



KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS 2020/2021 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BSC CHEMISTRY, BACHELOR OF AGRICULTURAL ECONOMICS AND RESOURCE MANAGEMENT AND BSC AGRICULTURE AND BIOTECHNOLOGY

COURSE CODE: SCH 111

COURSE TITLE: INTRODUCTION TO INORGANIC CHEMISTRY

DATE: 29/09/2021 TIME: 11:00-1:00PM

INSTRUCTIONS TO CANDIDATES:

- Answer Question ONE (Compulsory) and any other TWO (2) questions
- Indicate answered questions on the front cover of your answer booklet
- Start each question on a new page and make sure the question's number is written on each page

TIME: 2 Hours

Constants: 1 mole = 6.02×10^{23} particles

This paper consists of 4 printed pages. Please Turn Over

KIBU observes ZERO tolerance to examination cheating

Question 1 [30 Marks]

a. State the Aufbau Principle [2 Marks]

b. Identify the isotope of Chromium with the same number of neutrons as Zn-65

[5 Marks]

c. Determine the volume of 4.55 x 10⁶ atoms of Nickel (density 8.908 g/cm³)

[5 Marks]

d. Describe the four principles of Bohr's atomic theory

[8 Marks]

e. Determine the numbers of the following atoms in 12 g of Fe(MnO₄)₃

i. Oxygen

[4 Marks]

ii. Manganese

[3 Marks]

f. Describe covalent and ionic bonds giving an example for each

[3 Marks]

Question 2 [20 Marks]

a. Draw each of the following orbitals and indicate the maximum number of electrons they can hold [9 Marks]

i. 1s

ii. 2p

iii. 3d

b. List all the sets of 4 quantum numbers used to describe the electrons in a 4f orbital

[6 Marks]

c. Draw the Lewis electron structure for the species below.

[5 Marks]

i. NCl₃

ii. NOCl

Question 3 [20 Marks]

- a. For each of the following ions, indicate the; chemical formula and charge, the chemical formula for the compound each anion would form with K⁺ and with Ca²⁺. [@ 4 Marks]
 - i. sulfate
 - ii. acetate
 - iii. nitrate
 - iv. chloride
 - v. carbonate

- Describe four trends observed in periods and groups of the periodic table and describe the Question 4 [20 Marks] reasons for each
- Study the table below and answer the questions

Study the table belo	ow and ansv	 **	Z	
Element	X	Y 53	·35	
Mass Number	20	28	19	
No. of neutrons	13			[3 Marks]

- Determine the atomic number of each element i.
- [6 Marks] Draw the electron filling diagram for each element e.g He ii.
- [3 Marks] Indicate the group and period to which each element belongs iii.

Question 5 [20 Marks]

A solution of alcohol based sanitizer consists of 75% v/v isopropanol.

Given the density of isopropanol as 0.785 g/mL, determine;

- The total number of water and isopropanol molecules in 500 ml of the solution [14 Marks]
- The number of carbon, hydrogen and oxygen atoms in the solution

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