

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF  
SCIENCE AND BACHELOR OF EDUCATION (SCIENCE)

CHEM 101: CHEMICAL LABORATORY SAFETY AND SECURITY

STREAMS: BED (SCIENCE), BSC (CHEMISTRY, MATHEMATICS, BIOLOGY,  
BIOCHEMISTRY, INDUSTRIAL CHEMISTRY AND BIOMEDICAL SCIENCE AND  
TECHNOLOGY

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 16/12/2020




11.30 A.M. – 1.30 P.M.

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INSTRUCTIONS:

- Answer question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

- a) Differentiate between chronic and acute exposure of chemicals. (2 marks)
- b) Working alone in the lab can be very hazardous under most circumstances. Describe some of the laboratory situations under which you should never work alone. (4 marks)
- c) Give the procedure used to operate a fire extinguisher. (4 marks)
- d) State the type of safety hazards that the following signs indicate. (3 marks)
- i.  ii.  iii. 
- e) Briefly explain the circumstances under which a lab personnel can use a fire fighting equipment in the event of a fire and indicate an initial response plan that one should follow in case of large fires. (2 marks)
- f) State how you can smell a chemical in the laboratory. (1 mark)

- g) The clothing that one wears in the laboratory is a factor which will influence safety. Outline the type of clothing that should be worn/ not worn in a chemical laboratory. (3 marks)
- h) List the precautions that must be taken to minimize personal risks when using an equipment that use high current or high voltages. (3 marks)
- i) Discuss the four major routes by which a chemical may enter the body in the laboratory. (8 marks)

**QUESTION TWO (20 MARKS)**

- a) Briefly explain the methods of minimizing hazardous waste in the laboratory. (5 marks)
- b) There are four general classes of fires which are likely to pose a genuine threat to your laboratory safety. List each of the classes of fires and the type of extinguisher which would be required to put out the fire. (8 marks)
- c) Explain the steps for cleaning up spills in the event of an acidic solution spill (3 marks)
- d) Explain the dose response curve (4 marks)

**QUESTION THREE (20 MARKS)**

- a) Briefly discuss the properties of hazardous wastes (6 marks)
- b) Discuss the various laboratory disposal options (6 marks)
- c) Explain the following type of chemicals (4 marks)
- i. Corrosive substances
  - ii. Asphyxiants
  - iii. Reproductive and developmental toxins
  - iv. Carcinogens
- d) Describe the major classes of gloves and their usage. (4 marks)

**QUESTION FOUR (20 MARKS)**

- a) List two common cryogenes used in the lab giving the safety precautions that should be followed when using Cryogenic Liquids. (4 marks)
- b) Describe sequence of steps in following safe procedures for repairing electrical equipment. (4 marks)
- c) Briefly explain the type of eye protection needed in a laboratory (2 marks)

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- d) Solvents for disposal are best stored if the containers used are fireproof cans or polyethylene jerricans, and are closed and properly tagged or labeled. Outline the reasons for use of these types of containers and the solvents which should be kept in each. (4 marks)
- e) State the conditions necessary for a fire to occur (3 marks)
- f) State precautions that should be taken when dealing with broken glassware in the laboratory. (2 marks)
- g) Name one Dual-Use chemical that pose a security threat in a laboratory stating how it is illegally used. (1 mark)
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