NATIONAL OPEN UNIVERSITY OF NIGERIA
14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS

SCHOOL OF SCIENCE AND TECHNOLOGY
OCTOBER 2013 EXAMINATION

Course Code: CHM 303:

Course Title: INORGANIC CHEMISTRY III

Time: 2½ Hours

INSTRUCTION: Answer any four Questions

1.

a) i. State the principal sources of Ne, Arand Xe and how these elements can be obtained. (3 marks)

ii. Why do the noble gases have the highest ionization energies compared to other elements in their respective periods? (3 marks)

b) i. The noble gases are chemically unreactive but chemical reactivity of the noble gases increase as we go down the group from helium to radon.Explain. (5 marks)

ii. State two uses of helium. (3 marks)

2.

a) i. Write an equation representing the reaction between xenon and fluorine at 700k, 6 atm. (3 marks)

ii. What kind of compound is formed between quinol and the noble gases Ar, Kr or Xe under pressure of 10-40 atmospheres . HowdoAr, Kr or Xe bind to quinol to form this compound? (4 marks)

b) i. Account for the structure of XeF_4 according to the valence bond theory. (5 marks)

ii. State 2 uses of hydrogen. (2 marks)

3.

a) i. What is the difference between beryllium oxide(BeO) and oxides of the other elements of Group II. (4 marks)

ii. Why is it that, unlike group I and II (with the exception of Be), Group IIIB elements are essentially covalent or contain an appreciable amount of covalent character?. (3 marks)

b) i. Name the elements with which boron reacts, and the compounds formed. (4 marks)

ii. How do the elements of Group IVA make more than four covalent bonds (carbon excluded). (3 marks)

4.

a) i. What properties or characteristics of Group VA element make them exhibit properties of non-metals? (3 marks)

ii. What kind of oxides are formed when oxygen reacts with;
(2 marks)
-Group I and II metals
-Sulphur and Phosphorus

b) i. Write chemical reactions to show the difference in the products formed when chlorine and
fluorine reactwith water. (2 marks)
ii. Write the electronic configuration of the dipositive ion of Copper.
(4 marks)

c) With the exception of Beryllium, Group IIA elements are good reducing agents and give ionic
compound. Discuss (4 marks)

5.

a) i. State two characteristics of transition elements. (3 marks)
ii. What is the main source of helium and how is it obtained from this source.
(4 marks)

b) Discuss the trend in ionization energy going from the transition series Sc to Zn.
(7 marks)

p.t.o

6.

a) i. What do you understand by the term “lanthanide contraction” ?. (6 marks)
ii. Identify the most stable state for lanthanides.(2 marks)

b) Why are the compounds of Sc^{3+}, Ti^{4+} and Zn^{2+} white or colourless. (6 marks)

7.

a) i. What is a coordination compound? (3 marks)
ii. Coordination compounds are said to be lewisadduct. Explain. (5 marks)

b) i. What is Beneficiation of ores? (3 marks)
ii. State the methods of beneficiation of ores. (3 marks)