National Open University of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Sciences
2021_1 EXAMINATION QUESTIONS[1234]

COURSE CODE: CHM426
COURSE TITLE: Chemistry of lanthanides and actinides
CREDIT: 2 Units
TIME ALLOWED: 2 Hours
INSTRUCTION: Answer Question ONE (1) and any other Three (3) Questions

Question 1

a. Discuss on the process of extraction and separation of lanthanide series elements. **5 marks**
b. What is the name given the following?
   i. vertical arrangement in PT
   ii. Horizontal arrangement in PT
   iii. A whole class of elements having their valence electrons in the same orbitals **3 marks**

c. i. Name and explain the main content of the three principal ores of lanthanides. **6 marks**
   ii. What properties are responsible for making depleted uranium (DU) suitable for use as weapons, especially armor-piercing ammunition? **3 marks**
d. Give any four (4) general physical properties of actinide elements. **4 marks**
e. Write on the general description of oxidation state of actinides **4 marks**

Question 2

a. i. Name the first three members of lanthanide series **1½ marks**
ii. Give their electronic configuration in both atomic form and in M^{+3} oxidation states. **3 marks**

b. Discuss about the formation and properties associated with hydrides of lanthanide. **4 marks**

c. i. Explain why it is difficult to separate lanthanides from each other **2½ marks**

d. What are the compounds lanthanides that are usually formed in +4 oxidation state? **4 marks**

Question 3

a. Discuss on the formation of halide compounds by actinide elements **5 marks**

b. i. Write an equation for balanced chemical reaction of the reaction between actinium (III) hydroxide and hydrofluoric acid. **3 marks**

ii. Explain on the application for Ce in Ceramics **3 marks**

c. Name the most important oxide of Uranium and why is that oxide so important? **4 marks**

Question 4

4a. Mention the physical properties of uranocene, the most important organometallic compound of uranium **4 marks for any 4**

4b. Mention any four (4) applications of the lanthanide alloy; Misch metals. 6 **marks for any 4**

4c. Explain the principle of gaseous diffusion method used in the separation of U – 235 from U – 238. **5 marks**

Question 5

1. a. Explain the term "actinide contraction" **5 marks**

   b. Explain why the hydrides of uranium are preferred over metallic uranium for use in preparation of uranium compounds? **5 marks**

   c. What is responsible for the colour of lanthanides? **5 marks**