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OLABISI ONABANJO UNIVERSITY

DEPARTMENT OF CHEMICAL SCIENCES

AGO-IWOYE, OGUN STATE, NIGERIA

TITLE OF EXAMINATION: B.Sc Chemistry/Industrial Chemistry/ Chemistry Education

SESSION: 2011/2012 **SEMESTER**: Harmattan

COURSE CODE: CHM 201 **Number of Units**: 3

COURSE TITLE: Inorganic Chemistry I

INSTRUCTION: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

TIME ALLOWED: 2.5 HOURS

(1ai) Draw and describe the structure of a trihydride of group V elements.

(1aii) Explain why Selenium and Tellurium exhibit the +4 and +6 states whereas Oxygen does not.

(1aiii) In a tabular form, give at least four comparative chemistry of group V, VI and VII elements.

(1bi) Mention at least three properties that chiefly determine the utility of a solvent as either Lewis acids or bases.

(1bii) Write an equation to show self-ionization property of the following solvents: (i). Water. (ii) Liquid ammonia and (iii) Liquid Hydrofluoric.

(1biii) Explain why covalent azides are usually much less stable than ionic azides

(2a) With relevant diagrams, explain the following overlap of orbitals (i) Positive overlap (ii) Negative overlap (iii) Zero overlap.

(2b) Consider these hypothetical molecules: O_2^{2+}, O_2^+, O_2, O_2^- (i) Write the electronic configuration for each (ii) Draw the molecular orbital energy level diagram for each (iii) Calculate bond order and (iv) Arrange them in the order decreasing stability.

(2c) Use the concept of molecular orbital theory to explain the bond formation for the following heteronuclear diatomic molecules (i) NO (ii) CO and (iii) CO^+ and NO^+

(3a) Draw the structure for the following oxides of Nitrogen: (i) Dinitrogen monoxide (ii) Nitrogen monoxide (iii) Dinitrogen trioxide (iv) Dinitrogen tetraoxide (v) Dinitrogen pentaoxide.

(3b) Explain with relevant equations, dehydration condensation in the formation of polyphosphates.

(3c) What are the two important oxides of phosphorous? Write equations for their formation and reactions (i) to produce oxoacids and (ii) with excess strong base.

(4a) Explain the role of the Haemocyanin and Haemerythrin in the biological systems of arthropods and molluscs.

(4b) Explain the role of iron in siderophores and transferins as well as the role of Zinc in DNA code transcription.

(4c) Give details of the involvement of iron porphyrin compounds and explain the mechanism of action of Heamoglobin.