COMPLETE f-BLOCK

1. Number of colourless lanthanoid ions among the following is _____.

Eu^{3+}, Lu^{3+}, Nd^{3+}, La^{3+}, Sm^{3+}

2. The electronic configuration of Einsteinium is :

(Given atomic number of Einsteinium = 99)

(1) [Rn] $5f^{12}$ $6d^0$ $7s^2$ (2) [Rn] $5f^{11}$ $6d^0$ $7s^2$

(3) [Rn] $5f^{13}$ $6d^0$ $7s^2$ (4) [Rn] $5f^{10}$ $6d^0$ $7s^2$

3. The number of element from the following that do not belong to lanthanoids is :

Eu, Cm, Er, Tb, Yb and Lu

(1) 3 (2) 4

(3) 1 (4) 5

4. Diamagnetic Lanthanoid ions are:

(1) Nd^{3+} and Eu^{3+} (2) La^{3+} and Ce^{4+}

(3) Nd^{3+} and Ce^{4+} (4) Lu^{3+} and Eu^{3+}

5. Which of the following acts as a strong reducing agent ?

(Atomic number : Ce = 58, Eu = 63, Gd = 64, Lu = 71)

(1) Lu^{3+} (2) Gd^{3+}

(3) Eu^{2+} (4) Ce^{4+}

6. The electronic configuration for Neodymium is:

[Atomic Number for Neodymium 60]

(1)[Xe] $4f^4$ $6s^2$

(2) [Xe] $5f^4 7s^2$

(3) [Xe] $4f^6$ $6s^2$

(4) [Xe] $4f^1 5d^1 6s^2$

7. Given below are two statements:

Statement (I) : In the Lanthanoids, the formation of Ce^{+4} is favoured by its noble gas configuration.

Statement (II) : Ce^{+4} is a strong oxidant reverting to the common +3 state.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are false

SOLUTIONS

1. Ans. (2)

Sol. La^{+3} – $[Xe]4f^0$

Nd^{+3} – $[Xe]4f^3$

Sm^{+3} – $[Xe]4f^5$

Eu^{+3} – $[Xe]4f^6$

Lu^{+3} – $[Xe]4f^{14}$

La^{+3} and Lu^{+3} do not show any colour because no unpaired electron is present.

2. Ans. (2)

Sol. Einsteinium (atomic No = 99): $[Rn]\ 5f^{11}\ 6d^0\ 7s^2$

3. Ans. (3)

Sol. Cm is Actinide

4. Ans. (2)

Sol. Ce : $[Xe]\ 4f^1 5d^1 6s^2$; Ce^{4+} diamagnetic

La : $[Xe]\ 4f^0 5d^1 6s^2$; La^{3+} diamagnetic

5. Ans. (3)

Sol. $Eu^{+2} \rightarrow Eu^{+3} + 1e^-$

$[Xe]4f^7 6s^0$ $[Xe]\ 4f^6 6s^0$

6. Ans.(1)

Sol. Electronic configuration of Nd(Z = 60) is ; $[Xe]\ 4f^4\ 6s^2$

7. Ans. (2)

Sol. Statement (1) is true, Ce^{+4} has noble gas electronic configuration.

Statement (2) is also true due to high reduction potential for Ce^{4+}/Ce^{3+} (+1.74V), and stability of Ce^{3+}, Ce^{4+} acts as strong oxidizing agent.