



NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, Plot 91 Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi - Abuja.

FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCES
JULY 2017 EXAMINATION

COURSE CODE: CHM 303

COURSE TITLE: INORGANIC CHEMISTRY III

COURSE UNIT: 3 Units

TIME: 2½ HOURS

INSTRUCTION: Question one is compulsory. Answer question one and any other four questions.

QUESTION ONE

1ai) Explain why the noble gases have very low melting and boiling points in comparison with those of other elements of comparable atomic or molecular weights. (3 marks)

1aii) What is the structure of the hydrides of carbon and silicon? (2 marks)

1aiii) Apart from oxygen other members of Group VI elements can make up to six covalent bonds, discuss. (2 marks)

1bi) Outline any three general properties of transition elements. (3 marks)

1bii) Write short note on formation of complexes by transition metals. (8 marks)

1ci) Depending on chemical composition, classify minerals of metals. (2½ marks)

1cii) What are coordination compounds? (1½ marks)

1ciii) Mention and explain the classes of coordination compounds. (3 marks)

QUESTION TWO

2ai) Why is there a steady increase in boiling points from He to Rn? (4½ marks)

2aii) State one characteristic and application of noble gases. (2mark)

2bi) Complete this reaction $\text{XeF}_2 + \text{H}_2$. (2 marks)

2bii) Expatiate on the term “lanthanide contraction” (6½marks)

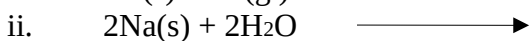
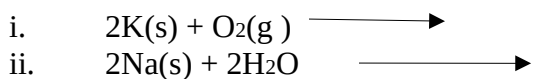
QUESTION THREE

3ai) Discuss the periodic trend in atomic radii among transition elements. (4 marks)

3aii) Distinguish between main group, transition and inner transition elements. (5 marks)

3bi) Show with balanced chemical reaction the product formed when any nitrate of Group 1A elements are heated. (2 marks)

3bii) Complete the following chemical equations. (4 marks)



QUESTION FOUR

4a) Fill in the shapes of the following compounds. (2 ½ marks)

Column I	Column II
XeF_4	
XeOF_4	

XeF ₄	
XeF ₆	

4a) Using Valence Shell Electron Pair Repulsion Theory (VSEPR), justify the shape of XeF₂ compounds. (6 marks)

4b) Comment on colour of transition metal compounds. (6½mark)

QUESTION FIVE

5a) Write on the following:

i. Four reasons why beryllium is different from other members of group IIA.

(6 marks)

ii. Why caesium is a more reducing agent than sodium.

(2marks)

5b) Describe formation of coordination compounds by Valence Bond Theory. (7 marks)

QUESTION SIX

6a) Write balanced chemical equations to show how reduction of iron oxide takes place in a blast furnace. (6 marks)

6b) List and explain briefly the steps involved in processing of metals from their ores after extraction/mining. (9 marks)