

CHEMISTRY

BOOKS - MTG GUIDE

THE d-AND f- BLOCK ELEMENTS

Illustration

1. Chemistry of actinoids is complicated as compared to lanthanoids. Give two reasons



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2. With reference to structural variability and chemical reactivity, write the differences between lanthanoids and actinoids.



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3. How would you account for the following:
Lanthanoids form primarily +3 ions, while the actinoids usually have higher oxidation states

in their compounds, +4 or even +6 being typical.



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Neet Cafe Topicwise Practice Questions

1. Hypo is used in photography to

- A. reduce AgBr grains to metallic silver
- B. convert metallic silver to silver salt

C. remove undecomposed silver bromide as
a soluble complex

D. remove reduced silver.

Answer: C



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2. A metal which is 'not affected by conc. H_2SO_4 , HNO_3 or alkalies forms a compound X. This compound X can be used to give a

complex which finds its application for toning in photography. The metal is

A. Au

B. Ag

C. Hg

D. Cu

Answer: A

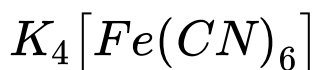


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3. A blue colouration is not obtained when

A. ammonium hydroxide dissolves in copper sulphate

B. copper sulphate solution reacts with



C. ferric chloride reacts with sodium ferrocyanide

D. anhydrous white $CuSO_4$ is dissolved in water.

Answer: B



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4. Silver chloride dissolves in a solution of ammonia but not in water because

A. ammonia is a better solvent than water

B. silver ion forms a complex ion with ammonia

C. ammonia is a stronger base than water

D. the dipole moment of water molecule is higher than that of ammonia molecule.

Answer: B



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5. Preparation of looking mirrors involves the use of

A. red lead

B. ammoniacal silver nitrate

C. ammoniacal $AgNO_3$ + red lead

D. ammoniacal $AgNO_3$ + red lead + HCHO

Answer: D



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6. The highest magnetic moment is shown by the transition metal ion with outer electronic configuration

A. $3d^2$

B. $3d^5$

C. $3d^7$

D. $3d^9$

Answer: B



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7. Which one of the following has the least magnetic moment?





Answer: A



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8. In the series Sc ($Z = 21$) to Zn ($Z=30$), the enthalpy of atomisation of which element is least?

A. Sc

B. Mn

C. Cu

D. Zn

Answer: D



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9. Third transition series consists of

A. atomic no. 39-48 and having incomplete

4d-orbitals

B. atomic no. 57,72 to 80 having incomplete

5d-orbitals

C. atomic no. 89, 104 to 112 having

incomplete 6d-orbitals

D. atomic no. 21 to 30 and having

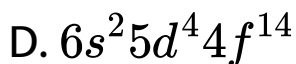
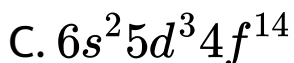
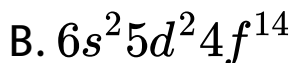
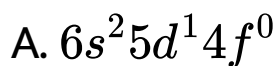
incomplete 3d-orbitals.

Answer: B



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10. The electronic configuration of Tantalum (Ta) is



Answer: C



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11. Cu^{2+} is more stable than Cu^{+} due to _____ reduction potential which is due to _____ hydration energy.

- A. lower, lower
- B. lower, higher
- C. higher, higher
- D. higher, lower

Answer: B



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12. The compounds which are formed by occupying vacant spaces in a lattice by all smaller size atoms like carbon, hydrogen, nitrogen, etc. are

- A. misch compounds
- B. stoichiometric compounds
- C. spinel
- D. interstitial compounds.

Answer: D



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13. Which of the following sets of elements have almost same atomic size?

A. Sc, Ti, V

B. Ni, Cu, Zn

C. Fe, Co, Ni

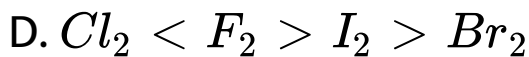
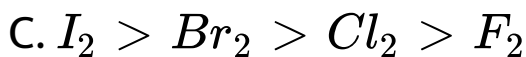
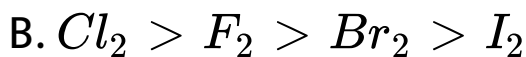
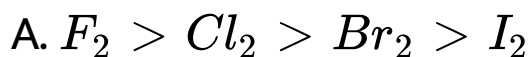
D. V, Ni, Cu

Answer: C



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14. Transition metals react with halogen at elevated temperature to form halides. The reactivity order of halogens are



Answer: A



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15. The transition metal ion that has 'spin-only' magnetic moment value of 5.92 is



Answer: A



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16. When KCN is added to $CuSO_4$ solution

A. KCN acts as reducing agent

B. KCN acts as complexing agent

C. $K_3[Cu(CN)_4]$ is formed

D. All are correct

Answer: D



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17. When KI (excess) is added to

I. $CuSO_4$ II. $HgCl_2$ III. $Pb(NO_3)_2$

Which of the following observations is correct

?

A. A white ppt. of CuI in I, an orange ppt. of

HgI_2 in II and a yellow ppt. of PbI_2 in III

B.

C.

D.

Answer: B



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18. Ni^{2+} in traces can be tested using

- A. sodium nitroprusside
- B. dimethyl glyoxime
- C. ammonium sulphocyanide
- D. potassium ferrocyanide.

Answer: B



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19. Ti^{2+} is purple while Ti^{4+} is colourless because

A. there is no crystal field effect in Ti^{+4}

B. Ti^{2+} has $3d^2$ configuration

C. Ti^{4+} has $3d^2$ configuration

D. Ti^{4+} is a very small cation when compared to Ti^{2+} and hence. Does not absorb any radiation.

Answer: B



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20. Iron is obtained on a commercial scale from Fe_2O_3 by reduction with

A. Al

B. CO

C. Na

D. H_2

Answer: B



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21. Which of the following has highest melting point?

A. Pig iron

B. Cast iron

C. Steel

D. Wrought iron

Answer: D



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22. Anhydrous ferric chloride is prepared by

A. dissolving $Fe(OH)_3$ in concentrated

HCl

B. dissolving $Fe(OH)_3$, in dilute HCl

C. passing dry HCl over heated iron scrap

D. passing dry Cl_2 , gas over heated iron scrap.

Answer: D



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23. Which of the following is the most impure form of iron?

A. Bessemer iron

B. Steel

C. Pig iron

D. Wrought iron

Answer: C

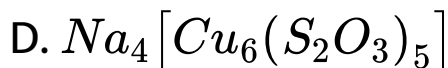
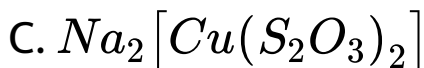


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24. An excess of $Na_2S_2O_3$ reacts with aqueous $CuSO_4$ to give

A. CuS_2O_3

B. $Cu_2S_2O_3$



Answer: D



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25. A colourless solution contains a metal nitrate. A little solution of sodium chloride is added to it when a cloudy white precipitate appears. The precipitate is of

A. $PbCl_2$

B. $AgCl$

C. Hg_2Cl_2

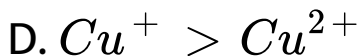
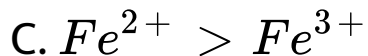
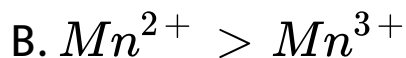
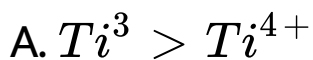
D. any of the three.

Answer: D



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26. In which of the following cases, the stability of two oxidation states is correctly represented?



Answer: B



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27. The magnetic moment (B.M) of Fe^{2+} ion is

A. 0

B. $\sqrt{35}$

C. $\sqrt{24}$

D. $2\sqrt{2}$

Answer: C



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28. Amongst TiF_6^{2-} , CoF_6^{3-} , Cu_2Cl_2 and $NiCl_4^{2-}$ (at. Nos. Ti=22, Co= 27, Cu = 29 Ni=28)

the colourless species are



Answer: D



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29. In the aqueous solution, $\text{Cu}(+1)$ salts are unstable because

A. Cu(+1) has a $3d^{10}$ configuration

B. the change in free energy of the overall reaction is zero

C. they disproportionate easily to the Cu and Cu (+2) states

D. they disproportionate easily to the Cu (+2) and Cu (+3) states.

Answer: C



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30. In context with the transition elements, which of the following statements is incorrect?

A. In addition to the normal oxidation states, the zero oxidation state is also shown by these elements in complexes

B. In the highest oxidation states, the transition metals show basic character and form cationic complexes.

C. In the highest oxidation states of the first five transition elements (Sc to Mn), all the 4s and 3d electrons are used for bonding.

D. Once the d configuration is exceeded, the tendency to involve all the 3d electrons in bonding decreases.

Answer: B



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31. Which of the following dissolves in hot concentrated NaOH solution?

A. Fe

B. Zn

C. Cu

D. Ag

Answer: B



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32. Native silver metal forms a water soluble complex with a dilute aqueous solution of NaCN in the presence of

A. nitrogen

B. oxygen

C. carbon dioxide

D. argon

Answer: B



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33. Which of the following statements is incorrect?

A. Iron belongs to 3d-transition series of the periodic table.

B. Iron belongs to f-block of the periodic table.

C. Iron belongs to first transition series.

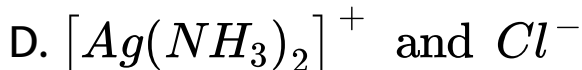
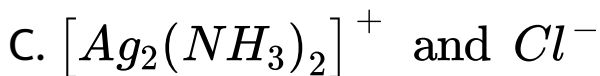
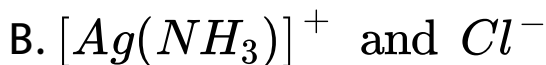
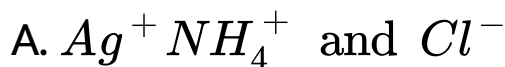
D. Iron belongs to group VIII of the periodic table.

Answer: B



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34. AgCl dissolves in ammonia solution giving



Answer: D



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35. Copper cannot replace from solution.

A. Ag

B. Hg

C. Au

D. Fe

Answer: D



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36. Articles made of copper and bronze slowly tarnish in air and turn green. The green colour is due to the formation of

A. copper oxide

B. copper sulphide

C. copper oxalate

D. basic copper carbonate

Answer: D



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37. Silver nitrate is usually supplied in coloured bottles because it is

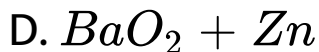
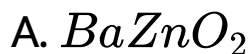
- A. oxidised in air
- B. decomposed in sunlight
- C. explodes in sunlight
- D. reactive towards air in sunlight.

Answer: B



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38. Philosopher's wool when heated with BaO at $1100^{\circ}C$ gives the compound



Answer: A



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39. A scarlet red precipitate is obtained on treating mercuric chloride solution with

A. H_2S

B. KI

C. $NaOH$

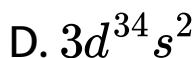
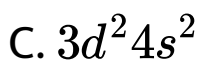
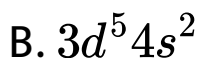
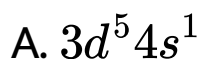
D. NH_4OH

Answer: B



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40. Which one of the elements with the following outer orbital configurations may exhibit the largest number of oxidation states?



Answer: B



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41. In solid $CSO_{4.5}H_2O$ copper is coordinated to

- A. 4 water molecules
- B. 5 water molecules
- C. 1 sulphate molecule
- D. 1 water molecule.

Answer: A



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42. The correct statement(s) among the following is/are :

(i) all d- and f-block elements are metals

(ii) all d- and f-block elements form coloured ions

(iii) all d- and f-block elements are paramagnetic.

A. (i) only

B. (i) and (ii) only

C. (ii) and (iii) only

D. (i), (ii) and (iii)

Answer: A



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43. The correct order of $E_{M^{2+}/M}^{\circ}$ values with negative sign for the four successive elements Cr, Mn, Fe and Co is

A. $Cr > Mn > Fe > Co$

B. $Mn > Cr > Fe > Co$

C. $Cr > Fe > Mn > Co$

D. $Fe > Mn > Cr > Co$

Answer: B



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44. What effect is noticed on shaking dilute sulphuric acid with a small quantity of anhydrous copper sulphate?

A. The white solid dissolves to form a colourless solution.

B. The white solid dissolves to form a green solution.

C. The white solid turns blue but does not dissolve.

D. The white solid dissolves to form a blue solution.

Answer: D



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45. Sodium thiosulphate is used in photography because of its

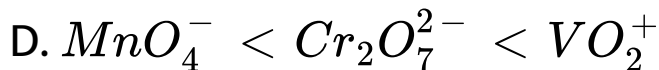
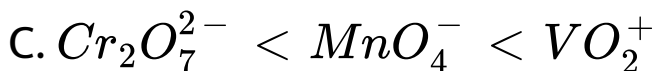
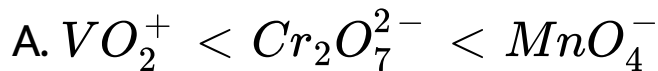
- A. reducing behaviour
- B. oxidising behaviour
- C. complex forming behaviour
- D. reaction with light.

Answer: C



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46. The correct order of increasing oxidizing power in the series is



Answer: A



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47. An aqueous solution of $FeSO_4$, $Al_2(SO_4)_3$ and chrome alum is heated with excess of Na_2O_2 , and filtered. The materials obtained are

- A. a colourless filtrate and a green residue
- B. a yellow filtrate and a green residue
- C. a yellow filtrate and a brown residue
- D. a green filtrate and a brown residue.

Answer: C



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48. The chemical processes in the production of steel from haematite ore involve

A. reduction

B. oxidation

C. reduction followed by oxidation

D. oxidation followed by reduction

Answer: D



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49. Silver iodide is used for producing artificial rain because AgI

A. is easy to spray at high altitude

B. is easy to synthesize

C. has crystal structure similar to ice

D. is insoluble in water.

Answer: C



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50. Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because

A. Zn acts as an oxidising agent when react with HNO_3

B. HNO_3 is weaker acid than H_2SO_4 and HCl

C. in electrochemical series Zn is above hydrogen

D. NO_3^- ion is reduced in preference to hydronium ion.

Answer: D



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51. The common oxidation states of Ti are

A. +2, +3

B. +3, +4

C. -3, -4

D. +2, +3, +4

Answer: D



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52. Automobile engine blocks are made of

- A. stainless steel
- B. cast iron
- C. nickel-chromium steel
- D. wrought iron.

Answer: B



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53. Which one of the following has the least magnetic moment?



Answer: A



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54. Zn does not show variable valency because of

A. complete 'd' subshell

B. inert pair effect

C. 4s-subshell

D. 5 unpaired electrons

Answer: A



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55. Which one of the following is false for Hg?

A. It can evolve hydrogen from H_2S .

B. It is a metal

C. It has high specific heat.

D. It is less reactive than hydrogen.

Answer: A



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56. Titanium shows magnetic moment of 1.73 BM in its compound. What is the oxidation number of Ti in the compound?

A. +1

B. +4

C. +3

D. +2

Answer: C



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57. An element in +3 oxidation state has the electronic configuration $[Ar]3d^3$. Its atomic number is

A. 24

B. 23

C. 22

D. 21

Answer: A



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58. Among the following ions :

1. Cu^{2+} 2. Ti^{2+} Co^{2+} 4. Fe^{2+}

the coloured ions are

A. 1,2,3,4

B. 1,3,4 only

C. 2,3, only

D. 1,2 only.

Answer: B



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59. Which of the following is a carbonate ore?

A. Pyrolusite

B. Malachite

C. Diaspore

D. Cassiterite

Answer: B



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60. Which one of the following shows highest magnetic moment?



Answer: C



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

A. 4

B. 5

C. 6

D. 3

Answer: A



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62. Which metal is present in brass, bronze and German silver?

A. Zn

B. Mg

C. Cu

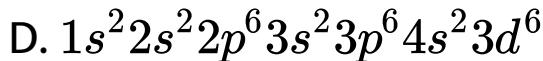
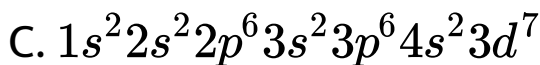
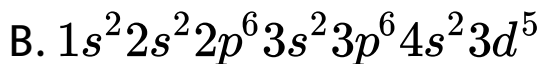
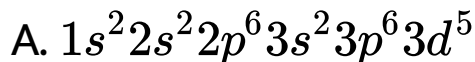
D. Al

Answer: C



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63. Which of the following configurations is correct for iron ?



Answer: D



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64. Which of the following does not have valence electrons in 3d-subshell?

A. Fe(III)

B. Mn(II)

C. Cr(I)

D. Ti(IV)

Answer: D



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65. Which of the following types of metals make the most efficient catalysts?

- A. Transition metals
- B. Alkali metals
- C. Alkaline earth metals
- D. Coloured metals

Answer: A



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66. Choose the correct statement for transition element.

A. Transition elements have low melting points

B. Transition elements do not have catalytic activity.

C. Transition elements exhibit variable oxidation states.

D. Transition elements exhibit inert pair effect.

Answer: C



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67. Which of the following contains maximum number of unpaired electrons?



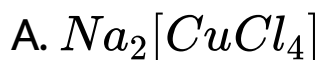


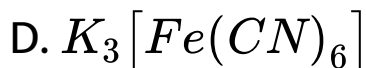
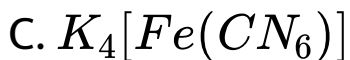
Answer: A



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68. Which of the following compounds is not coloured?



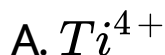


Answer: B



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69. Which one of the following ionic species will impart colour to an aqueous solution?





Answer: D



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70. Zinc and mercury do not show variable valency like d-block elements because

A. they are soft

B. their d-shells are complete

C. they have only two electrons in the outermost shell

D. their d-shells are incomplete.

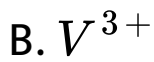
Answer: B



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71. Which of the following is colourless in water?

A. Ti^{3+}



Answer: D



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72. The alloy best suited for making meter scales is

A. stainless steel

B. invar

C. alnico

D. tungsten steel.

Answer: B



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73. In the ground state, an element has 13 electrons in its "M shell". The element is

A. copper

B. chromium

C. nickel

D. iron

Answer: B



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74. The ionic radii of group-12 metals Zn, Cd and Hg are smaller than those of group-2 metals because Zn, Cd and Hg have

- A. 10 d-electrons which shield the nuclear charge poorly
- B. 10 d-electrons which shield the nuclear charge strongly
- C. 10 d-electrons which have a large radius ratio
- D. 10 d-electrons which have a large exchange energy.

Answer: A



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75. A non-copper alloy is

A. solder

B. brass

C. bronze

D. bell metal.

Answer: A



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76. Which one of the following transition metal ions has the lowest density?

A. Copper

B. Nickel

C. Scandium

D. Zinc

Answer: C



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77. The last electron in d-block elements goes to

A. $(n-1)d$

B. nd

C. np

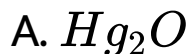
D. $(n-1)s$

Answer: A



View Text Solution

78. Mercury sticks to the surface of the glass when it comes in contact with



D. greases

Answer: C



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79. Elements which generally exhibit multiple oxidation states and whose ions are usually coloured are

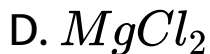
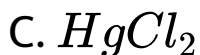
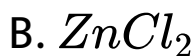
- A. metalloids
- B. non-metals
- C. transition elements
- D. gases

Answer: C



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80. Which of the following substances has least ionic character?



Answer: B



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81. The atomic number (Z) of an element is 25. In its ground state, how many electrons are present in the "N" shell?

A. 13

B. 2

C. 15

D. 3

Answer: B



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82. Transition metals are often paramagnetic owing to

- A. high m.pt. and b.pt.
- B. the presence of vacant orbitals
- C. the presence of unpaired electrons
- D. malleability and ductility

Answer: C



View Text Solution

83. Which of the following is not an element?

A. Graphite

B. Diamond

C. 22-Carat gold

D. Rhombic sulphur

Answer: C



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84. Green vitriol is



Answer: A



View Text Solution

85. Wrought iron, pig iron and steel differ in properties due to

A. carbon content

B. malleability

C. conductivity

D. softness

Answer: A



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86. The melting points of Cu, Ag and Au follow the order

A. $Cu > Ag > Au$

B. $Cu > Au > Ag$

C. $Au > Ag > Cu$

D. $Ag > Au > Cu$

Answer: B



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87. The ions of metals of group-12 (Zn, Cd and Hg) have a complete d-shell, and so

- A. behave like superconductors
- B. are very high melting solids
- C. do not behave like transition metals
- D. behave like semiconductors

Answer: C



View Text Solution

88. The metals of group-12 are softer than other transition metals because

A. group-12 metals have a cage-like structure

B. group-12 metals have high ionisation energies

C. s- as well as d-electrons take part in metallic bonding

D. d-electrons do not take part in metallic bonding.

Answer: D



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89. The "spin-only" magnetic moment [in units of Bohr magneton, (BM)] of Nit in aqueous solution would be (atomic number of Ni = 28)

A. 2.84

B. 4.9

C. 0

D. 1.73

Answer: A



View Text Solution

90. Copper can be extracted from

A. carnallite

B. dolomite

C. malachite

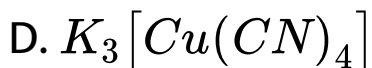
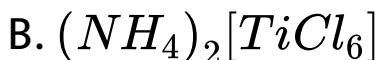
D. galena

Answer: C



View Text Solution

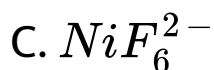
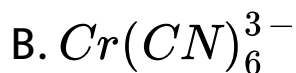
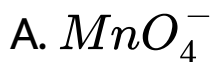
91. Compound that is both paramagnetic and coloured is



Answer: C



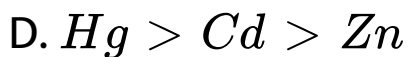
92. Amongst the following, the species with an atom in +6 oxidation state is



Answer: D



93. Which of the following is arranged in order of decreasing thermal stability?



Answer: C



View Text Solution

94. The number of d-electrons retained in Fe^{2+} (At. no. Fe 26) ions is

A. 3

B. 4

C. 5

D. 6

Answer: D



View Text Solution

95. Bonding in ferric chloride is

A. covalent

B. ionic

C. coordinate

D. none of these.

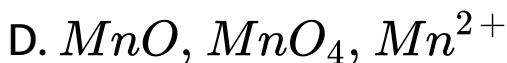
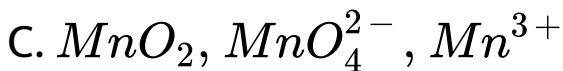
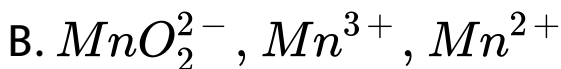
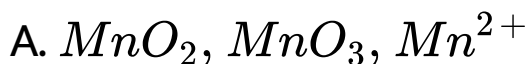
Answer: A



View Text Solution

Check Your Neet Vitals

1. 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

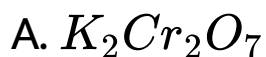


Answer: A



View Text Solution

2. Which compound is coloured due to charge transfer spectra ?



D. all of these

Answer: D



View Text Solution

3. Pick out the correct statements from the following :

A. Zinc forms coloured complexes.

B. Most of the d-block elements and their compounds are ferromagnetic .

C. Osmium show + 8 oxidation state.

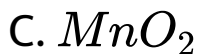
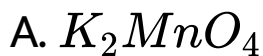
D. Both copper (I) and copper (II) salts are known in aqueous solution.

Answer: D



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4. On heating $KMnO_4$ which one among the following is not formed ?



Answer: D



5. Which of the following orders are correct ?

(I) $5d - 5d > 4f - 4d > 3d - 3d$ (orbital overlapping)

(II) $Mn^{2+} > Fe^{2+} > Cr^{3+} > Cu^{2+}$

(Magnetic moment)

(III) $Sc^{3+} > Zn^{2+} > V^{5+} > Ti^{4+}$ (magnetic nature)

(IV) $Zn > Cu > Fe > Co$ (atomic size)

A. only I,II

B. Only I, IV

C. Only I,II,IV

D. Only II, III,IV

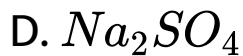
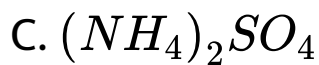
Answer: C



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6. Iodine is formed when potassium iodide reacts with a solution of

A. $ZnSO_4$



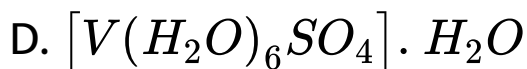
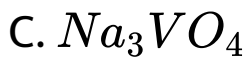
Answer: B



View Text Solution

7. The colourless species is





Answer: C



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

A. U

B. Th

C. Ac

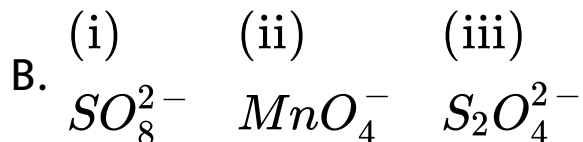
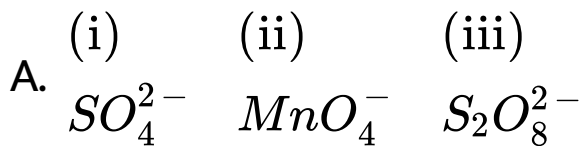
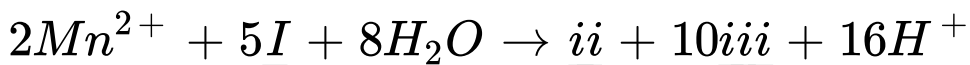
D. Pa

Answer: C



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9. Complete the give reaction .



- C. (i) MnO_4^- (ii) $S_2O_8^{2-}$ (iii) $S_2O_4^{2-}$
- D. (i) $S_2O_8^{2-}$ (ii) $S_2O_4^{2-}$ (iii) MnO_4^{2-}

Answer: B



View Text Solution

10. There are 14 elements in actinoid series .

Which of the following elements does not

belong to this series ?

A. U

B. Np

C. Tm

D. Fm

Answer: C



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