



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

- COURSE NAME : CHEMICAL INDUSTRY
- COURSE CODE : BNS 10403
- PROGRAMME CODE : BNS
- DATE : JULY/AUGUST 2023
- DURATION : 3 HOURS
- INSTRUCTION :
 1. ANSWER **ALL** QUESTIONS.
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK.**
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

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

- Q1** (a) Define the term and give **ONE (1)** example for these terminologies:
- (i) Particulate (Dust)
 - (ii) Particulate (Fumes)
- (5 marks)
- (b) There are **TWO (2)** types of air monitoring to evaluate the exposure monitoring. Identify these **TWO (2)** types of air monitoring and briefly explain the difference between each air monitoring.
- (5 marks)
- (c) The purpose of chemical exposure monitoring is to evaluate the chemical hazardous to health entering the body through various routes of exposure. Result from the exposure monitoring can be obtained by collecting the sample required through assessment. Therefore:
- (i) Sketch the graph of concentration-duration, by showing the differences between each **FOUR (4)** types of sample required.
- (10 marks)
- (ii) Determine **FIVE (5)** factors to be considered in order to plan and conduct an assessment, to obtain sample required for the exposure monitoring.
- (5 marks)
- Q2** (a) There are **TWO (2)** assessment of evaluation exposure for inhalation. Identify these **TWO (2)** assessment and briefly explain the difference between each assessments.
- (5 marks)
- (b) Evaluation of exposure for inhalation the potential chemical hazardous to health during normal operation is done by going through work procedures, observation of various tasks performed and interviewing members of the work unit. There are **FOUR (4)** important factors to be considered when assessing exposure in the workplace.
- Identify and explain all **FOUR (4)** important factors to be considered when assessing exposure for inhalation in the workplace.
- (10 marks)
- (c) A worker conducted a partial period consecutive sample of lead and the shift duration is 8 hours. Exposure monitoring results of three samples of lead, are recorded and the Permissible Exposure Limit (PEL) for lead is 0.05 mg/m^3 . Assuming that there is no exposure during the remainder of the shift, therefore:
- (i) By referring results of three samples of lead shown in **Table Q2 (c)(i)**, calculate the 8-hour Time-Weighted Average (TWA) concentration of lead.
- (6 marks)
- (ii) Calculate and determine the Exposure Rating (ER) based on **Table Q2 (c)(ii)**.
- (4 marks)

Q3 (a) Define the term of these terminologies:

- (i) Toxicology
- (ii) Toxicity

(5 marks)

(b) Differentiate and give **ONE (1)** example of these terminologies:

- (i) Additive effect
- (ii) Independent effects
- (iii) Synergistic effects
- (iv) Antagonistic effects

(10 marks)

(c) Dose response relationships describe the effect on an organism caused by differing levels of exposure or dose. The dose response curve is a valuable tool to understand the levels at which substances begin to exert adverse effects and the degree of harm expected at various levels.

Therefore, sketch the graph of dose response curves, by identify the exact location of LD_{50} , LC_{50} and NOAEL, and explain the differences between LD_{50} , LC_{50} and NOAEL.

(10 marks)

Q4 (a) Identify **FIVE (5)** hazards communication of information, instruction and training provided in the control measure of organizational controls.

(5 marks)

(b) Determine **FIVE (5)** general safe work practices to ensure that hazards are eliminate or risks are minimize at the workplace.

(10 marks)

(c) Safety Data Sheet (SDS) is an information sheet or paper that contains updated information related to chemicals hazard to health and its preparations that is essential to ensure the safe use of the chemical and its preparation at the workplace. There are **SIXTEEN (16)** important elements of SDS. Therefore, list and identify **TEN (10)** elements of SDS mainly required for the specific target groups of workers to understand the hazards communication.

(10 marks)

- END OF QUESTIONS -

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Table Q2 (c)(i)

Chemical	Sample ID	Duration (minutes)	Concentration (mg/m ³)
Lead	L1-1	150	0.01
	L1-2	130	0.02
	L1-3	150	0.15

Table Q2 (c)(ii)

Time-Weighted Average (TWA) or Short Term Exposure Limit (STEL) or Ceiling Limit	Exposure Rating
\geq PEL	5
≥ 0.75 PEL but $<$ PEL	4
≥ 0.5 PEL but $<$ 0.75 PEL	3
≥ 0.1 PEL but $<$ 0.5 PEL	2
$<$ 0.1 PEL	1

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