

POLITEKNIK
Jabatan Pengajian Politeknik

EXAMINATION AND EVALUATION DIVISION
DEPARTMENT OF POLYTECHNIC EDUCATION
(MINISTRY OF HIGHER EDUCATION)

CIVIL ENGINEERING DEPARTMENT

FINAL EXAMINATION
JUNE 2012 SESSION

CN202: HAZARDOUS AND TOXIC WASTE MANAGEMENT

DATE : 23 NOVEMBER 2012
DURATION : 2 HOURS (8.30AM – 10.30AM)

This paper consists of **SEVEN (7)** pages including the front page.
Section A: Objective (20 questions – answer all)
Section B: Essay (4 questions – answer 3 questions)

CONFIDENTIAL
DO NOT OPEN THIS QUESTION PAPER UNTIL INSTRUCTED BY
THE CHIEF INVIGILATOR

(CLO stated at the end of each question is referring to the learning outcome of the topic assessed. The CLO stated is only for lectures' references.)

SECTION A

Objective (40 marks)

Instruction: This section consists of 15 fill in the blank questions and 5 true false questions. Write your answers in the answer booklet.

1. Hazardous is defined as waste containing any harmful substances such as by-products of human activities from manufacturing processes, discarded used materials and _____ such as cleaning fluids, solvents or pesticides. CLO 1 : C2
2. The characteristics of hazardous waste include _____, _____, reactive and toxic. CLO 1 : C2
3. **Figure 1** below refers to the segregation process of waste at source. Fill in the blank space, labeled as a & b in the waste hierarchy system for segregation of waste. CLO 1 : C2

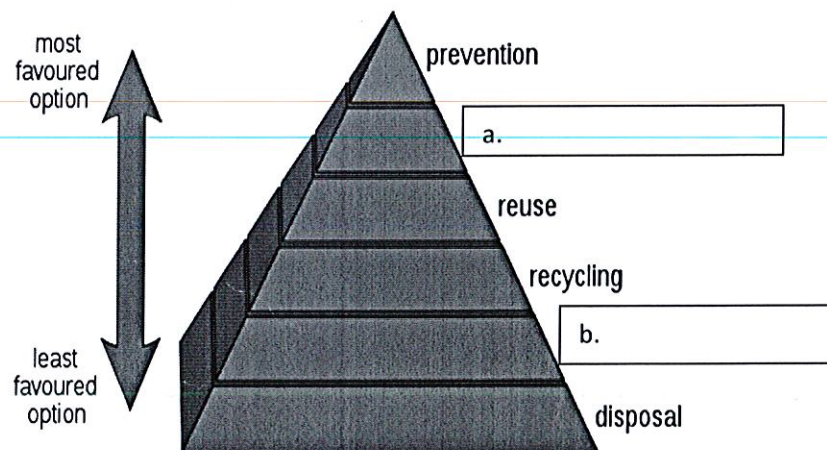


Figure 1

4. Organic waste is _____ and can be processed in the presence of oxygen by _____ or in the absence of oxygen using anaerobic digestion. CLO 1 : C2
5. _____ is a process which occurs through 3 basic ways. Firstly the substances adsorb to the exterior of the carbon granules. Secondly the substances move into the carbon pores and finally it adsorbs to the interior walls of the carbon. CLO 2 : C4
6. Name of the process in Figure 2 is _____. CLO 1 : C4

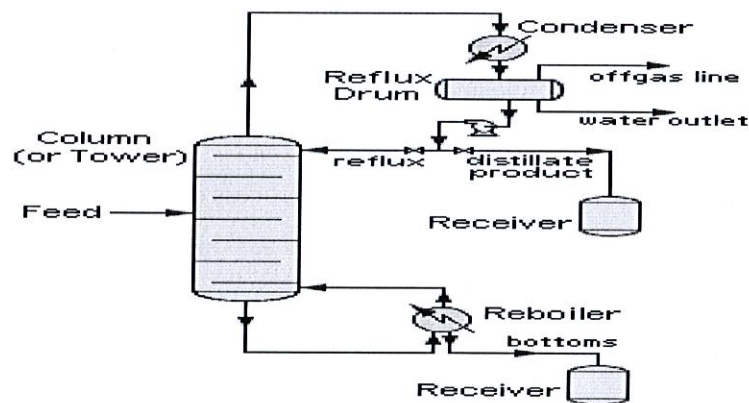


Figure 2

7. The purpose of chemical precipitation is to reduce the hardness of water through the removal of _____ and _____ in the treatment of hazardous waste. CLO 2 : C4
8. The disadvantages of sulfide precipitation are ; CLO 2 : C4
- i)
 - ii)

9. The advantages of solidification and stabilization process are ; CLO 2 : C4
- i)
 - ii)
10. The criteria in the selection of a particular type of geo-membrane for the construction of liners or final cover systems at hazardous waste landfills are ; CLO 2 : C4
- i)
 - ii)
11. A plan should be developed by the well operator and approved by the state regulatory agency for an alternative waste-management procedure if the injection well should become inoperative or if it needs to be shut down. The above statement refers to _____ . CLO 2 : C4
12. Clinical waste is any waste consists wholly or partly of _____ tissue, blood or other body fluids, drugs or other _____ products, being waste which unless rendered safe may prove hazardous to any person coming into contact with it. CLO 2 : C4
13. Identify which type of waste **does not** belong to the clinical waste category from **Table 1** below. CLO 2 : C4

Table 1

Type of Waste
a. Pathogenic waste
b. Stoma bags and Incontinence pads
c. Needels or sharp instruments
d. Teratogenic substances
e. Neurotoxic substances
f. Laboratory waste

14. The methods for disposing clinical waste includes incineration, _____ and _____ . CLO 2 : C4
15. Clinical waste is divided into 5 groups according to its characteristics. Name the type of clinical waste in Group C. _____ . CLO 2 : C4
16. A carcinogen is any substance, radionuclide, or radiation agent directly involved in causing cancer if exposed to human. (True or False) CLO 1 : C2
17. Inorganic waste becomes a natural part of the soil again as it can be decomposed. (True or False) CLO 1 : C2
18. Absorption is the incorporation of a substance in one state into another of similar state. (True or False) CLO 1 : C2
19. In chemical precipitation process for heavy metal removal, flocculation, with or without chemical coagulant or settling aid, may be used to enhance the removal of suspended solids. (True or False) CLO 2 : C4
20. Geo-membrane is used in the construction of liners or final cover systems at hazardous waste landfills. In the closing of landfills, geo-membranes are used to provide a high-permeability cover barrier to prevent the intrusion of rain water. (True or False) CLO 2 : C4

SECTION B**ESSAY (60 marks)**

Instruction: This section consists of 4 essay questions. Answer **THREE (3)** questions.

QUESTION 1

- (a) Explain briefly the risk of hazardous waste to human health. CLO 1 : C4
(3 marks)
- (b) Explain briefly **THREE (3)** categories of hazardous waste. CLO 1 : C4
(9 marks)
- (c) i. Explain briefly the term of 3R. CLO 1 : C4
(6 marks)
- ii. Give **TWO (2)** advantages of 3R concept for waste minimization. CLO 1 : C2
(2 marks)

QUESTION 2

- (a) Define activated carbon. CLO 1 : C1
(3 marks)
- (b) Explain briefly the suitable applications for the carbon adsorption. CLO 2 : C4
(8 marks)
- (c) i) Name **FIVE (5)** types of activated carbon materials.
ii) Compare the advantages between any **TWO (2)** types of activated carbon materials. CLO 2 : C4
(9 marks)

QUESTION 3

- (a) In industrial and hazardous waste treatment, reduction process has been used in conjunction with precipitation for removal of heavy metal such as chromium and copper from waste stream. State **FOUR (4)** common uses of reductant. CLO 2 : C4
(6 marks)
- (b) Explain briefly the importance of incineration process. CLO 2 : C4
(6 marks)
- (c) Explain briefly **TWO (2)** advantages and **TWO (2)** disadvantages of an incinerator in the hazardous and toxic waste management process. CLO 2 : C4
(8 marks)

QUESTION 4

- (a) Environmental protection features are very important in a secured landfill. Explain briefly the process below : CLO 2 : C4
(10 marks)
i) Control of Leachate Emissions
ii) Landfill Gas Control
- (b) Explain the characteristics of untreated wastewater that must be considered in evaluating its suitability for disposal by subsurface injection. CLO 2 : C4
(10 marks)