JEE Mains 2019 Chapter wise Question Bank

d and f-Block Elements - Questions

Q1

The transition element that has lowest enthalpy of atomisation is:

(1) Fe (2) Cu
(3) V (4) Zn

9 Jan Evening

Q2

The effect of lanthanoid contraction in the lanthanoid series of elements by and large means:

(1) increase in both atomic and ionic radii
(2) decrease in atomic radii and increase in ionic radii
(3) decrease in both atomic and ionic radii
(4) increase in atomic radii and decrease in ionic radii

10 Jan Morning

Q3

The electrolytes usually used in the electroplating of gold and silver, respectively, are:

(1) $[Au(CN)_2]^-$ and $[Ag(CN)_2]^-$
(2) $[Au(CN)_2]^-$ and $[AgCl_2]^-$
(3) $[Au(OH)_4]^-$ and $[Ag(OH)_2]^-$
(4) $[Au(NH_3)_2]^+$ and $[Ag(CN)_2]^-$

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Q4

The element that usually does **NOT** show variable oxidation states is:

(1) Cu (2) Ti
(3) Sc (4) V

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Q5

$Mn_2(CO)_{10}$ is an organometallic compound due to the presence of :

(1) Mn–C bond (2) Mn–Mn bond
(3) Mn–O bond (4) C–O bond

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Q6

The correct order of atomic radii is :

(1) N > Ce > Eu > Ho (2) Ho > N > Eu > Ce
(3) Ce > Eu > Ho > N (4) Eu > Ce > Ho > N

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Q7

The lanthanide ion that would show colour is :

(1) Gd^{3+} (2) Sm^{3+} (3) La^{3+} (4) Lu^{3+}

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Q8

The statement that is INCORRECT about the interstitial compounds is :

(1) they are chemically reactive.
(2) they are very hard.
(3) they have metallic conductivity.
(4) they have high melting points.

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Q9

The maximum number of possible oxidation states of actinoides are shown by:

(1) Nobelium (No) and lawrencium (Lr)
(2) Actinium (Ac) and thorium (Th)
(3) Berkelium (Bk) and californium (Cf)
(4) Neptunium (Np) and plutonium (Pu)

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Q10

Consider the hydrated ions of Ti^{2+}, V^{2+}, Ti^{3+}, and Sc^{3+}. The correct order of their spin-only magnetic moments is :

(1) $V^{2+} < Ti^{2+} < Ti^{3+} < Sc^{3+}$ (2) $Sc^{3+} < Ti^{3+} < Ti^{2+} < V^{2+}$

(3) $Ti^{3+} < Ti^{2+} < Sc^{3+} < V^{2+}$ (4) $Sc^{3+} < Ti^{3+} < V^{2+} < Ti^{2+}$

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Q11

The highest possible oxidation states of uranium and plutonium, respectively, are :

(1) 6 and 7 (2) 6 and 4 (3) 7 and 6 (4) 4 and 6

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Q11

The correct order of the first ionization enthalpies is :

(1) Ti < Mn < Zn < Ni (2) Ti < Mn < Ni < Zn

(3) Mn < Ti < Zn < Ni (4) Zn < Ni < Mn < Ti

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Q12

The pair that has similar atomic radii is :

(1) Mn and Re (2) Ti and Hf

(3) Sc and Ni (4) Mo and W

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d and f-Block Elements - Answers

Q1

(4) As zinc has no unpaired of electrons to take part in the bond, it has least enthalpy of atomisation amongst the given transition elements.

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Q2

(3) Due to lanthanoid contraction, size of atom as well as ion of lanthanoid decreases.

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Q3

(1) The electrolytes used in the electroplating of Au and Ag are $[Au(CN)_2]^-$ and $[Ag(CN)_2]^-$ respectively.

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Q4

(3) Sc shows oxidation state of +3 only.

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Q5

(1) Compounds having atleast one carbon metal (M – C) bond are known as organometallic compounds. It contains Mn-C bond.

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Q6

(4) Atomic radii follows the order

Eu	>	Ce	>	Ho	>	N
185 pm		182 pm		177 pm		71 pm

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Q7

(2) $Sm = 4f^6\,6s^2$

$Sm^{3+} = 4f^5$ = Partially filled f orbital

$\therefore$ Sm^{3+} will be coloured

$Lu^{3+} = 4f^{14}$ = colourless.

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Q8

(1) Interstitial compounds are inert, i.e., they are chemically non-reactive.

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Q9

(4)

Actinoids	Oxidation state shown
Th	+ 3, + 4
Ac	+ 3
Pu	+ 3, + 4, + 5, + 6, + 7
Np	+ 3, + 4, + 5, + 6, + 7
Bk	+ 3, + 4
Cm	+ 3, + 4, + 5
Lr	+ 3

$\therefore$ Maximum oxidation state is shown by Np and Pu.

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Q10

(2) Electronic configuration of the given transition metal ions are :

Sc^{3+} (Z = 21) $1s^2 2s^2 2p^6 3s^2 3p^6$

Ti^{2+} (Z = 22) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2$

Ti^{3+} (Z = 22) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^1$

V^{2+} (Z = 23) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$

Since, magnetic moment is directly proportional to the number of unpaired electrons. The correct increasing order of magnetic moment is

$Sc^{3+} < Ti^{3+} < Ti^{2+} < V^{2+}$ because they have

0, 1, 2 and 3 unpaired electrons respectively.

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Q11

(1) Maximum oxidation state shown by Uranium is + 6 and Plutonium is 7.

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Q11

(2) I.E. increases on moving left to right in a period.
$\therefore$ Ti < Mn < Ni < Zn

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Q12

(4) Mo and W belong to group-6 and period 5 (4*d* series) and 6 (5*d* series) respectively.
Due to lanthanoid contraction, radius of Mo and W are almost same i.e. 0.140 nm and 0.141 nm respectively.

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