

**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 2018 EXAMINATION**

**COURSE CODE: CHM 303**

**COURSE TITLE: INORGANIC CHEMISTRY III**

**COURSE UNIT: 3**

**TIME: 2 ⅟2 HOURS**

**INSTRUCTION: Question one is compulsory. Answer question one and**

 **any other four questions.**

**QUESTION ONE**

1ai) Mention the principal source of Ne, Ar and Xe and how these elements can be obtained from their source. 3 mks

1aii) Write an equation representing the reaction between xenon and fluorine at 700k, 6 atm.

 31/2 mks

1bi) Explain why Group IIIB elements, unlike group I and II are essentially covalent or contain an appreciable amount of covalent character. 2 mks

1bii) Write short note on formation of complexes by transition metals. 7 mks

1ci) Depending on chemical composition, classify minerals of metals. 21/2 mks

1cii) Why is Carbon a preferred reducing agent in commercial metallurgy? 2mks

1ciii) Carbon reduction is not used to obtain certain metals from their ores, explain 2mks

 **QUESTION TWO**

2ai)What kind of oxides is formed when oxygen reacts with;

-Group I and II metals

-Sulphur and Phosphorus 2 mks

2aii) How do the elements of Group IVA excluding carbon make more than four covalent bonds. 2mks

2bi) Why are the compounds of Sc3+, Ti4+ and Zn2+ white or colourless. 4mks

2bii) Differentiate between gangue and slag. 4 mks

 **QUESTION THREE**

3ai)Explain the chemistry behind the steady increase in boiling points from He to Rn? 31/2 mks

3aii) State one characteristic and application of noble gases. 2mks

3bi) Complete the chemical equation for the reaction;

 XeF2 + H2 2 mks

3bii) Briefly explain the meaning and implication of lanthanide contraction. 41/2mks

 **QUESTION FOUR**

4ai**)** Fill in the shapes of the following compounds.

|  |  |
| --- | --- |
| Column I | Column II |
| XeF4 |  |
| XeOF4 |  |
| XeF4 |  |
| XeF6 |  |

 2 ½ mks

4aii) Using Valence Shell Electron Pair Repulsion Theory (VSEPR), justify the shape of XeF2 compounds. 4 mks

4b) Comment on colour of transition metal compounds. 5½mks

 **QUESTION FIVE**

a) Give reasons for the following:

Four reasons why beryllium is different from other members of group IIA. 4 mks

Why caesium is a more reducing agent than sodium. 2 mks

b) Use the Valence Bond Theory to explain the formation of coordination compounds. 6 mks

 **QUESTION SIX**

a) Explain the chemistry behind beneficiation of ores. 4 mks

b) Distinguish between the following methods of beneficiation of ores.

Gravity 4 mks

Magnetic separation 4 mks