UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	ENVIRONMENTAL CHEMISTRY
COURSE CODE	:	DAU 22303/ DAU 32303
PROGRAMME CODE	:	DAU
EXAMINATION DATE	:	DECEMBER 2019/ JANUARY 2020
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWERS **FOUR (4)** QUESTIONS ONLY

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THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) Define the following terms;

   (i) Water pollution

   (1 mark)

   (ii) Anthropogenic sources

   (1 mark)

   (iii) Point sources and non-point sources

   (2 marks)

   (b) Explain **three** (3) types of parameters for water quality monitoring. Give an example of parameters for each type.

   (7 marks)

   (c) Proper sampling technique and preservation of water samples are of utmost importance before carrying out water analysis. Explain the proper technique to do the samplings and preserve the water samples.

   (7 marks)

   (d) A water quality monitoring program is carried out by the Department of Environment (DOE) to monitor the water quality of rivers in Malaysia. The classification of rivers is based on water quality index. Describe the procedure on how the water quality index is obtained.

   (7 marks)

Q2 (a) The treatment of water can be divided into three major categories. State all **three** (3) categories.

   (3 marks)

   (b) Water municipal treatment is a process that makes water more acceptable for a domestic use.

   (i) State **three** (3) objectives of water treatment.

   (3 marks)

   (ii) Explain the purpose of aeration and addition of lime during water treatment processes.

   (4 marks)

   (iii) Explain briefly the whole process that are being carried out in municipal water treatment plant.

   (9 marks)

   (c) Sewage treatment methods may be categorised into primary, secondary and tertiary treatment method. Describe the primary and secondary treatment method.

   (6 marks)

Q3   (a)   A BOD test was conducted at 20°C in which 15 ml of waste sample was diluted with dilution water to 300 ml.
Given :
Initial dissolved oxygen of diluted sample, D1 = 8.8 mg/L
Final dissolved oxygen after 5 days, D2 = 1.9 mg/L

       (i)   Describe BOD analysis.

                                                            (2 marks)

       (ii)   Explain the procedure to run the BOD analysis.

                                                            (7 marks)

       (iii)   Calculate the 5-day BOD.

                                                            (4 marks)

   (b)   A TSS analysis was conducted on 200 ml waste sample.
Given:
Weight of glass-fiber disk, T1 = 0.1400 g
Weight of disk plus dry solids, T2 = 0.1530 g

       (i)   Describe TSS analysis.

                                                            (2 marks)

       (ii)   Explain the procedure to run the TSS analysis.

                                                            (6 marks)

       (iii)   Calculate the TSS of the waste sample.

                                                            (4 marks)

Q4   (a)   The earth's atmosphere consists of six layers.

       (i)   Explain the first **three (3)** layers above the earth's surface.

                                                            (3 marks)

       (ii)   State the gas composition of the atmosphere.

                                                            (2 marks)

       (iii)   State the **two (2)** types of air pollutant and give an example of pollutant for each type.

                                                            (4 marks)

       (iv)   Explain the **four (4)** types of processes that influence the chemicals motion in the atmosphere.

                                                            (6 marks)

   (b)   Global warming has become the major environmental issue and being debated lately. Discuss the global warming phenomenon, the cause and effect to the environment.

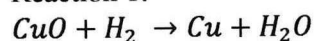   (10 marks)

Q5 (a) Chemical developments bring new environmental problems and harmful unexpected side effects, which result in the need for 'greener' chemical products and for green environment.

(i) Describe the difference between green chemistry and environmental chemistry.
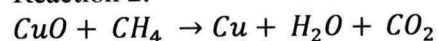
(2 marks)

(ii) Explain Principle No 1 and No 2 in green chemistry.

(6 marks)

(b) Given below two chemical reactions for the production of copper (Cu).

Reaction 1:
$$CuO + H_2 \rightarrow Cu + H_2O$$

Reaction 2:
$$CuO + CH_4 \rightarrow Cu + H_2O + CO_2$$

Answer the following questions.

(i) Write the balanced equation for both reactions.

(4 marks)

(ii) Calculate the atom economy of each reaction.
(Given atomic mass in g/mol: Cu = 63.5, O = 16, H = 1, C = 12)

(10 marks)

(iii) Discuss the atom economy obtained for both reactions in **Q5(b)(ii)**.

(3 marks)

-END OF QUESTIONS –

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