



CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

D-BLOCK ELEMENTS

Problems

1. What are coinage metals ? Are they transition elements ?



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2. Which element has pseudo inert gas electronic configuration ?



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3. Elements with the general electronic configuration $(n - 1)d^3ns^2$ belong to which group in the modern periodic table ?



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4. Among *Cu*, *Ag*, *Zn* and *Cd* which one is the biggest atom? why?



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5. Why the decrease in atomic radius amongst a series of transition elements is less when compared with representative elements ?



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6. Among $3d$ – , $4d$ – and $5d$ – series elements, which elements has the least and which has the highest I_1 ?



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7. Name a transition element which does not exhibit variable oxidation states.



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8. Among ferrous and ferric ions, which one is more stable? Why?



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9. Arrange the MnO_4^- , $Cr_2O_7^{2-}$ and V^{5+} ions in the increasing order of their oxidising power.



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10. $FeCl_3$ is known but not FeI_3 Why?



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11. Why is Cr^{2+} acts as reductant and Mn^{3+} as oxidant eventhough both have d^4 configuration ?



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12. Which is a stronger reducing agent among Cr^{2+} and Fe^{2+} ? Why ?



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13. Why is the E^\ominus value for the Mn^{3+} / Mn^{2+} couple much more positive than that for Cr^{3+} / Cr^{2+} or Fe^{3+} / Fe^{2+} ? Explain.



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14. What is the value of one Bohr magneton in S.I. units?



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15. Calculated spin only magnetic moment of Cr^{x+} is 4.9 BM. Find the 'x' value.

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16. $CaCl$ is colourless, while $CuSO_4 \cdot 5H_2O$ is coloured. Explain?

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17. Eventhough Cu^{2+} has one unpaired d - electron, anhydrous copper sulphate is colourless. Why?

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18. Au(I) is diamagnetic, while Au(III) has a magnetic moment of 2.95 BM. Predict the colour of aurous and auric ions?



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19. Give some examples of the ions which are coloured but diamagnetic in nature.



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20. Why transition metals act as good catalysts ?



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21. Copper is prepared as alloying element in ornamental gold. Why?



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22. How many moles of $KMnO_4$ are required to oxidise one mole of ferrous oxalate in acidic medium ?



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23. Potassium dichromate solution is used to test drunker driver? Discuss.



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24. Vanadium pentoxide is coloured. Why?



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25. What is chemical volcano ?



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26. Variability in the oxidation states of lanthanides is limited. Why?



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27. In lanthanide series, which element is well known to exhibit +4 oxidation state ? Why?



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28. Why Ln^{2+} ions are reductants and Ln^{4+} are oxidants ?



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29. Why actinides are not affected by nitric acid ?



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30. Actinides are called transuranic elements. Explain.



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31. Complex compounds of transition metals are familiar, but not inner transition elements. Why?



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32. Actinoid contraction is greater from element to element than lanthanoid contraction. why?



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33. In lanthanide series, which element is well known to exhibit +4 oxidation state ? Why?



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Subjective Exercise 1 Short Answer Questions

1. Define transition elements. Give the names and symbols of the metals of the first transition series.



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2. Name some d-block elements which have anomalous electronic configurations. Give their outer shell configurations.



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3. Write the electronic configuration of Co^{2+} and Mn^{2+} .



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4. Name the minerals of manganese and iron. Write their composition.

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5. Write the important minerals of the following elements of d-block : titanium, cobalt, nickel, copper, zinc and silver.

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Subjective Exercise 1 Very Short Answer Questions

1. Mention the d-block elements which are not considered as transition metals.

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2. Write the electronic configurations of Cr and Cu.



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3. How many d - electrons are present in Ag and Ni atoms ?



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4. Most abundant metal in the earth's crust is



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Subjective Exercise 2 Long Answer Questions

1. What is meant by variable oxidation states?

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2. The atomic radius along the 3d series decreases. Explain on the basis of their electron configuration.

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3. The colour of $[Ti(H_2O)_6]^{3+}$ is due to

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4. How does a catalyst work in a chemical reaction?

Discuss the catalysis with suitable examples.



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5. How do you classify magnetic substances? Give two examples each.



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6. What are alloys? How are they prepared?



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Subjective Exercise 2 Short Answer Questions

1. What do you understand by non-stoichiometric compounds?



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2. Mention any four alloys with composition and uses.



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3. Discuss the colour of the transition metal compounds with suitable examples.



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4. Explain the magnetic properties of first transition series metal ions.



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5. Give any five of the characteristic properties of transition elements.



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6. Transition elements have high melting points. Why ?



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7. $CuSO_4 \cdot 5H_2O$ has pale blue colour while $ZnSO_4 \cdot 7H_2O$ is white. Discuss.



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8. Predict which of the following will be coloured in aqueous solution?

Ti^{3+} , V^{3+} , Cu^{+} , Sc^{3+} , Mn^{2+} , Fe^{3+} and Co^{2+} .

Give reasons for each



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9. The most common oxidation state of first transition series is +2. Explain.



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10. Write the characteristic properties of transition elements.



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Subjective Exercise 2 Very Short Answer Questions

1. What is the highest oxidation state exhibited by a 3d element ?



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2. The most common oxidation state of first transition series is +2. Explain.



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3. Why do transition metals show a number of oxidation states ? Explain.



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4. Ferrous salts are more unstable compared to ferric salts. Explain in terms of their configurations.



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5. $CuSO_4$ is paramagnetic while $ZnSO_4$ is diamagnetic, Explain in terms of the electron configurations.

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6. Give the composition of Nichrome ?

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7. Give the composition and uses of Duralumin.

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8. Write the characteristics of non- stoichiometric compounds.

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9. Which metals form interstitial oxides ?



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10. The formula of Zirconium hydride is not represented as ZrH_4 but $ZrH_{1.92}$. Why?



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Subjective Exercise 3 Short Answer Questions

1. How the acidic nature, covalent character changes with the oxidation state for oxides of a transition metal.



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2. Explain the preparation of potassium dichromate and potassium permanganate. Write their uses.



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3. Write the oxidation properties of $KMnO_4$ in acidic and neutral medium.

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4. Write any four oxidising properties of potassium dichromate.

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Subjective Exercise 3 Very Short Answer Questions

1. Draw the structures of manganate and permanganate.

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2. Why manganate ion (MnO_4^{2-}) undergo disproportionation in acidic solutions.



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3. Nitric acid is not suitable to acidify potassium permanganate. Why ?



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Subjective Exercise 4 Short Answer Questions

1. Write the names and outer electronic configurations of $4f$ - series elements.



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2. What are the different oxidation states exhibited by the lanthanoids ?



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3. Write the chemical form and composition of monozite sand.



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4. What is lanthanoid contraction ? What are the consequences of lanthanoid contraction?



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Subjective Exercise 4 Very Short Answer Questions

1. In Lanthanide series where does the distinguishing electron enter ? Give the outer configuration of praseodymium.



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2. Is Lanthanum a real lanthanide element ? Why? or Why not?



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3. Justify the position of lanthanides and actinides in the periodic table .



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4. Fill up the blanks with nl formula for lanthanons :
[Pr].....



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5. How many elements are present in IIIB group of the long form of the periodic table ?



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6. What is the highest oxidation state exhibited by a lanthanide element ? Name one element exhibiting this.



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7. Ziegler-Natta catalyst is



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8. Write the catalysts used in Haber process and Wacker process.



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Objective Exercise 1

1. Which of the following is transition element

A. Pb

B. Sn

C. Cr

D. Zn

Answer: C



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2. Liquid metal among d-block elements is

A. Hg

B. Zn

C. Nb

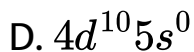
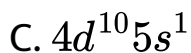
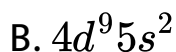
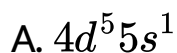
D. Cd

Answer: A



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3. Outer electronic configuration of the element Palladium is



Answer: D



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4. In 3d series which element has highest melting point

A. V

B. Zm

C. Cu

D. Cr

Answer: D



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5. Which of the following orbitals are filled progressively in the transition elements

A. s

B. p

C. d

D. f

Answer: C



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6. Which set of elements among the following are called non-transitional elements

A. Cu,Ag and Au

B. Fe,Co and Ni

C. Zn,Cd and Hg

D. Re, Os and Ir

Answer: C



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7. Iron catalyst is used in

- A. Contact process
- B. Ostwald's process
- C. Birkland-Eyde process
- D. Haber's process

Answer: D



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8. The changed name of Khurchatovium ($Z=104$) is

- A. Joliotium
- B. Dubnum

C. Rutherfordium

D. Hatrium

Answer: C



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9. The number of electrons in 4d-subshell of 'Pd' is

A. 7

B. 8

C. 9

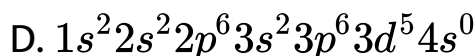
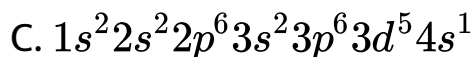
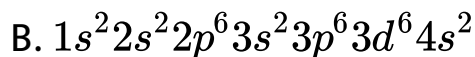
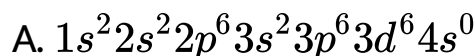
D. 10

Answer: D



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10. Write the the electronic configuration of Fe^{2+} ion.



Answer: A



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11. Which one of the following pairs of ions have the same electronic configuration



Answer: B



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12. How many 'd' electrons are present in Cr^{2+} ion?

A. 4

B. 5

C. 6

D. 3

Answer: A



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13. What kind of electronic transition take place in the exhibition of colour by transition metal ions

A. d to s

B. s to p

C. d to p

D. f to s

Answer: C



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Configuration

Element

1) $5s^1 4d^5$

A) Cu

2) $6s^1 5d^{10}$

B) Pd

3) $4s^1 3d^{10}$

C) Mo

4) $5s^0 4d^{10}$

D) Cr

E) Au

14.

The correct match is

A. 1-C, 2-A, 3-E, 4-B

B. 1-C, 2-E, 3-B, 4-A

C. 1-C, 2-E, 3-A, 4-B

D. 1-E, 2-C, 3-A, 4-B

Answer: C



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15. Number of d'electrons present in M shell of Ag^+ ion?

A. 10

B. 20

C. 18

D. 16

Answer: A



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16. Which one of the element may be expected to show highest second ionization enthalpy

A. V

B. Cr

C. Mn

D. Fe

Answer: B



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17. The element of 5th period with $5s^0 4d^{10}$ configuration is

A. Rh

B. Pd

C. Pt

D. Ag

Answer: B



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18. Electronic configuration of a transition element is $[\text{Ar}] 4s^2 3d^6$. A sudden hike is observed between

A. $IP_1 \& IP_2$

B. $IP_2 \& IP_3$

C. $IP_3 \& IP_4$

D. $IP_4 \& IP_5$

Answer: C



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19. Identify the correct statements

(a) In a group the correct order of melting points is $3d < 4d < 5d$

(b) In 3d and 4d series, VII B group elements have exceptionally low melting points

(c) II B group have highest melting points in any series.

(d) The correct order of melting points is $Cu > Ag > Au$

A. Only A, B, D are correct

B. Only A, B are correct

C. Only B, C, D are correct

D. Only A, D, C are correct

Answer: B



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Objective Exercise 1 Oxidation States

1. The common oxidation state exhibited by transition elements is

A. $+II$

B. $+IV$

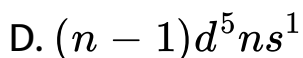
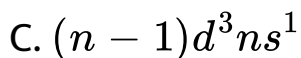
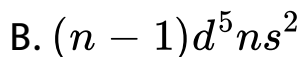
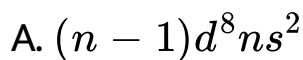
C. $+VI$

D. $+VII$

Answer: A

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2. Among the following outer electronic configurations of atoms, the highest oxidation state is exhibited by



Answer: B

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3. Which of the following transition elements exhibit +8 oxidation state

A. Cu and Zn

B. Ru and Os

C. W and Pb

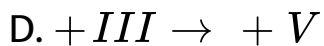
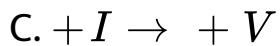
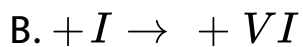
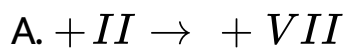
D. Ag and Au

Answer: B



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4. Manganese exhibits oxidation states from

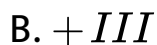


Answer: A



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5. The most stable oxidation state of Iron is



C. $+I$

D. $+VI$

Answer: B



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6. The maximum oxidation state in 3d series elements is shown by

A. Cu

B. V

C. Mn

D. Fe

Answer: C



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7. The transition element that has stable configuration in $+1$ oxidation state is

A. Cu

B. Zn

C. Sc

D. Mn

Answer: A



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8. Divalent Manganese is more stable due to

A. $3d^4$ configuration

B. $3d^2$ configuration

C. $3d^5$ configuration

D. $3d^3$ configuration

Answer: C



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9. The oxidation state of "Ni" in $Ni(CO)_4$ is

A. $+II$

B. zero

C. $+III$

D. $+VIII$

Answer: B



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10. Which metal has the least melting point

A. Cr

B. Ti

C. Ci

D. Zn

Answer: D



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11. Enthalpy of atomisation is lowest in

A. Sc

B. Mn

C. Ni

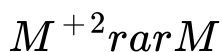
D. Zn

Answer: D



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12. Which of the following has highest tendency for



A. V

B. Cr

C. Co

D. Cu

Answer: D



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13. Which of the following has very high IP_2 value

A. Zn

B. Mn

C. Cu

D. Ti

Answer: C



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14. The element which has half-filled d-orbitals in its '+1' oxidation state is

A. Mn

B. Cr

C. Zn

D. Fe

Answer: B



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15. Transition element which does not show variable oxidation state is

A. Zn

B. Sc

C. Cu

D. Fe

Answer: B



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Objective Exercise 1 Colours

1. Identify the set of elements which do not exhibit multiple oxidation states

A. Sc, Ti

B. Mn, Cr

C. Zn, Cr

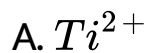
D. Zn, Sc

Answer: B



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2. The following ion is colourless in aqueous solution ?

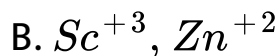
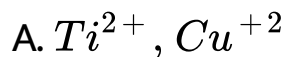


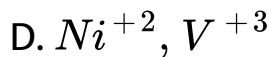
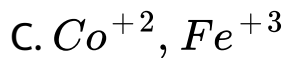
Answer: D



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3. Which of the following pairs of ions are colourless?





Answer: B



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4. The following ion exhibits colour in aqueous solution ?



Answer: C



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5. The atomic number of an element 'M' is 26. How many electrons are present in the M-shell of the element in its M^{3+} state ?

A. 5

B. 14

C. 12

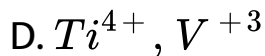
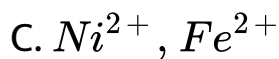
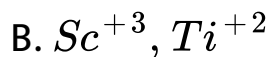
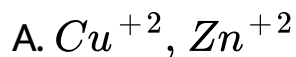
D. 13

Answer: D



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6. The pair of coloured ions among the following is



Answer: C



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7. Coloured complexes absorb radiation in the

A. Visible region

B. Infrared region

C. U.V. region

D. Far IR region

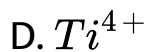
Answer: A



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8. Coloured ion among the following is

A. Zn^{2+}



Answer: B



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9. In aqueous solution which of the following colour is exhibited by Ni^{2+} ,

A. pink

B. green

C. blue

D. yellow

Answer: B



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10. CrO_4^{-2} , MnO_4^{-} ions are coloured due to

A. presence of unpaired electrons in d orbitals of

Cr & Mn

B. charge transfer phenomenon

C. d-d electron transition

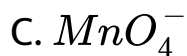
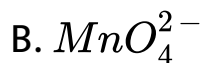
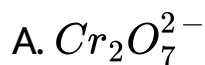
D. close packing crystal structures

Answer: B



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11. The ion which exhibits orange red colour in aqueous solution is



Answer: A



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Objective Exercise 1 Magnetic Properties

1. From the following ions magnetic moment is maximum for



Answer: A



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2. Which of the following set of elements are Ferromagnetic in nature

A. Zn, Cd and Hg

B. Cu, Ag and Au

C. Fe, Co and Ni

D. Sc, Ti and U

Answer: C



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3. Substances which are repelled by the external magnetic field are called

- A. diamagnetic
- B. paramagnetic
- C. ferromagnetic
- D. antiferromagnetic

Answer: A



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4. The following is paramagnetic

A. CaCl_2

B. CuCl_2

C. ZnCl_2

D. NaCl

Answer: B



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5. Magnetic moment of diamagnetic substance in Bohr magnetons is

A. 1.73

B. 2.83

C. 5.0

D. 0

Answer: D



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6. The calculated magnetic moment of Cu^{2+} ion

A. 1.73 B.M

B. zero

C. 2.6 B.M

D. 3.4 B.M

Answer: A



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7. The number of d-electrons present in 'X' and its magnetic moment are

A. 6 and 6.93 B.M.

B. 5 and 5.92 B.M.

C. 5 and 4.9 B.M.

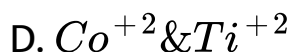
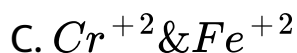
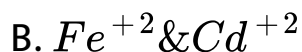
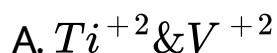
D. 4 and 5.92 B.M.

Answer: B



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8. Which of the following pair of transition metal ions, have the same calculate values of magnetic moment ?



Answer: C



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9. Which one of the following is diamagnetic?

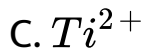


Answer: D



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10. Which of the following ions has the maximum magnetic moment

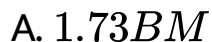


Answer: A



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11. The spin only magnetic moment of Ni^{2+} in aqueous solution would be



C. $4.9BM$

D. 0

Answer: B



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12. Paramagnetism is the property of

A. completely filled electronic subshells

B. unpaired electrons

C. non-transition elements

D. vacant orbitals

Answer: B



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13. The formula to calculate paramagnetic moment of a substance is

A. $\mu_s = \sqrt{4S(S + 2)} B.M$

B. $\mu_s = \sqrt{n(n + 2)} B.M$

C. $\mu_s = \sqrt{n(n + 4)} B.M$

D. $\mu_s = \sqrt{L(L + 2)} B.M$

Answer: B



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14. The units of magnetic moment are

- A. Newton - ohm
- B. Torrs
- C. Bohr magneton
- D. Pascals

Answer: C



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15. Which of the following would be attracted towards magnetic field

A. Zn

B. Mn

C. Mg

D. Cd

Answer: B



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16. Which of the following ions is most para magnetic

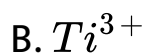


Answer: A



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17. The following ion exhibits highest magnetic moment?





Answer: D



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Objective Exercise 1 Alloys

1. d -block elements form alloys easily because they have

A. same number of shells

B. same electron configuration

C. nearly same atomic size

D. same atomic weight

Answer: C



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2. Bronze is an alloy of

A. Cu + Sn

B. Cu + Zn

C. Pb + Sn + Zn

D. Pb + Zn

Answer: A



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3. The metal not present in german silver is

A. Ag

B. Cu

C. Ni

D. Zn

Answer: A



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4. The transition element with highest density among the following is

A. Sc

B. Fe

C. Zn

D. Cu

Answer: D



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5. Brass is an alloy of

A. Zn and Cu

B. Cu and Sn

C. Sn and Zn

D. Cu, Zn and Sn

Answer: A



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Objective Exercise 1 Interstitial Compounds

1. Which of the following is an interstitial compound

A. NH_3

B. $PdCl_2$

C. TiH

D. ZnO

Answer: C



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2. The non-metal that usually occupies tetrahedral voids in the formation of interstitial compounds

A. Hydrogen

B. Boron

C. Carbon

D. Sulphur

Answer: A



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3. The type of bond expected to be formed atoms between of two elements in interstitial compounds is

A. Covalent

B. Ionic

C. Metallic

D. None

Answer: D



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4. Which of the following is not the property of interstitial compound

- A. They have high M.P, higher than those of pure metals
- B. They are very hard, some borides approach diamond in hardness.
- C. They retain metallic conductivity
- D. Their chemical reactivity is very high

Answer: D



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5. Incorrect statement of interstitial compounds formed by d-block elements is

- A. They are chemically inert
- B. They show metallic conductivity
- C. They are hard & some borides have hardness similar to diamond
- D. Their melting points are lower than those of pure metals

Answer: D



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Objective Exercise 1 Permanganate And Dichromate

1. An acidified solution of $KMnO_4$ oxidises

A. Sulphates

B. Oxalates

C. Iodine

D. Ferric ion

Answer: B



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2. To an acid solution of an anion, a few drops of $KMnO_4$ solution are added. Which of the following, if present will not decolourise the $KMnO_4$ solution



Answer: A



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3. $KMnO_4$ acts as an oxidising agent in

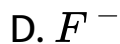
- A. Acidic medium only
- B. Neutral and acidic medium
- C. Neutral and alkaline medium
- D. Neutral, acidic and fairly basic medium

Answer: D



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4. $KMnO_4$ can not oxidize



Answer: D



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5. Permanganate ion is isostructural with

A. Chlorate ion

B. Perchlorate ion

C. Chlorite ion

D. Nitrate ion

Answer: B



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6. Incorrect statement about dichromate ion is

A. It has six shorter and two longer bonds

B. Bond length of chromium-bridge oxygen is longer than chromium-terminal oxygen

C. Bond angle $OCrO > CrOCr$

D. Two tetrahedrals are joined at a corner

Answer: C



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7. When $KMnO_4$, reacts with acidified $FeSO_4$

- A. Both $FeSO_4$ and $KMnO_4$ are oxidised
- B. Both $FeSO_4$ and $KMnO_4$ are reduced
- C. $FeSO_4$ is oxidised and $KMnO_4$ is reduced
- D. $FeSO_4$ is reduced and $KMnO_4$ is oxidised

Answer: C

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8. Permanganate ion is not isostructural with

A. Manganate ion

B. Cromate ion

C. Chlorate ion

D. Perchlorate ion

Answer: C

 [Watch Video Solution](#)

9. When MnO_2 is fused with KOH in air, it gives

- A. potassium permanganate
- B. potassium manganate
- C. manganese hydroxide
- D. manganese sesquioxide

Answer: B



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10. The number of moles of $KMnO_4$ that will be needed to react completely with one mole of ferrous

oxalate in acidic solution is

A. $\frac{3}{5}$

B. $\frac{2}{5}$

C. $\frac{4}{5}$

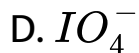
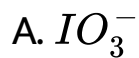
D. 1

Answer: A



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11. The product of oxidation of I with MnO_4 in alkaline medium is



Answer: A



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12. Number of Cr-O sigma bonds in dichromate in

$Cr_2O_7^{2-}$ is

A. 6

B. 7

C. 8

D. 4

Answer: C



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13. Which of the following oxides give chromic acid in sulphuric acid solutions

A. CrO

B. Cr_2O_3

C. CrO_3

D. CrO_2

Answer: C



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14. Number of moles of $K_2Cr_2O_7$ reduced by one mole of Sn^{2+} ions is

A. $1/3$

B. 3

C. $1/6$

D. 6

Answer: A



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15. Which of the following statements is/are true

A) $Na_2Cr_2O_7$ is more soluble in water than $K_2Cr_2O_7$

B) $K_2Cr_2O_7$ is used as a primary standard in volumetric analysis

C) Both $Na_2Cr_2O_7$ and $K_2Cr_2O_7$ are strong oxidizing agents

D) The chromates and dichromates are interconvertible in aqueous solutions

A. A and B

B. B and C

C. A and D

D. All the above

Answer: D



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16. The shape of chromate ion is

A. tetrahedral

B. square planar

C. two tetrahedra linked at one of their apex

D. octahedral

Answer: A



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17. When Na_2CrO_4 , is dissolved in sulphuric acid, it changes to

- A. orange coloured $\text{Na}_2\text{Cr}_2\text{O}_7$
- B. Yellow coloured $\text{Na}_2\text{Cr}_2\text{O}_7$
- C. retains as orange coloured Na_2CrO_4
- D. retains as yellow coloured Na_2CrO_4

Answer: A



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18. Oxidation number of chromium in chromyl chloride is

A. +2

B. +3

C. +4

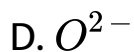
D. +6

Answer: D



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19. For the reaction $CrO_4^{2-} + ? \rightarrow Cr_2O_7^{2-}$ the missing ion is

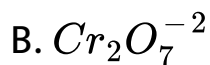


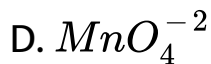
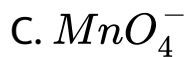
Answer: B



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20. Strongest oxidant among the following is





Answer: C



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21. Highest tendency for $M^{+3} \rightarrow M^{+2}$ is in

A. Mn

B. Cr

C. Fe

D. All have same

Answer: A



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22. Match the following columns

Set - I

Set - II

A) Mn_2O_7

1) Covalent green oil

B) CrO_3

2) Basic

C) V_2O_5

3) Amphoteric

D) CrO

4) Anhydride of chromic acid

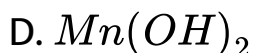
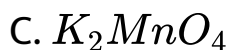
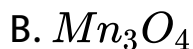
5) Acidic

	A	B	C	D		A	B	C	D
1)	1	4	3	2	2)	2	4	3	1
3)	4	5	1	3	4)	3	2	4	1



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23. When MnO_2 is fused with KOH in air, it gives

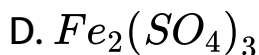
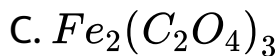
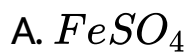


Answer: C



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24. Which of the following cannot be oxidised by the acidified solution of $KMnO_4$



Answer: D



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25. Structure of $Cr_2O_7^{2-}$ has

A. Two tetrahedra sharing one corner

B. Two tetrahedra sharing one edge

C. Two tetrahedra sharing one face

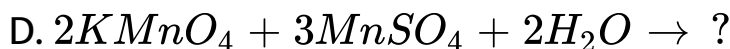
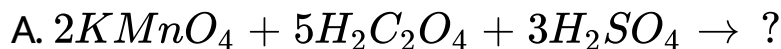
D. Irregular octahedral

Answer: A



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26. Which one of the following permanganometric titrations does not give satisfactory results ?



Answer: C



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Objective Exercise 1 Lanthanides And Actinides

1. Which of the following is a lanthanide ?

A. Ta

B. Rh

C. Th

D. Lu

Answer: D



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2. Which of the two have almost similar size

A. ${}_{22}\text{Ti}$ and ${}_{40}\text{Zr}$

B. ${}_{41}\text{Nb}$ and ${}_{73}\text{Ta}$

C. ${}_{39}\text{Y}$ and ${}_{57}\text{La}$

D. ${}_{20}\text{Ca}$ and ${}_{31}\text{Ir}$

Answer: B



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3. In aqueous solutions Eu^{2+} acts as

- A. an oxidising agent
- B. a reducing agent
- C. neither oxidant nor reductant
- D. can act as redox agent

Answer: B



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4. The radius of La^{3+} ($Z = 57$) is 1.06 \AA . Which one of the following given values will be closest to the

radius of Lu^{3+}

A. 1.60 Å

B. 1.40 Å

C. 1.06 Å

D. 0.85 Å

Answer: D



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5. The actinide element which can exhibit +7 oxidation state in its compounds

A. Thorium

B. Curium

C. Neptunium

D. Nobelium

Answer: C



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6. Highest oxidation state exhibited by an actinide element in its compounds is

A. +4

B. +6

C. +7

D. +8

Answer: C



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7. Actinide that is naturally available with highest isotopic number

A. U

B. Pu

C. Cu

D. Fm

Answer: A



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8. Which of the following Lanthanoid is radioactive

A. Cerium

B. Promethium

C. Thulium

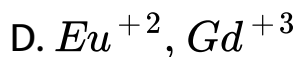
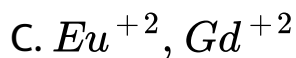
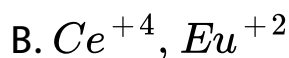
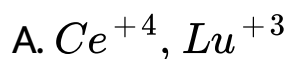
D. Lutetium

Answer: B



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9. Which of the following pair of ions have same outer electronic configuration

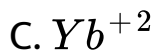


Answer: D



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10. Which of the following is strong oxidant ?



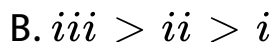
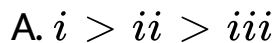
Answer: A



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11. Among the following correct basic strength order is

i) $La(OH)_3$, ii) $Ce(OH)_3$, iii) $Lu(OH)_3$



C. $i > iii > ii$

D. $iii > i > ii$

Answer: A



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12. More number of oxidation states are exhibited by the actinoids than by the lanthanoids. The main reason for this is

A. The 5f orbitals are more buried than the 4f orbitals

- B. There is a similarity between 4f and 5f orbitals in their angular part of the wave function
- C. The actinoids are more reactive than the lanthanoids
- D. The 5f orbitals extend further from the nucleus than the 4f orbitals

Answer: D



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13. An 'f' block element without any f electron is

A. Ce

B. Lu

C. No

D. Th

Answer: D



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14. Larger number of oxidation states are exhibited by the actinoids than those by the lanthanoids. This can be best explained as

A. 4f orbitals more diffused than the 5f orbitals

- B. Lesser energy difference between 5f and 6d than between 4f and 5d orbitals
- C. More energy difference between 5f and 6d than between 4f and 5d orbitals
- D. More reactive nature of the actinoids than the lanthanoids

Answer: B



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15. Incorrect statement among the following is

- A. Actinide contraction is greater than the lanthanide contraction
- B. Actinides exhibit variable oxidation states
- C. Most the actinides are naturally occurring
- D. Successive oxidation states of actinides differed by one unit

Answer: C



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16. Among the following largest ion is

A. La^{3+}

B. Ce^{3+}

C. Eu^{3+}

D. Lu^{3+}

Answer: A



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17. $4f^{14}$ configuratoin is observed in

A. Yb and Lu

B. Dy and Pm

C. Lu and La

D. Tm and Lu

Answer: A



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18. Which element among the lanthanides has the smallest atomic radius

A. Cerium

B. Lutetium

C. Europium

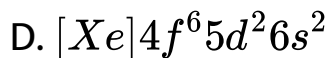
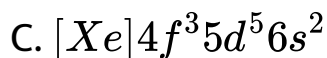
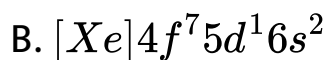
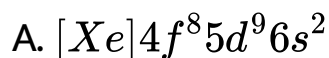
D. Gadolinium

Answer: B



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19. The electronic configuration of Gadolinium (At. No.64) is



Answer: B



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20. Across the lanthanide series, the basic strength of the lanthanide hydroxides

- A. Increases
- B. Decreases
- C. First increases and then decreases
- D. First decreases and then increases

Answer: B



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21. Most common oxidation states shown by cerium are

A. +2, +4

B. +3, +4

C. +3, +5

D. +2, +3

Answer: B



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22. Which of the following statements is not correct

A. $La(OH)_3$ is less basic than $Lu(OH)_3$

B. In lanthanide series, ionic radius of Ln^{3+} ions decreases

C. La is actually an element of transition series rather than lanthanide series

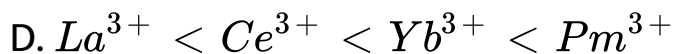
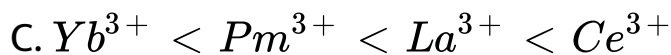
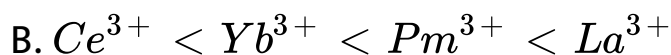
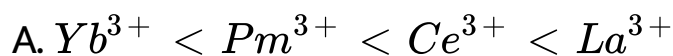
D. Atomic radii of Zr and Hf are same because of lanthanide contraction

Answer: A



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23. Arrange Ce^{3+} , La^{3+} , Pm^{3+} , and Yb^{3+} in increasing order of their ionic radii

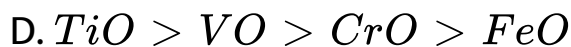
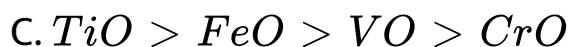
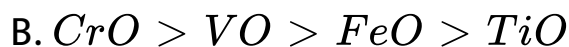
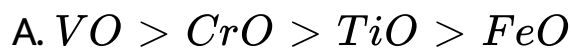


Answer: A



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24. The basic character of the transition metal monoxides follows the order



Answer: D



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25. Actinides have higher tendency to form complexes than Lanthanides, due to

- A. higher charge and smaller size
- B. Smaller charge and larger size
- C. they are radioactive
- D. they are electropositive

Answer: A



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26. Which of the following oxidation states is common for all lanthanides ?

A. +2

B. +3

C. +4

D. +5

Answer: B



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Objective Exercise 2 General Properties And Electronic Configuration

1. The following represents the electronic configuration of a transition element

A. ns^2np^3

B. $ns^2np^6nd^3(n+1)s^2$

C. $ns^2np^6nd^{10}(n-1)s^2(n+1)p^4$

D. ns^2np^5

Answer: B



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2. Which of the following statements concerning transition elements is not true?

A. They are all metals

B. They easily form complexes

C. Compounds containing their ions are coloured

D. They show multiple oxidation states always differing by two units

Answer: D



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3. The highly stable pair of ions are



Answer: C



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4. Transition metal "X" has a configuration $[Ar]3d^4$ in its $+3$ oxidation state. The atomic number of the

metal is

A. 25

B. 26

C. 32

D. 19

Answer: A



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5. The number of 'd' electrons in Fe^{2+} is not equal to that of

A. s-electrons in Mg

B. p-electrons in Ne

C. p-electrons in Cl

D. d-electrons in Fe

Answer: C



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6. The pair of ions which do not have same number of unpaired electrons is

A. Mn^{2+} and Fe^{3+}

B. Ti^{2+} and Ni^{2+}

C. Cu^{2+} and Ti^{3+}

D. Fe^{2+} and Ni^{2+}

Answer: D



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7. Among the transition elements the element with lowest melting point belongs to

A. group IIIB

B. group IB

C. group VIB

D. group IIB

Answer: B



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8. The reason for the stability of Gd^{3+} ion is

- A. 4f subshell - half filled
- B. 4f subshell - completely filled
- C. Possesses the general electronic configuration of noble gases
- D. 4f subshell empty

Answer: A



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9. Electronic configuration of a transition element is $[\text{Ar}] 4s^{23}d^6$. A sudden hike is observed between

A. $IP_1 \& IP_2$

B. $IP_2 \& IP_3$

C. $IP_3 \& IP_4$

D. $IP_4 \& IP_5$

Answer: C



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10. Transition elements have higher enthalpy of atomisation than alkali metals due to

- A. High electropositive nature of transition elements
- B. Larger size of transition elements
- C. Stronger metallic bond in transition elements
- D. Participation of ns and $(n - 1)d$ electrons in bond formation in alkali metals

Answer: C



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11. The correct statement(s) from among the following is/are

i) All the d and f-block elements are metals

ii) All the d and f-block elements form coloured ions

iii) All the d and f-block elements form paramagnetic ions

A. i only

B. i and ii

C. ii and iii

D. i, ii and iii

Answer: A



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12. Identify the correct statements

(a) In a group the correct order of melting points is $3d < 4d < 5d$

(b) In 3d and 4d series, VII B group elements have exceptionally low melting points

(c) II B group have highest melting points in any series.

(d) The correct order of melting points is $Cu > Ag > Au$

A. Only A, B, C are correct

B. Only A, B, D are correct

C. Only B, C, D are correct

D. Only A, D, C are correct

Answer: A



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13. d-block elements can act as catalysts due to their ability to

- A. Exhibit variable oxidation states
- B. Coloured ion formation
- C. Paramagnetic nature
- D. Alloy formation

Answer: A



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14. Incorrect statement regarding interstitial hydrides is

- A. They show metallic conduction
- B. They are harder than pure metal
- C. They have high mp than pure metal
- D. They are denser than pure metal

Answer: D



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15. The properties of Zr and Hf are similar because :

- A. both belong to d-block
- B. both belong to same group of the periodic table
- C. both have similar radii
- D. both have same number of electrons

Answer: C



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16. The stability of particular oxidation state of a metal in aqueous solution is determined by

- A. Enthalpy of sublimation of the metal
- B. Ionisation energy
- C. Enthalpy of hydration of the metal ion
- D. All of these

Answer: D



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17. Heat of atomization of zinc is lowest among 3d block elements due to

- A. Stronger metallic bond in zinc
- B. $(n-1)d$ electrons do not involve in bonding

C. $(n - 1)d$ electrons involve in bonding

D. Larger size of zinc

Answer: B



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18. The positive standard reduction potential of

$C \frac{u^{2+}}{C} u$ electrode is due to

A. high heat of atomisation and hydration energies

B. low heat of atomisation and hydration energies

C. high heat of atomisation and low heat of hydration

D. low heat of atomisation and high heat of hydration

Answer: C



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19. The observed and calculated E' values for M^{+2} / M are same for

A. Fe

B. Co

C. Ni

D. Cu

Answer: A



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20. Which one of the following is not correct regarding interstitial compounds ?

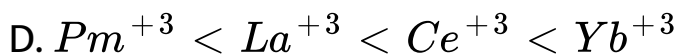
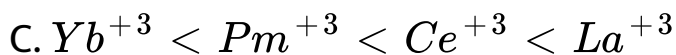
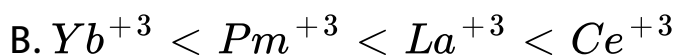
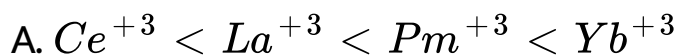
- A. They retain metallic conductivity
- B. They are chemically inert
- C. They have low melting points
- D. They are very hard

Answer: C



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21. Which one of the following is the correct order of ionic radii?



Answer: C



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Objective Exercise 2 Oxidation States

1. In aqueous solution the following undergoes disproportionation reaction



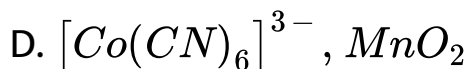
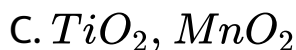
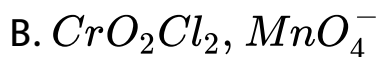
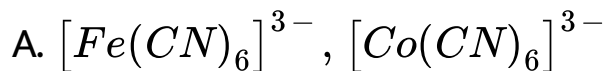
D. All

Answer: D



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2. The pair of the compounds in which both the metals are in the highest possible oxidation state is,

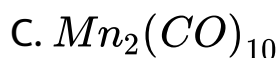
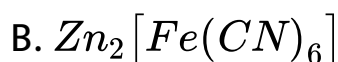


Answer: B



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3. In which of the following complexes the metal ion is in zero oxidation state ?



Answer: C



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4. The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromate solution is

A. +4

B. +6

C. +2

D. +3

Answer: D



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5. The electronic configuration of a transition element is $[Ar]4s^23d^3$. The possible oxidation states are

A. +1, +2 and +3 *only*

B. +2 and +3 *only*

C. +2, +3, +4 and +5 *only*

D. +2 and +5 *only*

Answer: C



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6. Gold can exhibit the oxidation states

A. $+I$ and $+II$

B. $+II$ and $+III$

C. $+I$ and $+III$

D. $+II$ and $+IV$

Answer: C



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7. The transition element having highest oxidation state belongs to which group?

A. $VIII$

B. VII_B

C. V_B

D. IV_B

Answer: A



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8. Which oxide of vanadium is most likely to be basic and ionic ?

A. VO

B. V_2O_3

C. VO_2

D. V_2O_5

Answer: A



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9. In the complex $[Ni(H_2O)_2(NH_3)_4]^{2+}$ the number of unpaired electrons is

A. 0

B. 1

C. 3

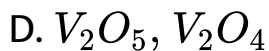
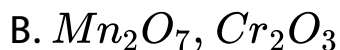
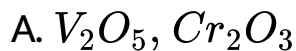
D. 2

Answer: D



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10. Which of the following is an amphoteric oxide ?



Answer: A



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11. The colour of $[Ti(H_2O)_6]^{3+}$ is due to

- A. absence of unpaired electrons in 'd' orbitals
- B. charge transfer phenomenon
- C. d-d electron transition
- D. close packing crystal structure

Answer: C



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12. Transition metal which forms green compounds in its +3 oxidation state and orange red compounds in its +6 oxidation state is

A. Cobalt

B. Chromium

C. Iron

D. Nickel

Answer: B



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13. The formation of coloured ions by transition metals is due to

A. incompletely filled 'd' orbitals

B. completely filled 'd' orbitals

C. completely filled 's' and 'd' orbitals

D. formation of interstitial compounds

Answer: A



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14. Element furnishing coloured ions in the aqueous medium is

A. Zn

B. Hg

C. Cu

D. Al

Answer: C



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15. Which of the following is a correct statement ?

- A. Aq.solutions of Cu^{+} and Zn^{2+} are colourless
- B. Aq. solutions of Cu^{2+} and Zn^{2+} are colour less
- C. Aqueous solutions of Fe^{3+} is green in colour
- D. Aqueous solutions of MnO_4^{-} is colourless

Answer: A



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Objective Exercise 2 Magnetic Properties

1. The complex $K_3[Fe(CN)_6]$ should have a spin only magnetic moment of

A. $\sqrt{3}$ B.M

B. $2\sqrt{5}$ B.M

C. $\sqrt{35}$ B.M

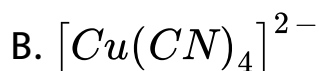
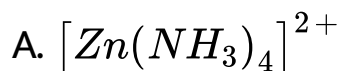
D. 6BM

Answer: C



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2. Which of the following is diamagnetic?



Answer: A



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3. The pair of ions which do not have diamagnetic nature

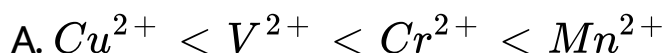


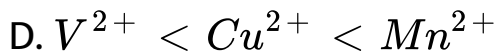
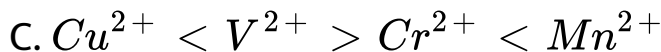
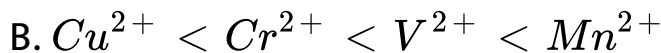
Answer: D



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4. Which one of the following sets correctly represents the increase in the paramagnetic property of the ions ?





Answer: A



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5. The magnetic moment of an ion is $\sqrt{24}$ B.M. Then that ion may be



D. Cu^{2+}

Answer: B



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6. M^{3+} ion of the first transition series metal 'M' has a magnetic moment 1.73 BM. The atomic number of the metal 'M' is

A. 21

B. 24

C. 29

D. 22

Answer: D



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7. The value of paramagnetic moment of Ti^{3+} ion in Bohr magnetons is

A. 5.9

B. 1.73

C. 2.84

D. 3.87

Answer: B



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8. What is the correct order of spin only magnetic moment (in BM) of Mn^{+2} , Cr^{+2} and V^{+2} ?

A. $Mn^{+2} > V^{+2} > Cr^{+2}$

B. $V^{+2} > Cr^{+2} > Mn^{+2}$

C. $Mn^{+2} > Cr^{+2} > V^{+2}$

D. $Cr^{+2} > V^{+2} > Mn^{+2}$

Answer: C



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9. Spin only magnetic moment can be calculated by using $\mu = \sqrt{n(n + 2)}$ where 'n' represents

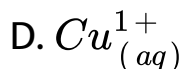
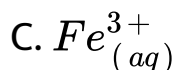
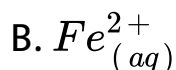
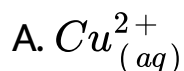
- A. Principal Quantum No
- B. Magnetic Quantum No.
- C. Number of unpaired electrons
- D. Spin Quantum No.

Answer: C



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10. In which of the following 'd' subshells are degenerate



Answer: D



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11. The magnetic moment of Cr^{3+} is similar to that of



Answer: D



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12. The atomic number of an element is 26. The magnetic moment exhibited by its ion in its +2 oxidation state is

A. 5.92 BM

B. 2.84 BM

C. 3.87 BM

D. 4.9 BM

Answer: D



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13. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition elements which shows highest magnetic moment ?

A. $3d^7$

B. $3d^8$

C. $3d^5$

D. $3d^2$

Answer: C



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14. The spin-only magnetic moment of an ion is 3.87 BM. The ion is

A. Ti^{2+}

B. Co^{2+}

C. Cu^{2+}



Answer: B



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Objective Exercise 2 Alloys

1. Transition elements form alloys easily because they have

- A. same number of shells
- B. same electronic configuration
- C. nearly same atomic size

D. same atomic weight

Answer: C



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2. Alloys are generally prepared to modify the property

A) malleability

B) toughness

C) resistance to corrosion

A. A and B are correct

B. A and C are correct

C. B and C are correct

D. All are correct

Answer: D



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3. Identify the correct statements among the following

I) Both Cr and Cu show +1 oxidation state

II) The complementary colour of absorbed green colour of visible radiation is purple.

III) Ni^{+2} ion in its hydrated state exhibits green colour

IV) Devarda's alloy contains least percentage of 'Zn

A. All

B. I,II,III only

C. I,IV only

D. I, III only

Answer: A



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4. Which of the following is an alloy containing iron?

A. German Silver

B. Magnalium

C. Nichrome

D. Brass

Answer: C



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5. The correct statement among the following is

A. The colour of $Cr_2O_7^{2-}$ ion is due to d-d transition of unpaired electrons

B. Transition elements form a large number of alloys, because of similar boiling points

C. Bronze is an alloy of Copper and Zinc

D. Salt of Fe^{2+} ion has greenish colour

Answer: D



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Objective Exercise 2 Permanganate And Dichromate

1. Acidified $K_2Cr_2O_7$ cannot oxidise

- A. Ferrous to ferric
- B. Sulphide to sulphur
- C. Stannous to stannic
- D. Fluoride to fluorine

Answer: D



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2. Number of electrons transferred in each case when $KMnO_4$ acts as an oxidising agent and converts into MnO_2 , Mn^{2+} , $Mn(OH)_3$ and MnO_2^- are respectively

A. 3, 5, 4 and 1

B. 4, 3, 1 and 5

C. 1, 3, 4 and 5

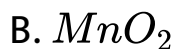
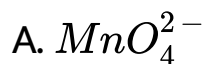
D. 5, 4, 3 and 1

Answer: A



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3. $KMnO_4$ is powerful oxidant where it converts into



Answer: B



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4. Four moles of $KMnO_4$ reacts with excess of hypo solution to produce - moles of Na_2SO_4

A. 3 moles

B. 1.5 moles

C. 6 moles

D. 2.0 moles

Answer: A



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5. An acidified solution of $KMnO_4$ oxidises

A. sulphates

B. sulphites

C. nitrates

D. ferric salts

Answer: B



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6. Incorrect statement regarding the structure of dichromate is

A. It has two kinds of bond lengths

B. Cr-O-Cr Bond angle is 126°

C.

D.

Answer: D

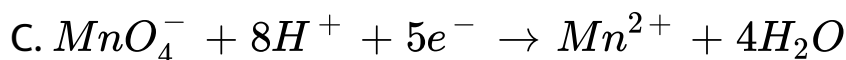
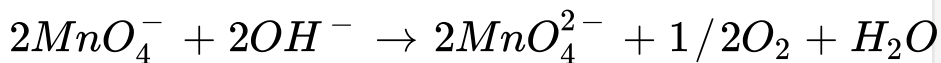


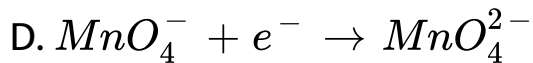
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7. Reaction of $KMnO_4$ in neutral or very weakly acidic solution can be represented as



B.





Answer: A



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8. $\text{K}_2\text{Cr}_2\text{O}_7$ cannot be used for

- A. preparing azo compounds
- B. tanning leather
- C. as a laboratory oxidant
- D. as a reductant

Answer: D

9. A solution of potassium chromate is treated with an excess of dilute nitric acid. Then the observations is

- A. Cr^{3+} and $Cr_2O_7^{2-}$ are formed
- B. $Cr_2O_7^{2-}$ and H_2O are formed
- C. $Cr_2O_7^{2-}$ is reduced to +3 state of Cr
- D. $Cr_2O_7^{2-}$ is oxidised to +7 state of Cr

Answer: B

10. The natures of the oxides CrO and CrO_3 , respectively

- A. acidic and basic
- B. basic and amphoteric
- C. amphoteric and basic
- D. basic and acidic

Answer: D



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11. When acidified solution of potassium dichromate is shaken with aqueous solution of ferrous sulphate

then

- A. $Cr_2O_7^{2-}$ ion is reduced to Cr^{3+} ions
- B. $Cr_2O_7^{2-}$ ion is converted to CrO_4^{2-} ions
- C. $Cr_2O_7^{2-}$ ion is oxidised to Cr
- D. $Cr_2O_7^{2-}$ ion is oxidised to CrO_3

Answer: A



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12. In the dichromate dianion

- A. 4 Cr-O bonds are equivalent

- B. 6 Cr-o bonds are equivalent
- C. All Cr-o bonds are equivalent
- D. All Cr-O bonds are non-equivalent

Answer: B



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13. The equilibrium $Cr_2O_7^{2-} \rightleftharpoons 2CrO_4^{2-}$

- A. exists in acidic medium
- B. exists in basic medium
- C. exists in neutral medium

D. never exists

Answer: C



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14. Which of the following oxides of chromium is amphoteric in nature

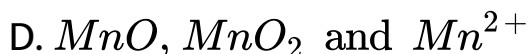
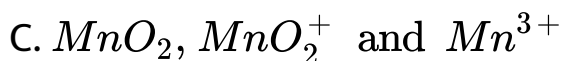
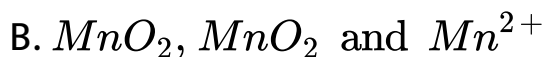
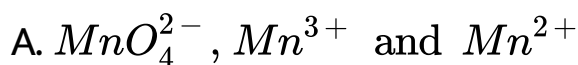


Answer: B



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15. Potassium permanganate acts as an oxidant in neutral, alkaline as well as acidic media. The final products obtained from it in the three conditions are respectively



Answer: B



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16. When $KMnO_4$ is added to oxalic acid, the decolourisation is slow in the beginning but becomes instantaneous after sometime because

- A. Mn^{2+} acts as autocatalyst
- B. CO_2 is formed as the products
- C. Reaction is exothermic
- D. MnO_4^- catalyses the reaction

Answer: A



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17. Acidified $KMnO_4$ oxidizes nitrites to

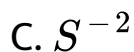


Answer: C



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18. Permanganate ion oxidize $S_2O_3^{2-}$ in fairly alkaline solutions to give



Answer: A



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19. When MnO_2 is fused with KOH in the presence of air, a coloured compound is formed, the product and its colour is

A. K_2MnO_4 Green

B. $KMnO_4$, Purple

C. Mn_2O_3 , Blue

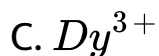
D. K_3MnO_2 Red

Answer: A



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1. Which of the following exhibits pink colour



Answer: A



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2. The +3 ion of which one of the following has half filled 4f subshell ?

A. La

B. Lu

C. Gd

D. Ac

Answer: C



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3. Catalytic activity of transition elements and their compounds is due to their

A. Their chemical reactivity

B. Their magnetic behaviour

C. Their unfilled s- and p-orbitals

D. Their ability to adopt multiple oxidation states.

Answer: D



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4. Yb^{+2} and Lu^{3+} are diamagnetic due to

A. Vacant 'f' sub shells

B. Fully 'f' sub shells

C. Partly filled 'f' sub shells

D. Partly filled 'd' sub shells

Answer: B



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5. Alloy of Misch metal consists of

- A. 95% of actinoid metal, +5% iron
- B. 95% of alkali metal, 5% iron
- C. 95% of lanthanoid metal, +5% iron
- D. 95% of alkaline earth metal, + 5% iron

Answer: C



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6. Identify the incorrect statement among the following

A. La and Lu have partially filled 'd' orbitals and no other partially filled orbitals

B. The chemistry of various lanthanoids is very similar

C. 4f and 5f orbitals are equally shielded

D. d-block elements show irregular and erratic chemical properties among themselves

Answer: C



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7. Which of the following element has f electronic configuration in its + 4 state

A. Ac

B. Bk

C. Er

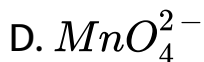
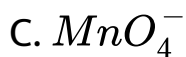
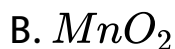
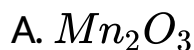
D. Lv

Answer: B



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8. The equivalent weight of $MnSO_4$ is half of its molecular weight when it is converted to



Answer: B



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9. Cerium ($Z = 58$) is an important member of lanthanoids. Which of the following statement about cerium is incorrect 1)

A. The common oxidation states of cerium is + 3 and + 4

B. The + 3 oxidation state of cerium is more stable than the + 4 oxidation state

C. The + 4 oxidation state of cerium is not known in solutions

D. Cerium (iv) acts as an oxidising agent

Answer: C



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10. Which of the following is a lanthanide element?

A. Ac

B. As

C. Nd

D. Pd

Answer: C



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11. Which of the following is not a consequence of the Lathanoid contraction ?

- A. 5d series elements have a higher IE, than 3d or 4d series
- B. Zr and Hf have a comparable size
- C. Zr and Hf occurs together in the earth crust in their minerals
- D. High density of the period 6 elements

Answer: D



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12. The fact that can be explained based on lanthanide contraction is

- A. Zr and Y have about the same radius
- B. Zr and Nb have similar oxidation state
- C. Zr and Hf have about same radius
- D. Zr and Zn have the same oxidation state.

Answer: C



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13. Observe the following statements

- 1) Lanthanides actively participate in chemical reactions
- 2) The basic nature of hydroxides of lanthanides increases from $La(OH)_3$ to $Lu(OH)_3$
- 3) Lanthanides do not form coordinate compounds as readily as d-block metals

The correct statements are

A. 2 & 3

B. 1, 2 & 3

C. 1 & 3

D. 1 & 2

Answer: C



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14. Electronic configuration of divalent cation of Eu is

A. $4f^6$

B. $4f^7$

C. $5f^7$

D. $5f^8$

Answer: B



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15. The correct statement is / are

A. The extent of actinoid contraction is almost the same as lanthanoid contraction.

B. Ce^{+4} in aqueous solution is not known

C. The earlier members of lanthanoid series resemble calcium in their chemical properties.

D. In general, lanthanoids and actinoids do not show variable oxidation states

Answer: C



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Objective Exercise 3 Previous Neet Aipmt Questions

1. Which of the following characteristics of the transition metals is associated with their catalytic activity ?

A. High enthalpy of atomization

B. Paramagnetic behaviour

C. Colour hydrated ions

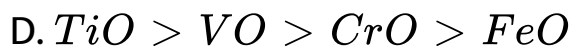
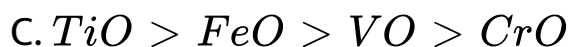
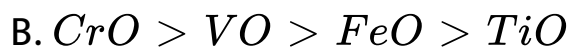
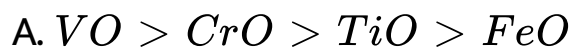
D. Variable oxidation states

Answer: D



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2. The basic character of the transition metal monoxides follows the order

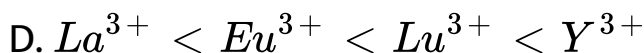
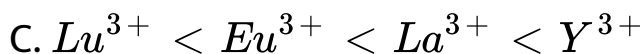
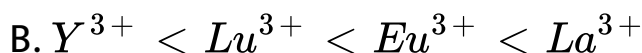
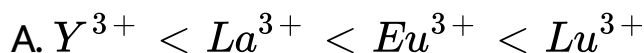


Answer: D



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3. The correct order of ionic radii of Y^{3+} , La^{3+} , Eu^{3+} and Lu^{3+} is (Atomic nos. Y=39, La = 57, Eu = 63, Lu = 71)

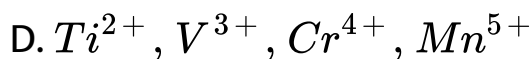
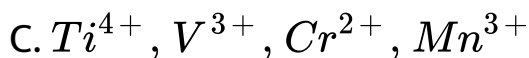
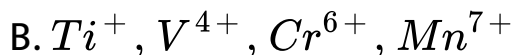
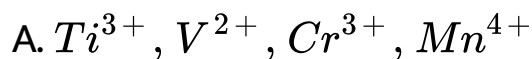


Answer: B



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4. Among the following series of transition metal ions, the one where all metal ions have $3d^2$ electronic configuration is (At. nos. Ti = 22, V = 23, Cr = 24, Mn = 25)



Answer: D



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5. Lanthanoids are

A. 14 elements in the sixth period (atomic no. 90 to 103) that are filling 4f sublevel

B. 14 elements in the seventh period (atomic number = 90 to 103) that are filling 5f sublevel

C. 14 elements in the sixth period (atomic number = 58 to 71) that are filling the 4f sublevel

D. 14 elements in the seventh period (atomic number = 50 to 71) that are filling 4f sublevel

Answer: C



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6. The number of moles of $KMnO_4$ reduced by one mole of KI in alkaline medium is

A. one

B. two

C. five

D. one fifth

Answer: B



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7. Four successive member of the first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionisation enthalpy?

A. Vanadium ($Z = 23$)

B. Chromium ($Z = 24$)

C. Manganese ($Z = 25$)

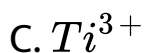
D. Iron ($Z = 26$)

Answer: C



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8. The aqueous solution containing which one of the following ion will be colourless ?



Answer: A



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9. More number of oxidation states are exhibited by the actinoids than by the lanthanoids. The main

reason for this is

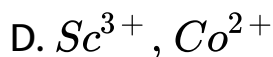
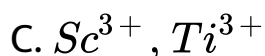
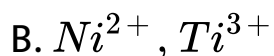
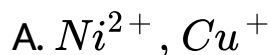
- A. more active nature of the actinoids
- B. more energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals
- C. lesser energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals
- D. greater metallic character of the lanthanoids than that of the corresponding actinoids

Answer: C



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10. In which of the following pairs are both the ions coloured in aqueous solution ? (At no: Sc=21, Ti=22, Ni=28, Cu=29, Co=27)

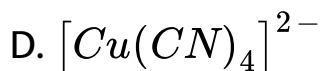
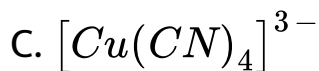
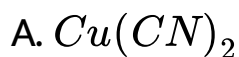


Answer: B



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11. Copper sulphate dissolves in excess of KCN to give



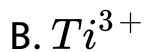
Answer: C



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12. Which one of the following ions is the most stable in aqueous solution (At.No. Ti = 22, V = 23, Cr = 24, Mn = 25)





Answer: D



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13. Identify the incorrect statement among the following

A. Lanthanoid contraction is the accumulation of successive shrinkages

- B. As a result of lanthanoid contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements
- C. Shielding power of 4f electrons is quite weak
- D. There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu

Answer: B



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14. The correct order of decreasing second ionization enthalpy of Ti(22), V(23), Cr (24) and Mn(25) is

A. $Mn > Cr > Ti > V$

B. $Ti > V > Cr > Mn$

C. $Cr > Mn > V > Ti$

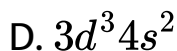
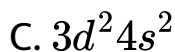
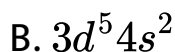
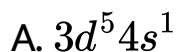
D. $V > Mn > Cr > Ti$

Answer: C



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15. Which one of the elements with the following outer orbital configurations exhibits the largest number of oxidation states?

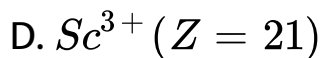
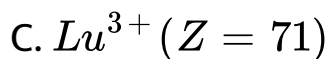
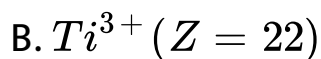
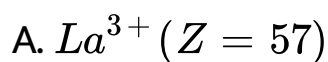


Answer: B



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16. Which of the following ions will exhibit colour in aqueous solutions ?



Answer: B



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17. Which one of the following ions has electronic configuration $[Ar]3d^6$ (Atomic number of $Mn = 25$, $Fe = 26$, $Co = 27$, $Ni = 28$)

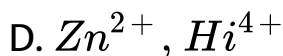
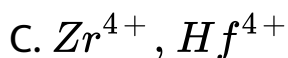
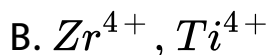
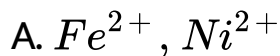


Answer: D



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18. Which of the following pairs has the same size



Answer: C



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19. Match List I (substances) with List II (processes) employed in the manufacture of the substances and

select the correct option

List I (Substances)

1) Sulphuric acid

2) Steel

3) Sodium hydroxide

4) Ammonia

List II (Processes)

i) Haber's process

ii) Bessemer's
process

iii) Leblanc process

iv) Contact process

A. a-i, b-iv, c-ii, d-iii

B. a-i, b-ii, c-iii, d-iv

C. a-iv, b-iii, c-ii, d-i

D. a-iv, b-ii, c-iii, d-i

Answer: D



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20. Which of the following oxidation states is common for all lanthanides ?

A. 4

B. 2

C. 5

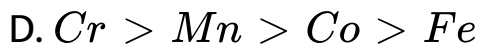
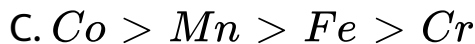
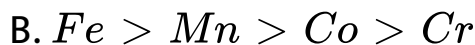
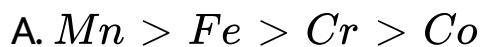
D. 3

Answer: D



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21. Compare the stability of + 2 oxidation state of the elements of the first transition series.

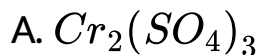


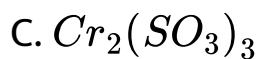
Answer: A



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22. Acidified $K_2Cr_2O_7$ solution turns green when Na_2SO_3 is added to it. This is due to the formation of





Answer: A



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23. Which of the statements is not true?

A. On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed

B. $Na_2Cr_2O_7$ is preferred over $K_2Cr_2O_7$ is a volumetric analysis

C. $K_2Cr_2O_7$ solution in acidic medium is orange

D. $K_2Cr_2O_7$ solution becomes yellow on increasing the pH beyond 7

Answer: B



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24. Which one of the following does not correctly represent the correct order of the property indicated against it?

A. $Ti < V < Cr < Mn$, increasing number of oxidation states

B. $Ti^{3+} < V^{3+}, Cr^{3+} < Mn^{3+}$, increasing
magnetic moment

C. $Ti < V < Cr < Mn$, increasing melting
points

D. $Ti < V < Mn < Cr$: increasing 2nd ionization
enthalpy

Answer: C



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25. Four successive members of the first series of the transition metals are listed below. For which one of

them the standard potential ($E_M^0 + \frac{2.303 RT}{nF} \log \frac{1}{m}$) value has a positive sign?

A. Co (Z = 27)

B. Ni (Z = 28)

C. Cu (Z = 29)

D. Fe (Z = 26)

Answer: C



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26. Catalytic activity of transition elements and their compounds is due to their

- A. their magnetic behaviour
- B. their unfilled d-orbitals
- C. their ability to adopt variable oxidation states
- D. their chemical reactivity

Answer: C



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27. Which of the following exhibits only +3 oxidation state ?

- A. U
- B. Th

C. Ac

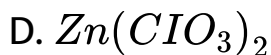
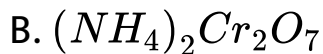
D. Pa

Answer: C



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28. Which of the following does not give oxygen on heating?

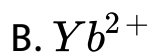


Answer: B



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29. Which of the following lanthanoid ions is diamagnetic ?

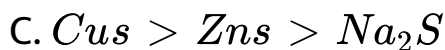
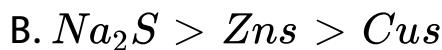


Answer: B



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30. Identify the correct order of solubility of Na_2S , CuS and ZnS in aqueous medium :

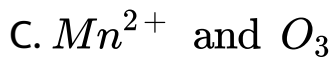
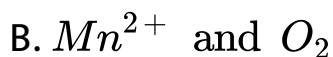
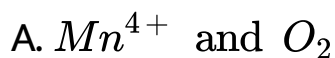


Answer: B



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31. The reaction of aqueous $KMnO_4$ with H_2O_2 in acidic conditions gives

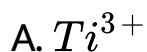


Answer: B



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32. Magnetic moment 2.83 BM is given by which of the following ions ?



Answer: B



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33. Reason of lanthanodi contraction is

- A. negligible screening effect of 'f' orbitals
- B. increasaing nuclear charge
- C. decreasing nuclear charge
- D. decreasing screening effect

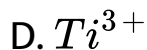
Answer: A



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34. Magnetic moment 2.84B.M. is given by (Atomic number, Ni = 28, Ti = 22, Cr = 24, Co = 27)





Answer: C



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35. Which of the following processes does not involve oxidation of iron ?

A. Formation of $Fe(CO)_2$ from Fe

B. Liberation of H_2 from steam by iron at high temperature

C. Rusting of iron sheets

D. Decolourisation of blue $CuSO_4$ solution by iron

Answer: A



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

A. Zr(40) and Hf(72)

B. Zr(40) and Ta(73)

C. Ti(22) and Zr(40)

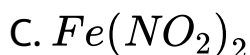
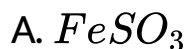
D. Zr(40) and Nb(41)

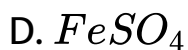
Answer: A



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37. Assuming complete ionisation, same moles of which of the following compounds will require the least amount of acidified $KMnO_4$ for complete oxidation ?



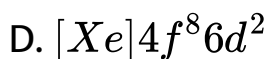
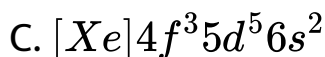
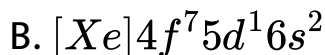
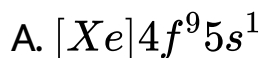


Answer: D



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38. Gadolinium belongs to 4f series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium



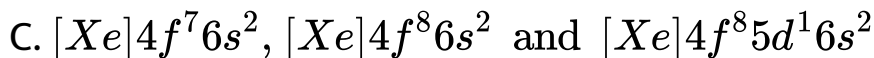
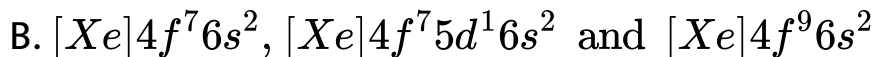
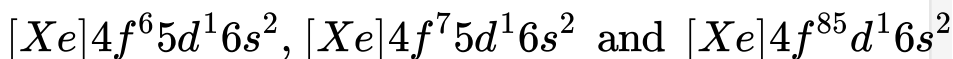
Answer: B



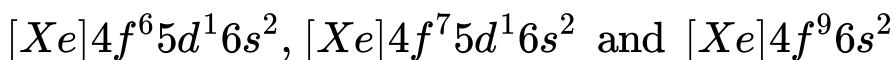
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39. The electronic configurations of Eu (Atomic No. 63), Gd (Atomic No. 64) and Tb (Atomic No. 65) are :

A.



D.



Answer: B



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40. Which one of the following statements related to lanthanons is incorrect?

A. Europium shows + 2 oxidation state

B. The basicity decreases as the ionic radius decreases from Pr to Lu

C. All the lanthanons are much more reactive than aluminium

D. $\text{Ce}(+4)$ solutions are widely used as oxidizing agent in volumetric analysis

Answer: C



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41. The reason for greater range of oxidation states in actinoids is attributed to

- A. 4f and 5d levels being close in energies
- B. the radioactive nature of actinoids
- C. actinoid contraction
- D. 5f, 6d and 7s levels having comparable energies

Answer: D



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42. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column H and assign the correct code

Column I

a. Co^{3+}

b. Cr^{3+}

c. Fe^{3+}

d. Ni^{2+}

Column II

i) $\sqrt{8}$ B.M.

ii) $\sqrt{35}$ B.M.

iii) $\sqrt{3}$ B.M.

iv) $\sqrt{24}$ B.M.

v) $\sqrt{15}$ B.M. (2018)

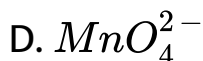
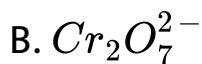
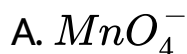
- | | a | b | c | d |
|----|----|---|----|-----|
| 1) | iv | i | ii | iii |
| 3) | iv | v | ii | i |

- | | a | b | c | d |
|----|-----|----|-----|----|
| 2) | i | ii | iii | iv |
| 4) | iii | v | i | ii |



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43. Which one of the following ions exhibits d-d transition and paramagnetism as well ?



Answer: D



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1. (A): Fe^{+3} is more stable than that of Fe^{+2} .

(R) : Fe^{+3} ion has half filled 3d orbital whereas Fe^{+2} does not.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

2. (A): Sc^{+3} ion in aqueous solutions is colorless

(R) : Ions with d^0 configuration are colorless

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

3. (A): The spin only magnetic moment of Sc^{+3} 1.73 BM

(R) : The spin only magnetic moment (in BM) of an ion

is equal to $\sqrt{n(n+2)}$

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

4. (A) Cu^{+} is diamagnetic

(R) Ions With d^{10} configuration are diamagnetic

A. Both (A) and (R) are true and (R) is the correct

explanation of (A)

B. Both (A) and (R) are true and (R) is not the

correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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5. (A): Transition elements form alloys easily

(R) : Transition elements have high melting points

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

6. (A): Transition elements form alloys very easily.

(R): They exhibit variable oxidation states.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

7. (A): Outermost electronic configuration of



(R) : Pt in its ion attains pseudo inert gas configuration The correct answer is

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

8. (A): Elements of second and third transition series have nearly same atomic radii

(R): Lanthanide contraction is observed in the elements from atomic number 58 to 71.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



Watch Video Solution

9. (A) : Transition metals form colored ions

(R): They have completely filled d-orbitals in the nth

shell.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



Watch Video Solution

10. (A): Magnetic moment of Mn^{+2} is 5.8 B.M

(R): Mn^{+2} has five unpaired electrons

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

11. (A) : $\text{Cu}^{+2}(\text{aq})$ is more stable than $\text{Cu}^{+}(\text{aq})$

(R): Heat of hydration of Cu^{+2} is more than IP_2 of Cu

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

12. (A): Zn(II) compounds are diamagnetic.

(R): Zn(II) has all its electrons paired.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

13. (A): FeO is basic in character.

(R): Oxides of transition metals are basic when metal is in lower oxidation state.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A





14. (A): Pyrolusite is an ore of manganese.

(R) : Formula of pyrolusite is Mn_3O_4 .

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



15. (A): Equivalent mass of $K_2Cr_2O_7$, when it acts as oxidizing agent in acidic medium, is $M/3$

(R) : During reduction, oxidation number of chromium changes from $+6$ to $+3$

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

16. (A): $Ti(IV)$ in aqueous solutions is colour less.

(R): $Ti(IV)$ has no electrons in d-subshell.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

17. (A): In alkaline medium, $KMnO_4$ oxidizes iodides to iodates.

(R): $KMnO_4$ behaves as stronger oxidizing agent in alkaline medium than in acidic medium.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

18. (A): Zr and Hf have nearly equal atomic radii.

(R): Zr and Hf belong to the same group.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

19. (A) Scandium is the lightest transition metal,
(R) Atomic radius of scandium is largest among all the
transition elements.

A. Both (A) and (R) are true and (R) is the correct
explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

20. (A) The most common oxidation state of lanthanides is + 3.

(R) Lanthanides have three electrons in their outermost shell.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



Watch Video Solution

21. (A): Ce^{4+} is a good oxidizing agent.

(R): Sm^{2+} is a good reducing agent.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



Watch Video Solution

22. (A): Zinc does not show characteristic properties of transition metals

(R): The outer most shell of zinc is completely filled

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



Watch Video Solution

23. (A): K_2CrO_4 has yellow colour due to charge transfer

(R) : CrO_4^{2-} ion is tetrahedral in shape.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

24. (A) The highest oxidation state of chromium in its compounds is + 6

(R) Chromium atom has only six electrons in ns and (n-1)d orbitals.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

25. (A) CrO_3 , reacts with HCl to form chromyl chloride gas

(R) Chromyl chloride (CrO_2Cl_2) has tetra hedral shape

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

26. (A) Tungsten has a very low melting point

(R) Tungsten is a covalent compound

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

27. (A) Cu^{+} ion is coloured in aqueous solutions

(R) Four water molecules are coordinated to Cu^{+} ion

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

28. (A) Equivalent mass of $KMnO_4$ is equal to one-third of its molecular mass when it acts as an oxidising agent in faint alkaline medium

(R) Oxidation number of Mn is +7 $KMnO_4$

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

29. (A) Ce^{4+} is used as an oxidising agent in volumetric analysis.

(R) Ce^{4+} has a tendency to attain a stable + 3 oxidation state

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



Watch Video Solution

30. (A) In MnO_4^- the M-O bonds are ionic .

(R) The oxidation number of maganese in MnO_4^- is - 1

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: D



Watch Video Solution

31. (A) Mn atom loses ns electrons first during ionization as compared to $(n-1)d$ electrons .

(R) The effective nuclear charge experienced by $(n-1)d$ electrons is greater than that by ns electrons.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A

32. (A) Aqueous solution of $FeCl_3$ is acidic due to cationic hydrolysis

(R) Ferric chloride is a covalent compound and exists as a dimer.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

33. (A) Mercury is liquid at room temperature

(R) In mercury, there is no unpaired d-electron and thus metallic bonding is weakest.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



Watch Video Solution

34. (A) The purple colour of $KMnO_4$ is due to the charge transfer transition

(R) The intense colour in most of the transition metal complexes is due to d-d transition

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

35. (A) The highest oxidation state of Os is +8.

(R) Osmium is a 5d element

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

36. (A) Atomic size of silver is almost equal to that of gold.

(R) d subshell has low penetration power and produce poor shielding effect.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: B



Watch Video Solution

37. (A) Cr^{+2} is strong reducing agent in aqueous solution.

(R) Cr^{+2} cannot liberate H_2 from dilute HCl.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



Watch Video Solution

38. (A) Potassium dichromate is used as a primary standard in volumetric analysis.

(R) $K_2Cr_2O_7$ is strong reducing agent

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

39. (A) Potassium ferrocyanide and potassium ferricyanide both are paramagnetic.

(R) Both have unpaired electrons

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



40. (A) Zn^{+2} is diamagnetic

(R) The electrons are lost from 4s orbital to form Zn^{+2}

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

41. (A) d block elements are transitioned between s-block metals and p-block metals.

(R) d block elements are more-electropositive than s-block elements.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

42. (A) E.C of Pd is $[Kr]4d^85s^2$

(R) Palladium contains $8e^-$ in N shell.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

43. (A) Sc exhibit variable oxidation states.

(R) Sc is not a transitional element.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

44. (A) : $Cu^{+2}(aq)$ is more stable than $Cu^{+}(aq)$

(R): Heat of hydration of Cu^{+2} is more than IP_2 of Cu

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

45. (A) Cr^{+2} is reducing in nature.

(R) Half filled t_{2g} level in Cr^{+3} gives greater stability.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

46. (A) Many copper(I) compounds are unstable in aqueous solution.

(R) Copper(I) compounds undergo only reduction in aqueous solution

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



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47. (A) The number of unpaired electrons in the following gaseous ion Mn^{3+} , Cr^{3+} , V^{3+} and

Ti^{3+} are 4, 3, 2 and 1 respectively

(R) Cr^{3+} is most stable

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

48. (A) MnO_4^{-1} is strong oxidizing agent.

(R) Mn^{+2} is stable with fully filled d sublevel.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

49. (A) The free gaseous Cr atom has six unpaired electrons.

(R) Half filled s-orbital has greater stability

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

50. (A) E° for Mn^{+3} / Mn^{+2} is more positive than Cr^{3+} / Cr^{+2}

(R) IP_3 of Mn is larger than that of Cr.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



51. (A) $K_2Cr_2O_7$ is used as primary standard in volumetric analysis.

(R) It has a good solubility in water.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: C



Watch Video Solution

52. (A) Solution of Na_2CrO_4 in water is intensely coloured.

(R) Oxidation state of Cr in Na_2CrO_4 is +VI

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



View Text Solution

53. (A) Elements of 4f series are called Lanthanides

(R) Lanthanum Belongs to 'f' block

A. Both (A) and (R) are true and (R) is the correct

explanation of (A)

B. Both (A) and (R) are true and (R) is not the

correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



View Text Solution

54. (A) Silver. Gold and platinum are precious metals.

(R) Silver gold and platinum are good conductors.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



Watch Video Solution

55. (A) Zn, Cd and Hg of group 12 are transition metals

(R) Partially filled d sublevel is present in the atomic state as well as in their common oxidation state.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

56. (A) Mn & Hg exist in simple crystal structures.

(R) Both Mn & Hg are solids.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

57. (A) Metals of 4d and 5d series have greater enthalpies of atomization than the corresponding 3d series.

(R) 4d and 5d series elements are smaller than 3d series

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



Watch Video Solution

58. (A) The enthalpy of atomization of zinc is the highest in 3d series.

(R) Zn is a transition metal

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: D



Watch Video Solution

59. (A) Second ionization enthalpies of Cr and Cu are very low

(R) Both Cr and Cu are stable in their +2 oxidation state

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D

60. (A) The calculated spin only magnetic moment of Ti^{+2} is 1.73 BM.

(R) Number of unpaired electrons in Ti^{+2} is 4.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

61. (A) Ni^{+2} salts are pink in colour

(R) Ni^{+2} absorb light in IR region

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

62. (A) Cu^{+} is highly stable in aqueous solution

(R) E.C of Cu^{+} is $[Ar]4s^13d^9$

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



Watch Video Solution

63. (A) Chromates and dichromates are not interconvertible in aqueous solution with change in pH.

(R) Chromates are orange in colour.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: D



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64. (A) Cu has a unique behavior having a positive SRP.

(R) Cu is unable to liberate H_2 from acids.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



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65. (A) Although fluorine is more electronegative than oxygen, but the ability of oxygen to stabilise the higher oxidation states with d-block metal is more.

(R) Oxygen has ability to form multiple bonds to metals

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: A



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66. (A) Cr^{2+} is reducing while Mn^{3+} is oxidizing when both have d^4 configuration.

(R) Configuration of Cr^{2+} changes from d^3 to d^4

- A. Both (A) and (R) are true and (R) is the correct explanation of (A)
- B. Both (A) and (R) are true and (R) is not the correct explanation of (A)
- C. (A) is true but (R) is false
- D. Both (A) and (R) are false

Answer: C



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67. (A) Cr^{+3} and Co^{2+} ions have same number of unpaired electrons but the observed magnetic moment of Cr^{3+} is 3.87 B. M and that of Co^{2+} is 4.87 B.M

(R) Due to symmetrica electronic configuration there is no orbital motion of unpaired electron in Cr^{3+} ion while appreciable orbital contribution takes place in Co^{2+} ion .

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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68. (A) +3 oxidation states is characteristic property of lanthanoids but cerium shows + 4 state also

(R) Cerium acquire $4f^0$ configuration after loosing one more eletron.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: A



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69. (A) Steel is an alloy of iron with a metal.

(R) Same steels contain carbon as a constituent

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. Both (A) and (R) are false

Answer: B



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