



# CHEMISTRY

## BOOKS - ARIHANT PUBLICATION

### F-BLOCK ELEMENTS

Questions For Practice Multiple Choice Type  
Questions 1 Mark

1. Which of the following has got incompletely filled f-subshell?

A. Gadolinium

B. Lutetium

C. Lawrencium

D. Tantalum

**Answer: A**



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2. The lanthanoid contraction relates to

A. atomic radii

B. atomic as well as  $M^{3+}$  radii

C. valence electrons

D. oxidation states

**Answer: B**



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**3.** The atomic size of cerium and promethium is quite close, because

A. they are in same period in periodic table

B. their electronic configuration is same

C. f-electrons have poor shielding effect

D. nuclear charge is higher on cerium than promethium

**Answer: C**



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**Questions For Practice Very Short Answer Type**

**Questions 1 Mark**

1. Outer electronic configuration of Gd

(atomic number = 64) is \_\_\_\_\_



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2. Write down the electronic configuration of gadolinium (Gd).

Its atomic number is 64.



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3. Although Zr belongs to 4d and Hf belongs to 5d- transition series but it is quite difficult to separate them. why ?



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4. Write the electronic configuration of the elements with the atomic numbers 61,91,101,109.



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5. Use Hund's rule to derive the electronic configuration of  $Ce^{3+}$  ion and calculate its magnetic moment on the basis of spin only formula.



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6. What are the uses of misch metal?



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7. Which compound is used as phosphorus in TV screen?



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## Questions For Practice Short Answer Type I

### Questions 2 Mark

1. Name the members of the lanthanoid series which exhibit + 4 oxidation states and those which exhibit +2 oxidation states. Try to



correlate this type of behaviour with the electronic configuration of these elements.



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2. Actinoid contraction is greater from element to element than lanthanoid contraction. Why?



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3. The chemistry of the actinoid elements is not so smooth as that of the lanthanoids. Justify this statement by giving some examples from the oxidation state of these elements.



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4. With reference to the structural variability and chemical reactivity, write the difference between lanthanoids and actinoids.



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## Questions For Practice Short Answer Type II

### Questions 3 Mark

1. What are alloys? Name an important alloy which contains some of the lanthanoid metals. Mention its uses.



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2. Compare the chemistry of actinoids with that of the lanthanoids with reference to

(i) electronic configuration

(ii) oxidation state

(iii) chemical reactivity



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## Questions For Practice Long Answer Type Questions 7 Marks

1. (i) Which is the last element in the series of the actinoids? Write the electronic configuration of this element. Comment on

the possible oxidation state of this element.

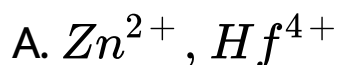
(ii) What is lanthanoid contraction? Name an important alloy which contains some of the lanthanoid metals.

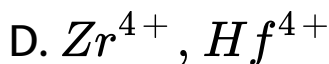
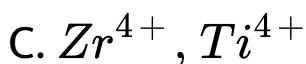
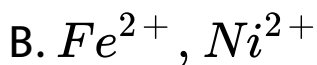


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## Odisha Bureau S Textbook Solutions Multiple Choice Type Questions

1. Which of the following pairs have same size?





**Answer: D**



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2. Lanthanide contraction is due to \_\_\_

A. poor shielding of one of the 4f -  
electrons by another in the subshell

B. greater shielding of 5d electrons by 4f electrons

C. poorer shielding of 5d electrons by 4f electrons

D. effective shielding of one of the 4f electrons by another in the subshell

**Answer: A**



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3. The maximum oxidation state exhibited by actinide ions is:

A. +4

B. +5

C. +7

D. +8

**Answer: C**



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4. The most common mineral containing lanthanoids is

A. pyrites

B. monazite sand

C. rock salt

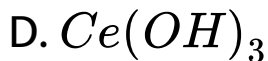
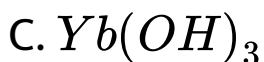
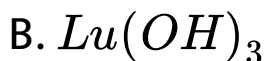
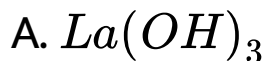
D. None of the above

**Answer: B**



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5. Which is the strongest base among the following



**Answer: A**



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6. The general electronic configuration of inner transition elements is -

A.  $ns^2(n-1)d^{0-1}(n-2)f^{1-14}$

B.  $ns^2(n-1)d^{1-2}(n-2)f^{0-14}$

C.  $ns^2(n-1)d^{0-1}(n-2)f^{0-14}$

D.  $ns^2(n-1)d^1(n-2)f^{1-14}$

**Answer: A**



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7. Which of the following oxidation state-is the most common among the lanthanoids?

A. +4

B. +2

C. +5

D. +3

**Answer: D**



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8. The lanthanoid ions are coloured due to

A. p-p transition

B. d-d transition

C. d-f transition

D. f-f transition

**Answer: D**



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1. General electronic configuration of lanthanide is :



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2. Write down the electronic configuration of

(i)  $Lu^{2+}$ , (ii)  $Pm^{3+}$



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3. Identify the atomic number of the inner transition elements.

24,35,59, 65,73, 87,91,102,105



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4. What are the different oxidation states, exhibited by lanthanoids?



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5. What are alloys? Name an important alloy which contains some of the lanthanoid metals. Mention its uses.



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6. Write the electronic configuration of (i)  $Yb^{2+}$ , (ii)  $Sm^{2+}$



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7. Which lanthanoid shows maximum paramagnetism.



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8. Name the common mineral containing lanthanoids.



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9. Name a member of the lanthanoid series which is well known to exhibit + 4 oxidation state.



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## Odisha Bureau S Textbook Solutions Short Answer Type I Questions

1. Define lanthanoid contraction. Write two consequences of it.



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2. Eu. and .Yb. show + 2 oxidation state, whereas + 4 oxidation state is shown by Ce and Tb. Why?



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3. Explain with correct reason whether  $Sm^{2+}$  and  $Eu^{2+}$  act as good oxidising or reducing agent



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4.  $La^{3+}$  and  $Lu^{3+}$  are colourless, whereas  $Sm^{3+}$  and  $Eu^{3+}$  are coloured. Why?



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5. Mention important uses of uranium and plutonium.



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6. In chemistry of all lanthanoids is quite similar. Why?



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7. Actinoid contraction is greater from element to element than lanthanoid contraction. Why?



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8. Give reason. Why in chemistry of all the lanthanoids is quite similar?



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**Odisha Bureau S Textbook Solutions Short Answer Type Ii Questions**

1. Compare the chemistry of actinoids with that of lanthanoids with special reference to-

(i) electronic configuration

(ii) atomic and ionic radii

(iii) oxidation states.



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2. What are alloys? Name an important alloy which contains some of the lanthanoid metals.

Mention its uses.



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3. Which is the last element in the series of actinoids? Write its electronic configuration.

Comment on its oxidation states.



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4.  $La(OH)_3$  is more basic than  $Lu(OH)_3$ , why?



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5. Why  $Sm^{2+}$ ,  $Eu^{2+}$  and  $Yb^{2+}$  ions in solutions are good reducing agents, but an aqueous solution of  $Ce^{4+}$  is a good oxidising agent.



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Odisha Bureau S Textbook Solutions Long Answer Type Questions

1. Write the general electronic configuration of lanthanoids.



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2. Why  $Sm^{2+}$ ,  $Eu^{2+}$  and  $Yb^{2+}$  ions in solutions are good reducing agents?



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3. Why is the separation of lanthanoid elements difficult?



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4. Compare the chemistry of actinoids with that of lanthanoids with special reference to-

(i) electronic configuration

(ii) oxidation state

(iii) atomic and ionic sizes

(iv) chemical reactivity



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**Chapter Practice Multiple Choice Type Questions**

**1 Marks**

1. Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii? (Numbers in the parenthesis are atomic numbers).

A. Ti (22) and Zr (40)

B. Zr(40) and Nb(41)

C. Zr (40) and Hf (72)

D. Zr (40) and Ta (73)

**Answer: C**



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2. Misch metal is

- A. an alloy which consists of a lanthanoid metal , (-95%) and iron (-5%) an traces of S, C, Ca and Al
- B. used in Mg based alloy to produce bullets, shell and lighter flint
- C. Both (a) and (b) are true
- D. Both (a) and (b) are false

**Answer: C**



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**3.** Consider the following statements,

I.  $La(OH)_3$  is the least basic among hydroxides of lanthanides.

II.  $Zr^{4-}$  and  $Hf^{4+}$  possess almost the same ionic radii.

III.  $Ce^{4+}$  can act as an oxidising agent.

Which of the above is/are true?

A. I and III

B. II and III

C. Only II

D. I and II

**Answer: B**



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**Chapter Practice Very Short Answer Type  
Questions 1 Marks**

1. The basicity of lanthanoid hydroxides, across the lanthanoid series.....



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2. Write down the electronic configuration of samarium (Sm).



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3. An element is a radioactive element. In which part of periodic table, the element should reside?



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4. Name two actinides used in nuclear reactors.



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5. What are inner-transition elements? Decide which of the following atomic numbers are of the inner-transition elements 29,59,74,95, 102,104?



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6. Write down the electronic configuration of the following and predict their magnetic moments.

(i)  $Ce^{4+}$ , (ii)  $Pm^{3+}$ , (iii)  $Lu^{2+}$ , (iv)  $Th^{4+}$





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7. Describe the factors on which the stability of an oxidation state of lanthanoid elements depends.



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**Chapter Practice Short Answer Type I Questions 2**  
**Marks**

1. Write one similarity and one difference between the chemistry of lanthanoids and that of actinoids.



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2. Explain

(i) The atomic size of cerium and promethium is quite similar.

(ii) Magnetic behaviour of lanthanoids.

(iii) Shielding power of 4f -electrons, is quite poor.



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3. The outer electronic configurations of two members of the lanthanoid series are as follow:  $4f^1 5d^1$  and  $4f^7 5d^0 6s^2$ . What are their atomic numbers? Predict the oxidation states exhibited by these elements in their compounds.



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## Chapter Practice Short Answer Type II Questions

### 2 Marks

1.  $Yb^{2+}$  acts as a reductant while  $Tb^{4+}$  act as an oxidant. Why?



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## Chapter Practice Long Answer Type Questions

1. (i) What is the effect of lanthanoid contraction on the chemistry of the lanthanoids?



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2. (a) Separation of lanthanide elements is difficult. Explain.

(b)  $Sm^{2+}$ ,  $Eu^{2+}$  and  $Yb^{2+}$  ions in solutions are good reducing agents but an aqueous

solution of  $Ce^{4+}$  is a good oxidising agent.

Why?



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