



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

MAY – JULY 2019 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF CHEMISTRY

SPECIAL / SUPPLEMENTARY EXAMINATION

CHEM 104: CHEMICAL BONDING AND STRUCTURE

Date: JULY 2019

Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and any other Two Questions

Q1

- (a). What do you understand by the Rutherford-Bohr atomic model? (3 marks)
- (b). Using suitable illustrations, explain what you understand 'Exceptions to the Octet Rule' (3 marks)
- (c). State Hund's rule. (2 Marks)
- (d). List the four conclusions about de Broglie's matter waves. (3 Marks)
- (e). What is an electromagnetic spectrum? (4 marks)
- (f). Using the London dispersion forces, explain the meaning of polarizability in molecules. (3 marks)
- (g). What is a Lewis structure? (3 Marks)
- (h). What effect does frequency of incident light have on photoelectric current? (3 Marks)
- (i). The larger the central atom, the more atoms you can bond to it. Explain. (4 Marks)
- (j). What is a potential energy diagram for an ionic bond. (2 Marks)

Q2

- (a). In the 'bent' shape of water, less repulsion is exerted by a bonding pair compared to the lone electron pair. Explain. (5 marks)
- (b). What are the main rules for drawing Lewis structures? (4 marks)
- (c). Explain how one can calculate the formal charge on CN^- (5 marks)
- (d). There are two properties of isolated atoms that influence electronegativity. Explain. (6 marks)

Q3

- (a). What is your understanding of the following types of intermolecular forces;

Hydrogen Bonding, Ion–Dipole Interactions, London Dispersion Forces, and Dipole–Dipole

Interactions,. (6 Marks)

- (b). Using a water molecule, arrange the possible electron pair repulsions in terms of decreasing

strength. (6 Marks)

- (c). Using the Pauling scale of electronegativity, explain the factors that affect electronegativity.

(8 Marks)

Q4

- (a). Explain your understanding of the following; bonding, non-bonding and anti-bonding molecular orbitals. (6 marks)

- (b). Differentiate between the Octet and Duplet Rules.

(6 Marks)

- (c). What is your understanding of Valence Shell Electron Pair Repulsion (VSEPR)? (4 Marks)

- (d). What are Radio waves? (4 Marks)

Q5

- (a). Explain the different parts of the Born Haber Cycle for NaCl. (6 Marks)

(b). What are the weaknesses of the Octet Rule?

(5 Marks)

(c). What do you understand by covalent character in ionic compounds?

(3 Marks)

(d). List the rules of hybridization of Atomic Orbitals.

(6 Marks)

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