DEPARTMENT OF CHEMISTRY

UNIVERSITY OF ESWATINI

CHE 211 GOOD LABORATORY PRACTICE AND MANAGEMENT

NOVEMBER 2018 FINAL EXAMINATION

Time Allowed: Three (3) Hours

Instructions:

1. **This examination has six (6) questions. The total number of pages is four (4), including this page.**
2. **Answer any four (4) questions fully; diagrams should be clear, large and properly labelled. Marks will be deducted for improper units and lack of procedural steps in calculations.**
3. **Each question is worth 25 marks.**

Special Requirements

None

YOU ARE NOT SUPPOSED TO OPEN THIS PAPER UNTIL PERMISSION TO DO SO HAS BEEN GIVEN BY THE CHIEF INVIGILATOR.

Question 1 [25]

a) ISO is the international standards body that has issued ISO 17025

(i) What is a standard? (3)

(ii) Why is the ISO 17025 important for Good Laboratory Practice (GLP) and Management? (4)

(iii) Briefly outline the principles of ISO 17025 as the basis of good laboratory practice. (5)

(iv) Outline the steps involved in ISO 17025 accreditation. (5)

b) In the laboratory, what safety risks are posed by the following, and how are the risks minimized during storage.

(i) Benzene (3)

(ii) Hydrogen gas (3)

c) In the laboratory, what security risks are posed by trinitrotoluene? (2)

Question 2 [25]

a) What does the acronym "LIMS" stand for in the chemistry laboratory? (1)

b) UNESWA is considering building new chemistry laboratories because of the increased enrolment over the past 30 years.

(i) List and describe what would be considered three (3) barriers to good laboratory design for the new labs (6)

(ii) Discuss each of the three (3) phases involved in the design of a chemistry laboratory (6)

c) The handling and disposal of wastes is a component of good laboratory practice and management in a chemistry laboratory.

i) In terms of human health and the environment, explain why Cadmium salts and solution wastes should not be thrown down the drain in the laboratory. How are they disposed of? (6)

ii) In terms of human health and the environment, explain why Mercury from broken thermometers is dangerous to human health. How are disposed of? (6)

Question 3 [25]

(a) Explain why the following laboratory chemicals are subject to a strict regulatory environment

i) $NaNO_2$ (2)

ii) Methanol (2)

iii) Mercury (2)

(b) The balance room is one of the most important facilities in a chemistry laboratory.

i) Discuss any three (3) essential design elements of a balance room (6)

ii) Use diagram to explain how an analytical balance works (6)

(c) What is meant by chain of custody in a laboratory and why this concept is useful. (4)

(d) What is the difference between a "process laboratory" and an "academic laboratory?" (3)

Question 4 [25]

a) Give the official definition of a Good Laboratory Practice (GLP) in non-clinical laboratories. (2)

b) What is the function of a Risk and Hazard Assessment in the chemistry laboratory (4)

c) For each of the following chemicals, what would be its MSDS symbol, and how would you minimize the risk associated with it ?

i) NO_2 gas, poisonous (3)

ii) $HClO_4$, explosive (3)

iii) Cr (VI), Carceinogenic (3)

d) What health risks do the following pose in the chemistry laboratory, and how are they managed and disposed of

(i) broken glass (3)

(ii) bloodied bandages (3)

(e) i) What are ultrasound baths used for in the laboratory ? (2)

iii) What safety precautions must be used when working with ultrasound equipment and why? (2)

Question 5 [25]

(a) Discuss the importance of the following when designing a chemistry laboratory

i) Access to the laboratory (2)

ii) Ventilation (2)

iii) Water (2)

(b) For each of the following, describe how it is a hazard and state the personal protection equipment (PPE) used to reduce the hazard.

i) Noise (3)

ii) Dust (3)

iii) Concentrated hydrochloric acid (3)

(c) Why are the following considered physical hazards in the laboratory, and how are these hazards minimized.

i) Exposed electrical wires (3)

ii) Centrifuges (3)

iii) Fire (3)

(d) Why is ionizing reduction hazardous to human health? (1)

Question 6 [25]

(a) Give the official definition of the "Scientific Method of Investigation" (2)

(b) Why is KCN a highly regulated chemical in the laboratory (2)

(c) Why is chrysotile no longer accepted as roofing material in the lab? (2)

(d) Why is methanol storage important in the laboratory? (2)

(e) What does the term "ergonomics" mean, and how is ergonomics an important element of designing a chemistry laboratory (4)

(f) Explain the role of bar code technology in the procument of laboratory chemicals (3)

(g) How are mercury spills handled in the laboratory? (5)

(h) Discuss the role of each of the five human resource elements in the hierarchical structure of laboratory management (5)