



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

(MAIN CAMPUS)

**UNIVERSITY EXAMINATIONS (MAIN PAPER)
2021/2022 ACADEMIC YEAR**

FIRST YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE MEDICAL LABORATORY
SCIENCE/MEDICAL BIOTECHNOLOGY**

COURSE CODE: BML 121

COURSE TITLE: INORGANIC CHEMISTRY

DATE: 20/04/2022

TIME: 8.00 -10.00 AM

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, **A B** and **C**, carrying respectively: Multiple Choice Questions (**MCQs**), Short Answer Questions (**SAQs**) and Long Answer Questions (**LAQs**). **Answer all questions. DO NOT WRITE ON THE QUESTION PAPER.**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 5 Printed Pages. Please Turn Over

SECTION A: Multiple Choice Questions (20 marks).

- The statement that is not correct for the periodic classification of elements is:
 - The properties of elements are the periodic functions of their atomic numbers.
 - Non – metallic elements are lesser in number than metallic elements
 - The first ionization energies of elements along a period do not vary in a regular manner with increase in atomic number
 - For transition elements the d – sub shells are filled with electrons monotonically with increase in atomic number
- In the long form of periodic table, elements are arranged according to:
 - Increasing atomic number
 - Decreasing atomic number
 - Increasing atomic mass
 - Decreasing atomic mass
- Which of the following statement is incorrect in relation to ionization energy?
 - Ionization energy increases for each successive electron
 - The greatest increase in ionization energy is experienced on removal of electron from core of noble gas configuration
 - End of valence electrons is marked by a big jump in ionization energy
 - Removal of electron from orbitals bearing lower n value is easier than from orbital having higher n value
- Four successive members of first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionization energy.
 - Iron (Z = 26)
 - Chromium (Z=24)
 - Manganese (Z=25)
 - Vanadium (Z=23)
- Which of the following statement is correct?
 - Generally reducing character of elements increases in period
 - Generally oxidizing character of elements increases in period
 - Generally, basic character of oxides decreases in group
 - All are correct
- The set representing the correct order of first ionization energy is:
 - $K > Na > Li$
 - $Be > Mg > Ca$
 - $N > P > As$
 - Both (b) and (c)
- Which is correct order of atomic radii?
 - $Mg < Al < Na < K$
 - $Al < Mg < Na < K$
 - $K < Na < Mg < Al$
 - None of the above
- (A), (B) and (C) are elements in the third short period. Oxide of (A) is ionic, that of (B) is amphoteric and of (C) a giant molecule. (A), (B) and (C) have atomic numbers in the order of
 - $(A) < (B) < (C)$
 - $(C) < (B) < (A)$
 - $(A) < (C) < (B)$
 - $(B) < (A) < (C)$
- Which of the following is incorrect?
 - An element which has high electronegativity always has high electron gain enthalpy
 - Electron gain enthalpy is the property of an isolated atom

- c. Electronegativity is the property of bonded atoms
 - d. Both electronegativity and electron gain enthalpy are usually directly related to nuclear charge and inversely related to atomic size
10. according to modern periodic law, variations in the properties of elements is related to their:
 - a. Atomic weight
 - b. Nuclear weight
 - c. Atomic numbers
 - d. Neutron – proton ratios
 11. Mass of an atom is equals to which of the following
 - a. Only protons
 - b. Only neutrons
 - c. Neutrons and protons
 - d. Protons and electrons
 12. Nickel has atomic number 28. The correct electronic configuration is:
 - a. $1s^2 2s^2 2p^4 3s^2 3p^8 3d^{10}$
 - b. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$
 - c. $1s^2 2s^2 2p^4 3s^2 3p^6 4s^2$
 - d. $1s^2 2s^2 3s^2 3p^8 3d^{10}$
 13. Atoms having the same mass number and different atomic number are known as:
 - a. Isotopes
 - b. Isotones
 - c. Isobars
 - d. Isomers
 14. The formula for a mass number of an atom is:
 - a. Number of protons + number of electrons
 - b. Number of neutrons + number of electrons
 - c. Number of protons + number of neutrons
 - d. None of these
 15. The correct electronic configuration of element having atomic number 20 is:
 - a. 2,6,6,2
 - b. 2,8,8,2
 - c. 2,4,6,2
 - d. 2,4,6,2
 16. The place of atom where maximum mass of it concentrated is:
 - a. Nucleus
 - b. Neutrons
 - c. Protons
 - d. Electrons
 17. Which rule will this configuration be violating, if electronic configuration for oxygen is written as $1s^2 2s^2 2p^4$.
 - a. Aufbau's principle
 - b. Hund's rule
 - c. Pauli's exclusion principle
 - d. None of the above
 18. The nucleus of an atom has:
 - a. Protons and neutrons
 - b. Protons and electrons
 - c. Neutrons and electrons
 - d. Protons, neutrons and electrons
 19. How many electrons can fit into the orbitals that comprise the 3rd energy level?
 - a. 2
 - b. 8
 - c. 18
 - d. 32

20. In d orbitals the maximum number of unpaired electron that can be present is:
- 1
 - 3
 - 5
 - 7

SECTION B: Short Answer Questions (40 marks).

1. Explain why lithium and magnesium have similar chemical properties yet they belong in different periods (8 marks)
2. The data given below are for the elements, A, B, C and D which belong to the same periodic table

Element	A	B	C	D
1 st I.E	495	580	790	1255
Melting point of oxide	2300	1610	-20°

- a. Which one of the elements A, B, C and D is a metal? Explain your answer(4 marks)
 - b. State the type of bonding and structure of the oxides of elements A and D. Explain. (4 marks)
3. State what would be observed when chlorine gas is bubbled through a solution of iron (II) chloride solution hence write the equation of reaction (6 marks)
 4. Explain the following observations:
 - a. When hydrochloric acid is exposed in air, it turns brown (2 marks)
 - b. A colourless solution of acidified hydrogen peroxide turns brown on addition of acidified potassium iodide (2 marks)
 5. Using examples, explain how group (IV) elements reacts with:- (8 marks)
 - a. Water
 - b. Air
 - c. Acids
 - d. Alkalis
 - e. Non-metals
 6. Explain why lithium carbonate is insoluble in water (4 marks)

SECTION C: Long Answer Questions (60 marks).

1. Explain the four rules and principles followed when constructing an electronic configuration of elements. Demonstrate these using the following elements and explain which elements are thermodynamically stable and why? (20 marks)
 - a. Aluminium (Z = 13)
 - b. Phosphorus (Z = 15)
 - c. Calcium (Z = 20)
 - d. Chlorine (Z = 17)
 - e. Vanadium (Z = 23)
 - f. Selenium (Z = 34)
 - g. Nickel (Z = 28)
 - h. Copper (Z = 29)
2. The table below shows the melting points of elements in period 3 of the periodic table

(20 marks)

Element	Na	Mg	Al	Si	P	S	Cl
Atomic no.	11	12	13	14	15	16	17
Melting point (°C)	98	650	660	1410	44	119	-101

- a. Plot a graph of melting point against atomic number
 - b. Explain the shape of graph
 - c. The melting points of group I metals decrease down the group. Explain
3. Using two (2) examples, demonstrate how halogens reacts with:-
- a. Water (5 marks)
 - b. Cold dilute alkalis (5 marks)
 - c. Hot concentrated alkali (5 marks)
 - d. Hydrogen (5 marks)

