NATIONAL OPEN UNIVERSITY OF NIGERIA
14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS
SCHOOL OF SCIENCE AND TECHNOLOGY
MARCH/APRIL 2014 EXAMINATION

COURSE CODE: CHM 303
COURSE TITLE: INORGANIC CHEMISTRY III
TIME ALLOWED: 3HOURS
INSTRUCTION: ANSWER ANY FIVE QUESTIONS

1ai. Briefly explain why XeF_4 has square planar structure.2mks

ii. Juxtapose why vander waals force between the noble gas atoms increase down the group. 3mks

bi. Write short notes on the following;

i. Lambda point. 2mks
ii. Super conductivity. 2mks
iii. Radon. 2mk

c. Using chemical equations show the formation of Xenon Tetra fluoride.3mks

2ai. Write balanced chemical equations to describe the reaction of potassium metal with:

(i) oxygen (ii) water (iii) chlorine (6 marks)

b. Work out the oxidation states of xenon in XeF_4 and XeF_6 (2mks)

c. Given below in Column I are the few expected compounds of noble gases. Write down in Column II the shapes of these compounds on the basis of VSEPR theory. (3mks)

Column I	Column
(i) $XeOF_4$	(ii) _____
(ii) XeO_4	(iii) _____
(iii) XeF_6	(iii) _____

d. State three State four uses of hydrogen. (3mks)

Question Three

3a. (i) List and describe the isotopes of hydrogen (3 marks)

(ii) What do you understand by the term ‘active hydrogen’? (2 marks)

b. Discuss the classification of ligands in coordination chemistry (6 marks)

Question Four

4ai. What are β rays? (2 marks)

b. Discuss briefly the principles of the valence bond theory (6 marks)

c. Highlight the differences between the valence bond and molecular orbital theories (6marks)

Question Five

5a (i) What is the difference between gangue and slag? (4 mks)

(ii) Write balanced chemical equations to show how the flux forms the slag in an iron blast furnace. (4 mks)

(b) (i) Why is it necessary to concentrate the ores before extracting metals from them?(2 mks)

(ii) Describe the froth flotation process for the concentration of ores. (4mks)

Question Six

6ai. List and give the electronic configurations of the 3d transition elements (8 mks)

(b) What are rare earth elements? Why are they so called? (2 mks)

(c) (i) Identify the most common oxidation state for the lanthanides and the actinides (2 mks)

(ii) How is this oxidation state formed? (2 mks)

Question Seven

7ai. How do the following properties vary in the transition elements? (6 marks)

(i) Atomic size

(ii) Ionisation energy

(iii) Electronegativity

(b) Highlight four characteristics of transition metals (4 mks)

(c) (i) Explain briefly why $CuSO_4$ is blue while $ZnSO_4$ is white (2 marks)

(ii) Predict the spin-only magnetic moment for: (2 marks)

Fe^{2+}