganic
15. Heavy metals must be removed from wastewater prior to discharge. Wastewaters from metal plating/mining industries contain various types of harmful heavy metals. All of the followings indicate the nature of heavy metals, EXCEPT:
- A. Bioaccumulative
 - B. Persistent
 - C. Harmful to health
 - D. Toxic substance
 - E. Biodegradable

16. Solids can be grouped based on their physical state as suspended solids, colloidal solids, and dissolved solids, each of which can include both organic and inorganic solids. Choose a classification that is CORRECT for colloidal materials.
- A. Total suspended solids
 - B. Total dissolved solids
 - C. Mixed liquor suspended solids
 - D. Mixed liquor volatile suspended solids
 - E. Settleable solids
17. The condition where materials or products are recycled into new products at the end of their lives is defined as:
- A. Cradle to cradle
 - B. Grave to cradle
 - C. Cradle to grave
 - D. Waste to grave
 - E. Waste to waste
18. Clinical waste should be put into an appropriate container as listed below, EXCEPT:
- A. Leak-proof
 - B. Black colour
 - C. Yellow colour
 - D. Impervious to moisture
 - E. Strong enough to prevent tearing

19. Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment, which can be in the form of:
- I. Liquids
 - II. Solids
 - III. Gases
 - IV. Sludges
- A. I and II
B. II and III
C. III and IV
D. I, II and III
E. All of the above
20. Determine the possible hazardous characteristics of wastes based on the label shown in **Figure 3**.

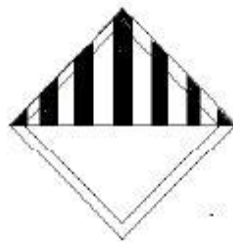


Figure 3 Characteristic Label

- I. Corrosive
 - II. Oxidizing
 - III. Ignitability
 - IV. Toxicity
- A. I, II, and III
B. I, III and IV
C. I, II and IV
D. II, III and IV
E. All of the above

21. Cleaner Production (CP) can be defined as the continuous application of an integrated preventative environmental strategy intending to increase overall efficiency and reduce risks to human and the environment. The practicalities of the Cleaner Production concept can be applied in:
- I. Processes
 - II. Products
 - III. Services
 - IV. Planning
- A. I, II, and III
 - B. I, III, and IV
 - C. II, III, and IV
 - D. I, II, and IV
 - E. All of the above
22. Any application related to the scheduled waste handling by the waste generator should be submitted to the Director General of DOE. Choose the situations that require permission from the Director General.
- I. Storage of more than 20 metric tonnes of scheduled waste since the date from the first generation does not exceed 180 days.
 - II. Storage of the scheduled waste for more than 180 days since the weight for the generated scheduled waste does not yet reach 20 metric tonnes.
 - III. The construction of an off-site storage facility.
 - IV. Notification of scheduled waste.
- A. I, II, and III
 - B. I, III and IV
 - C. I, II and IV
 - D. II, III and IV
 - E. All of the above

23. Handling the stored scheduled waste at any facility requires continuous monitoring and proper documentation by a Certified Environmental Professional in Scheduled Waste Management (CePSWaM). Choose which documentation requires continuous update and inspection by the CePSWaM.
- I. Waste card
 - ii. Inventory record
 - lii. A standard inspection checklist
 - Iv. Consignment note
- A. I and II
 - B. I and III
 - C. II and III
 - D. II, and III and IV
 - E. I, II, and III
24. Based on ISO 14040 (2006a), the Life Cycle Assessment (LCA) methodology can be divided into four stages, which are:
- I. Goal and scope
 - II. Applications
 - III. Impact assessment
 - IV. Inventory
 - V. Interpretations
- A. I, II, III and IV
 - B. I, III, IV and V
 - C. II, III, IV and V
 - D. I, II, IV and V
 - E. All of the above

25. Incineration is a thermal waste treatment technique that can be defined as a controlled combustion process with the primary objective of volume reduction and energy recovery from the waste stream. Choose the statements that describe the benefits of the combustion process in the incinerator.

- I. Fuel is required to initiate and maintain the incineration process.
- II. The ash residue is usually non-putrescible.
- III. Breaks down chemical toxins.
- IV. Reduce organic substances from green waste.

- A. I and IV
- B. II and IV
- C. I and III
- D. II and III
- E. II and IV

26. Choose which of the following chemicals can be used in the Advanced Oxidation Process (AOP).

- I. Ferric chloride (FeCl_3)
- II. Sodium hypochlorite (NaClO)
- III. Alum ($\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$)
- IV. Potassium permanganate (KMnO_4)

- A. I and III
- B. IV and I
- C. II and III
- D. II and IV
- E. III and IV

27. Based on the scheduled waste classification as stated below, choose the correct wastes code.
- I. SW3 - wastes comprising of organic constituents (metal and inorganic materials)
 - II. SW1 - wastes comprising of organic and inorganic constituents.
 - III. SW2 - wastes comprising of inorganic constituents (metal and organic materials)
 - IV. SW5 - other wastes
- A. I, III and IV
 - B. II and IV
 - C. I, II and III
 - D. II, III and IV
 - E. I, II and IV
28. Choose from the following hazardous waste characteristics as defined by the United States Environmental Protection Agency (USEPA):
- I. Corrosive
 - II. Flammable
 - III. Biodegradable
 - IV. Vaporize
- A. I dan II
 - B. I dan III
 - C. II dan III
 - D. I, II dan III
 - E. All of the above

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29. Choose which of the following actions best describes the industrial planning concept of "cradle to grave".
- I. Extracting and processing raw material
 - II. Safe disposal at the site
 - III. Reuse, recycle, recovery
 - IV. Innovating of raw material
- A. I dan II
 - B. I dan III
 - C. II dan III
 - D. I, II dan III
 - E. All of the above
30. Clinical waste is classified into six categories by the World Health Organization (WHO). Choose the descriptions that fit the classification of clinical waste from the list below.
- I. Microbiological laboratory waste
 - II. Broken thermometer waste
 - III. Needles & syringes waste
 - IV. Human tissue or fluid
- A. I dan II
 - B. I dan III
 - C. II dan III
 - D. I, III dan IV
 - E. All of the above

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