CHEMISTRY

BOOKS - MODERN PUBLICATION CHEMISTRY (KANNADA ENGLISH)

CHEMISTRY OF D-AND F-BLOCK ELEMENTS

Multiple Choice Questions Level I D Block Elements And Their Characteristics

1. The correct electronic configuration of copper atom is

A. $[Ar]3d^9 4s^2$

B. [AR] $3d^{10} 4s^1$

C. [Ar] $3d^8 4s^2$

D. [Ar] $3d^{10} 4s^2$.

Answer: B

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2. Ag^+ ion is isoelectronic with

A. Cu^+

B. Au^{3+}

C. Zn^{3+}

D. Cd^{2+}.

Answer: D

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3. Which of the following is paramagnetic ?

A. Cu^{2+}

B. Ag^{+}

C. Zn^{2+}

D. Au^{+}

Answer: A

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4. Which of the following ions has smallest radii ?

A. Mn^{2+}

B. Ni^{2+}

C. Ti^{2+}

D. V^{2+}

Answer: B

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5. Which of the following has maximum number of unpaired electrons ?

A. Mg^{2+}

B. Ti^{3+}

C. V^{3+}

D. Fe^{2+}

Answer: D

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6. The colour of d-block elements is due to :

A. nd-(n + 1)s transition

B. nd-(n+1)p transition

C. nd-nd transition

D. nd-(n+1)d transition.

Answer: C

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7. Which ion gives coloured solution ?

A. Zn^{2+}

B. Ti^{4+}

C. Cu

D. V^{3+}

Answer: D

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8. Which of the following is paramagnetic as well as coloured ?

A. Sc^{3+}

B. Ti^{4+}

C. Cu^{2+}

D. Cu^{+}

Answer: C

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9. In which state, the compounds of vandadium are diamagnetic ?

A. V (II)

B. V (III)

C. V (IV)

D. V (V)

Answer: D

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10. Which of the following has lowest magnetic moment ?

A. Cu^{2+}

B. Ni^{2+}

C. Fe^{2+}

D. Cr^{3+}

Answer: A

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11. The maximum oxidation state shown by osmium is :

A. $+6$

B. $+7$

C. $+8$

D. $+5.$

Answer: C

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12. Which of the following does no belong to same group ?

A. Zn, Cd, Hg

B. Cu, Ag, pt

C. Cr, Mo, W

D. Sc, Y, La

Answer: B

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13. Which of the following contain two unpaired electrons ?

A. Ni^{2+}

B. Sc^{3+}

C. Cu^{+}

D. Ti^{3+}

Answer: A

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14. Oxidation state of chromium is CrO_5 is

A. $+6$

B. $+5$

C. $+3$

D. $+10$

Answer: A

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15. The maximum oxidation state shown by Mn in its compounds is :

A. $+4$

B. $+5$

C. $+6$

D. $+7$

Answer: D

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

A. $3d^5 4s^1$

B. $3d^5 4s^2$

C. $3d^2 4s^2$

D. $3d^3 4s^2$

Answer: B

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Multiple Choice Questions Level I Transition Metal Compounds And Their Characteristics

1. Scandium resembles with aluminium in the following properties except :

A. the nature of bonding in both Al^{3+} and Sc^{3+} compounds in mainly ionic

B. both liberate hydrogen vigorously from water

C. both form basic hydroxides

D. both form volatile halides.

Answer: C

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2. The yellow coloured solution of chromate salt changes to orange colour on acidification due to the formation of :

A. Cr^{3+}

B. $Cr_2O_7^{2-}$

C. CrO_4^-

D. Cr_2O_3

Answer: B

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3. MnO_4^- ions can be reduced in strong alkaline medium to give :

A. Mn^{2+}

B. MnO_2

C. MnO_4^{2-}

D. MnO_3^-

Answer: C

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4. $TiCl_4$ fumes strongly in moist air and is hydrolysed by water to give :

A. Ti

B. $TiOCl_2$

C. TiO_2

D. TiO_3^{2-}

Answer: C

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5. Which of the following is an acidic oxide ?

A. Mn_2O_7

B. Mn_2O_3

C. MnO_2

D. MnO.

Answer: A

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6. The brown ring test for nitrites and nitrates is due to the formation of complex of iron with the formula.

A. $\left[Fe(H_2O]_5NO\right]^{2+}$

B. $\left[Fe(H_2O\right]^{2+}$

C. $\left[Fe(H_2O)(NO)_5\right]^{2-}$

D. $\left[Fe(NO)(CN)_5\right]^{2+}$

Answer: A

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7. When $K_2Cr_2O_7$ is heated with conc. H_2SO_4 in the presence of a soluble metal chloride, orange red vapours are produced. These are due to :

A. $CrCl_3$

B. $CrOCl_2$

C. CrO_2Cl_2

D. CrO_4^{2-}

Answer: C

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8. Acidifed $K_2Cr_2O_7$ oxidises H_2S to :

A. SO_2

B. SO_3

C. S

D. $H_2SO_4 + S$

Answer: C

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9. The mass of gold in an 18 carat gold ring of 4 g is

:

A. 4g

B. 3g

C. 2g

D. 1g

Answer: B

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10. Potassium permangante on heating gives :

A. K_2MnO_4, MnO_2, O_2

B. MnO_2, O_3, KOH

C. K_2MnO_4, O_2

D. MnO_2, O_2, KOH

Answer: A

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11. Mn_3O_4 is a mixed oxide of :

A. MnO, Mn_2O_3

B. MnO, MnO_2

C. MnO, MnO_3

D. MnO_2, Mn_2O_3

Answer: B

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12. The reaction

$$MnO_4^- + e^- \rightarrow MnO_4^{2-}$$

occur in

A. a basic medium

B. an acidic medium

C. a neutral medium

D. both acidic and basic medium.

Answer: A

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13. Fe^{2+} and Fe^{3+} can be distinguished by :

A. NH_4SCN

B. $CaCl_2$

C. $AgNO_3$

D. H_2SO_4.

Answer: A

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

A. Mn_2O_3

B. MnO_2

C. MnO_4

D. MnO_4^{2-}

Answer: B

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15. When potassium dichromate crystals are heated with concentrated sulphuric acid, we get :

A. Oxygen

B. Hydrogen

C. Sulphur dioxide

D. Hydrogen sulphide.

Answer: A

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16. Acidified potassium dichromate is treated with hydrogen sulphide, IN this reaction, the oxidation number of chormium :

A. increase from +3 to +6

B. decreases from + 6 to +3

C. remains unchanged

D. decreases from + 6 + 2.

Answer: B

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17. The oxidation states of Mn in K_2MnO_4, $KMnO_4$ and Mn_2O_7 are respectively :

A. $+6+7+8$

B. $+4+6,\ +8$

C. $+6+7+7$

D. $+7+6+7$

Answer: C

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18. In $Cr_2O_7^{2-}$:

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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19. In a redox reaction, how many moles of electrons are accepted by 1 mol of MnO_4^- in acidic medium ?

A. 3

B. 5

C. 43953

D. 6

Answer: B

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20. Cr_2O_3 dissolves in aqueous NaOH in the presence of an oxidant to form :

A. $Cr(OH)_3$

B. CrO_4^{2-}

C. Cr^{3+}

D. $Cr_2O_7^{2-}$

Answer: B

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21. Passivity of iron is due to the formation of a thin layer of :

A. Fe_3O_4

B. Fe_2O_3

C. FeS_2

D. $FeCO_3$.

Answer: A

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22. Two fo the constituents of German silver are :

A. Ag - Cu

B. Ag - Zn

C. Cu - Zn

D. Cu - Mg.

Answer: C

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23. The compound which gives off oxygen on moderate heating is :

A. Cupric oxide

B. Mercuric oxide

C. Zinc oxide

D. Aluminium oxide.

Answer: B

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24. Nessler's reagent is :

A. aqueous K_2Hgl_4

B. K_2Hgl_4 in excess of Kl

C. K_2Hgl_4 in excess of HCl

D. K_2HgL_4 in excess of NH_4OH

Answer: B

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25. The black oxide of copper (CuO) in attacked by moisture and carbon dioxide in air and forms a green film of :

A. $Cu(OH)_2$ and C

B. $Cu(OH)_2 \cdot CuCO_3$

C. $CuCO_3$ and CO_2

D. $Cu(OH)_2 \cdot CuSO_4$

Answer: B

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26. $FeCl_3$ has each of the following characteristics except :

A. it exists as dimer

B. its aqueous solution is basic in nature

C. its is used for stopping from a fresh cut.

D. on heating above 973 K it dissociates to ferrous chloride and gives Cl_2

Answer: B

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27. Thomas slag is :

A. $FeSiO_3$

B. $CaSIiO_3$

C. $Ca_3(PO_4)_2$

D. $MnSiO_3$

Answer: C

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28. Blister copper is :

A. Purest form of copper

B. Ore of copper

C. Impure copper containing about 1 % impurity

D. Alloy of copper.

Answer: C

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29. Iron is obtained on a large scale by reduction of Fe_2O_3 with :

A. CO

B. Al

C. H_2

D. Na

Answer: A

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30. Which of the following ions exist as dimer ?

A. Hg^{2+}

B. Cu^{2+}

C. Hg^{+}

D. Cd^{2+}

Answer: C

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31. KI and $CuSO_4$ solutions when mixed give :

A. $CuI_2 + K_2SO_4$

B. $Cu_2I_2 + K_2SO_4$

C. $Cu_2I_2 + I_2 + K_2SO_4$

D. $K_2SO_4 + CuI_2 + I_2$

Answer: C

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32. Ammonium dichromate is used in fireworks. The green coloured blown in air is :

A. CrO_3

B. Cr_2O_3

C. Cr

D. $CrO(O)_2$

Answer: B

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33. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is :

A. $2/5$

B. $3/5$

C. $4/5$

D. 1

Answer: A

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34. Silica is added to roasted copper ore during smelting in order to remove :

A. cuprous oxide

B. cuprous sulphide

C. ferrous sulphide

D. ferrous oxide.

Answer: A

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35. Iron is rendered passive when treated with conc. :

A. H_2SO_4

B. HCl

C. H_3PO_4

D. HNO_3

Answer: D

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36. The principal oxidation state of lanthanides is :

A. $+3$

B. $+2$

C. $+4$

D. 0

Answer: A

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37. The lanthanoid contraction refers to :

A. valence electrons of the lanthanoid series

B. ionic radius of the series

C. the density of the series

D. nuclear mass of the series.

Answer: B

38. Which of the following is not correct ?

A. The oxides and hydroxides of d-block elements are less basic than those of f-block elements

B. The sizes of the atoms and ions of d-block elements are relatively smaller than those of the f-block elements.

C. the tendency to form complexes of d-block elements is less than that of f-block elements.

D. f-block elements are called inner transition elements.

Answer: C

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39. Which of the following ions is paramagnetic ?

A. La^{3+} (Z = 57)

B. Lu^{3+} (Z = 71)

C. Yb^{2+} (Z = 70)

D. Sm^{3+} (Z = 62)

Answer: D

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40. The separation of landthanoids in ion exchange method is based on :

A. basicity of the hydroxides

B. size of the ions

C. the solubility of their nitrates

D. oxidation state of the ion.

Answer: B

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41. which of the following has the smallest ionic radius ?

A. Nd^{3+}

B. y^{3+}

C. Lu^{3+}

D. Pm^{3+}

Answer: C

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42. Zr and Hf have almost identical atomic radii. Give reason.

A. diagonal relationship

B. similar chemical properties

C. lanthanoid contraction

D. similar electronegativity vlaues.

Answer: C

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43. The colour of lanthoanoids and actinoids is due to :

A. s-f transitions

B. p-f transitions

C. d-f transtition

D. f-f transitions.

Answer: D

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44. Which of the following has tendency to act as an oxidising agent ?

A. Ce^{4+}

B. Sm^{2+}

C. Lu^{3+}

D. Gd^{3+}

Answer: A

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45. Which of the following pairs has almost same colours ?

A. ${}_{60}Nd^{3+} \cdot {}_{69}Tm^{3+}$

B. ${}_{70}Yb^{3+}, {}_{59}Pr^{3+}$

C. ${}_{63}Eu^{2+}, {}_{67}Tb^{3+}$

D. ${}_{64}Gd^{3+}, {}_{67}Ho^{3+}$

Answer: C

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46. Which of the following good oxidising agent ?

A. Eu^{2+}

B. Ce^{4+}

C. Yb^{2+}

D. Sm^{2+}

Answer: B

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47. The major component of alloys of lanthanides is

A. Gd

B. Ce

C. Yb

D. Nd.

Answer: B

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48. The lanthanide contraction is responsible for the fact that

A. Zr and Y have about the same radius

B. Zr and Nb have similar oxidation state

C. Zr and Hf have about the same radius

D. Zr and Zn have the same oxidation state.

Answer: C

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49. The electronic configuration of terbium (IV) (At no. 65) is

A. [Xe] $4f^5 6s^2$

B. [Xe] $4f^7 6s^0$

C. [Xe] $4f^8 6s^0$

D. [Xe] $4f^9 6s^2$

Answer: B

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

A. Lu^{3+} (Z = 71)

B. Sc^{3+} (Z = 21)

C. La^{3+} (Z = 57)

D. Ti^{3+} (Z = 22)

Answer: D

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51. The lanthanoid elements than has the electronic configuration. [Xe] $4f^1 5d^1 6s^2$ is

A. lutetium

B. cerium

C. yterbium

D. gadolinium

Answer: D

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52. Which of the following hydroxide has maximum basic character ?

A. $La(OH)_3$

B. $Pm(OH)_3$

C. $Dy(OH)_3$

D. $Lu(OH)_3$

Answer: A

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53. Which of the following pair of ions have the same colour ?

A. ${}_{58}Ce^{3+}, {}_{63}Eu^{3+}$

B. ${}_{59}Pr^{3+}, {}_{64}Gd^{3+}$

C. ${}_{62}Sm^{3+}, {}_{66}Dy^{3+}$

D. ${}_{71}Lu^{3+}, {}_{69}Tm^{3+}$

Answer: C

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Multiple Choice Questions Level Ii

1. Manganese shows oxidation states from +2 to + 7. the Most strongly oxidising state known in aqueous solution is :

A. $+2$

B. $+3$

C. $+4$

D. $+7$

Answer: D

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2. Which of the following forms a stable + 4 oxidation state ?

A. La (Z = 57)

B. Ce (Z = 58)

C. Eu (Z = 63)

D. Gd (Z = 64)

Answer: B

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3. Which of the following statements concerning transition metal is false ?

A. They are all metals.

B. They easily form complex coordination compounds.

C. Compounds containing their ions are coloured.

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

Answer: D

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4. Which of the following oxidse of chromium is amphoteric in nature ?

A. CrO

B. CrO_3

C. Cr_2O_3

D. CrO_5

Answer: C

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5. The maximum magnetic moment is shown by the ion with the outer electronic configuration of :

A. $3d^6$

B. $3d^9$

C. $3d^5$

D. $3d^4$

Answer: C

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6. Which of the following is not true ? In acidic medium $KMnO_4$ oxidises :

A. sulphur dioxide to sulphur

B. ferrous sulphate to ferric sulphate

C. potassium iodide to iodine

D. oxalic acid to carbon dioxide.

Answer: A

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7. When potassium dichromate is heated with conc. H_2SO_4 and NaCl. Orange vapours are evolved due to :

A. CrO_2Cl_2

B. $CrCl_3$

C. Cl_2

D. CrO_5

Answer: A

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8. When diliute sulphuric acid and hydrogen perioxide are added to a solution of chromate ions, an intense blue colour is produced which is stable in ether. This is due to the formation of :

A. Cr_2O_3

B. $Cr_2O_7^{2-}$

C. CrO_3

D. Cr_2O_5

Answer: D

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9. Amongst the following the lowest digree of paramagnetism per mole of the compound at 298 K will be shown by :

A. $MnSO_4 \cdot 4H_2O$

B. $CuSO_4\& \cdot 5H_2O$

C. $FeSO_4 \cdot 6H_2O$

D. $NSO_4 \cdot 6H_2O$

Answer: B

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10. The magnetic moment of a transition metal ion is found to be 3.87 B.M. It is probably :

A. Fe^{2+}

B. Ti^{3+}

C. Cr^{3+}

D. Ni^{2+}

Answer: C

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11. In acidic medium if potassium permanganate is used as an oxidising agent, we get :

A. MnO_4^{2-}

B. Mn^{2+}

C. MnO_2

D. Mn_2O_3

Answer: B

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12. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is :

A. $2/5$

B. $3/5$

C. $4/5$

D. 1

Answer: A

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13. Which of the following statement (s) is (Are) correct with reference to ferrous and ferric ions ?

A. Fe^{3+} gives brown colour with potassium ferricyanide.

B. Fe^{2+} gives blue colour precipitate with potassium ferricyanide.

C. Fe^{3+} gives black precipitate with potassium thiocynate.

D. Fe^{2+} gives brown colour with ammonium thiocyanate.

Answer: B

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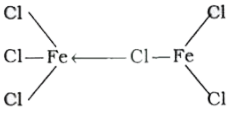
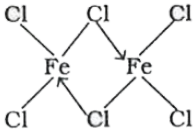
14. The structure of Fe_2Cl_6 is best represented as

:

A. $[FeCl_2]^+[FeCl_4]^-$

B. 

C. 

D. 

Answer: D

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15. Reduction of MnO_4^- in strongly basic medium gives :

A. MnO_2

B. Mn^{2+}

C. MnO_4^{2-}

D. Mn_2O_7

Answer: C

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16. The calculated spin magnetic moment of Fe(II) is :

A. 4.90 B.M.

B. 4.47 B.M.

C. 5.91 B.M.

D. 0

Answer: A

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17. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is :

A. 2

B. 5

C. $2/5$

D. $3/5$

Answer: C

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18. Which of the following statements is incorrect ?

A. Nb is markedly stable in +4 oxidaiton state.

B. Bk in +4 oxidation state is strongly oxidising but more stable than Cm and Am in +4 oxidation state.

C. Uranium can form oxygenated ion such as U_2^{2+}

D. Pu shows oxidation states up to +7.

Answer: A

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19. In case of actinoids, the degree of complex formation decreases as :

A. $M^{4+} > M^{3+} > Mo_2^{2+} > MO_2^+$

B. $M^{3+} > M^{4+} > MO_2^{2+} > MO_2^+$

C. $M^{4+} > MO_2^{2+} > M^{3+} > MO_2^+$

D. $MO_2^{2+} > M^{4+} > MO_2^+ > M^{3+}$

Answer: C

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20. In which of the following pairs, the first ion has larger magnetic moment than the other ?

A. Fe^{3+}, Fe^{2+}

B. Zn^{2+}, CU^{+}

C. Cr^{2+}, Mn^{2+}

D. V^{3+}, Cr^{3+}

Answer: A

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21. Which of the following statements is false ?

A. First ionisation energies of 5d elements are higher than those of 3d and 4d elements.

B. Zr and Hf have similar properties.

C. Cu^{2+} is more stable than Cu^{+}

D. V^{2+} and CO^{3+} have same magnetic moment.

Answer: D

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22. The magnetic moment of Ce^{3+} (Z = 58) on the basis of spin only formula is

A. 0 B.M.

B. 1.732 B.M.

C. 2.45 B.M.

D. 3.87 B.M.

Answer: B

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23. The basic character of transition metal monoxides follow the order :

A. $VO > CrO > TiO > FeO$

B. $CrO > VO > FeO > TiO$

C. $TiO > FeO > VO > CrO$

D. $TiO > VO > CrO > FeO.$

Answer: D

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24. The correct order of ionic radii of Y^{3+}, La^{3+}, Eu^{3+} and Lu^{3+} is :

A. $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$

B. $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$

C. $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$

D. $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$

Answer: B

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25. Lanthanoids are :

A. 14 elements in the seventh period (at. Nos. 90 to 103) that are filling 5f sublevel.

B. 14 elements in the sixth period (at. Nos. 58 to 71) that are fiiling 4f sublevel.

C. 14 elements in the seventh period (atmoic nos. 58 to 71) that are filling 4f sublevel.

D. 14 elements in the sixth period (at nos. 90 to 103) that are filling 4f sublevel.

Answer: C

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26. The number of moles of $KMnO_4$ reduced by one mole of Kl in alkaline medium is :

A. one

B. two

C. five

D. one-fifth.

Answer: A

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27. Four sucessive members of the first two transition elements are listed below with their atomic numbers. Which one of them is expected to have 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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28. The aqueous solution containing which one fo the following ions will be colourless ?

A. Sc^{3+}

B. Fe^{2+}

C. Ti^{3+}

D. Mn^{2+}

Answer: A

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29. Copper sulphate dissolves in excess of KCN to give :

A. $\left[Cu(CN)_4\right]^{3-}$

B. $\left[Cu(CN)_4\right]^{2-}$

C. $Cu(CN)_2$

D. CuCN

Answer: A

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30. Which is not correct about the chemistry of 3d and 4f series elements ?

A. 3d elements show more oxidation states than 4f series.

B. The energy difference between 3d and 4s orbital is very little.

C. Europium (II) is more stable than certum (II).

D. The paramagnetic character in 3d elements increases from scandium to copper.

Answer: D

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31. The approximate percentage of iron in mischmetal is :

A. 10

B. 20

C. 50

D. 5

Answer: D

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32. To an acidic solution of anion a few drops of acidified $KMnO_4$ are added. Which one of the following anions , if present wil not decolourise the $KMnO_4$ solutions ?

A. I^-

B. CO_3^{2-}

C. S^{2-}

D. NO_2^-

Answer: B

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33. The electronic configuration of transition element "X", is +3, oxidation state is $[Ar]3d^5$. What is its atomic number?

A. 25

B. 26

C. 27

D. 24

Answer: B

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34. 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. $3d^5$

C. $3d^8$

D. $3d^2$

Answer: B

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35. Which of the following is amphoteric oxide ?

$Mn_2O_7, CrO_3, Cr_2O_3, CrO, V_2O_3, V_2O_4$

A. V_2O_5, Cr_2O_3

B. Mn_2O_7, CrO_3

C. CrO, V_2O_5

D. V_2O_5, V_2O_4

Answer: A

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

A. [Xe] $4f^7 5d^1 6s^2$

B. [Xe] $4f^6 5d^2 6s^2$

C. [Xe] $4f^8 6d^2$

D. [Xe] $4f^9 5s^1$

Answer: A

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37. $KMnO_4$ acts as an oxidising agent in alkaline medium. When alkaline $KMnO_4$ is treated with KI, iodide ion is oxidised to

A. I_2

B. IO^-

C. IO_3

D. IO_4^-

Answer: C

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38. Although Zirconium belongs to 4d transition series and Hafnium to 5d transition series even then they show similar physical and chemical properties because.

A. both belong to d-block

B. both have same number of electrons

C. both have similar atomic radius

D. both belong to the same group of the periodic table

Answer: C

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39. Why is HCl not used to make the medium acidic in oxidation reactions of $KMnO_4$ in acidic medium ?

A. Both HCl and $KMnO_4$ ct as oxidsing agents.

B. $KMnO_4$ oxidises HCl into Cl_2 which is also an oxidising agent.

C. $KMnO_4$ is a weaker oxidising agent than HCl.

D. $KMnO_4$ acts as a reducing agent in the presence of HCl.

Answer: B

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40. In a reaction K_2MnO_4 is converted into $KMnO_4$ The change in the oxidation number of Mn is :

A. zero

B. $+1$

C. -1

D. $+7$

Answer: B

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41. The stable oxidation state of Ce (Z = 58) is

A. $+4$

B. $+3$

C. $+2$

D. $+5$

Answer: A

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42. In the reaction :

$CrO_4^{2-} + X \rightarrow Cr_2O_7^{2-}$ X is

A. OH^-

B. H_2O

C. H^+

D. O_2

Answer: C

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43. In which of the following pairs, the atomic size is almost the same ?

A. La -Ce

B. Nb - Ta

C. Zr - Hf

D. Nb - Zr.

Answer: B

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44. Which of the following statement is not correct ?

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

B. IN lanthanide series, ionic radius decreases from $La^{3+} \rightarrow Lu^{3+}$ ion.

C. La is actually an elements of transition series rather than lanthanides.

D. Atomic radius of Zr and Hf are same because of lanthanoid contraction.

Answer: A

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45. In the standarization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry , the equivalent weight of $K_2Cr_2O_7$ is

A. mol wt /2

B. mol wt/6

C. mol wt/3

D. same as mol wt.

Answer: B

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46. In the preparation of $KMnO_4$ pyrolusite (MnO_2) is first converted to potassium manganate (K_2MnO_4). In this conversion, the oxidation state off manganese changes from

A. +1 to +3

B. $+2 \rightarrow +4$

C. $+3 \rightarrow 5$

D. $+4 \rightarrow +6$

Answer: D

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47. When I^- is oxidised by MnO_4^- is alkaline medium. I^- converts into

A. IO_3^-

B. I_2

C. IO_4^-

D. IO^-

Answer: A

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48. IN which of the following pairs, both the ions are coloured in aqueous solutions ?

A. Sc^{3+}, Ti

B. Sc^{3+}, Co^{2+}

C. Ni^{2+}, Cu^{+}

D. Ni^{2+}, Ti^{3+}

Answer: D

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49. Which one of the following ions is the most stable in aqueous solutions ?

A. Mn^{3+}

B. Cr^{3+}

C. V^{3+}

D. Ti^{3+}

Answer: B

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50. Which of the following ions has a magnetic moment of 5.93 BM ?

A. Mn^{2+}

B. Fe^{2+}

C. Cr^{2+}

D. V^{3+}

Answer: A

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

A. $+5$

B. $+4$

C. $+7$

D. $+8$

Answer: C

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52. Among the oxides Mn_2O_7 (I), V_2O_3 (II), V_2O_5 , (III) CrO (IV) and Cr_2O_3 (V) the basic oxides are

A. I and II

B. II and III

C. III and IV

D. II and IV

Answer: D

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53. Which of the following pairs has the same size ?

A. Zr^{4+}, Hf^{4+}

B. Zn^{2+}, Hf^{4+}

C. Fe^{2+}, Ni^{2+}

D. Zr^{4+}, Ti^{4+}

Answer: A

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54. All Cu(II) halides are known except the iodide. The reason for is that

A. iodine is a bulky ion

B. Cu^{2+} oxidizes iodide to iodine

C. Cu^{2+} has much more negative hydration enthalpy

D. Cu^{2+} ion has smaller size

Answer: B

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55. The transition metal ion that has 'spin-only' magnetic moment value of 5.96 is

A. Mn^{2+}

B. Fe^{2+}

C. V^{2+}

D. Cu^{2+}

Answer: A

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56. The yellow precipitate formed during the chromyl chloride test in chemically

A. chromic acid

B. lead chromate

C. lead acetate

D. sodium chromate

Answer: B

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57. By passing Na_2SO_3 to the solution of $K_2Cr_2O_7$, it turns green due to the formation of

A. $Cr_2(SO_4)_3$

B. CrO_4^{2-}

C. $Cr_2(SO_3)_3$

D. $CrSO_4$

Answer: A

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58. For the four successive transition elements [Cr, Mn, Fe and CO) the stablility of +2 oxidation states will be there in which of the following order ?

A. $Mn > Fe > Cr > CO$

B. $Fe > Mn > Co > Cr$

C. $Co > Mn > Fe > Cr$

D. $Cr > Mn > Co > Fe$

Answer: A

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59. Which of the following 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 $K_2Cr_2O_7$ in 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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60. The correct order of increasing oxidizing power in the series is

A. $VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$

B. $Cr_2O_7^{2-} < Vo_2 < MnO_4$

C. $Cr_2O_7^{2-} < MnO_4 < VO_2$

D. $MnO_4 < Cr_2O_7 < VO_2$

Answer: A

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61. The bonds present in the structure of dichromate ion are

A. four equivalent Cr - O bonds only

B. Six equivalent Cr- O bonds and one O-O bond

C. six equivalent Cr-O bonds and one Cr -Cr bond

D. six equivalent Cr -O bonds and one Cr - O - Cr bond

Answer: D

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62. The radius of La^{3+} (At No. of La = 57) is 1.06Å. Which one of the following given value will be closest to the radius fo Lu^{3+} (Atomcic NO. of Lu = 71) ?

A. $1 \cdot 40Å$

B. $1 \cdot 06Å$

C. $0 \cdot 85Å$

D. $1 \cdot 60Å$

Answer: C

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

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

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

C. The common oxidation states of cerium are +3 and +4.

D. Cerium (IV) acts as an oxidising agent.

Answer: C

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64. Explain why the members of the actinoid series exhibit a large number of oxidation states than the corresponding members of the lanthanoid series.

A. more energy differen ce between 5f and 6d orbitals than between 4f and 5d orbitals.

B. lesser energy difference between 5f and 6d orbitals than between 4f and 5d orbitals.

C. larger atomic size of actinoids than the lanthanoids.

D. greater reactive nature of actinoids than the lanthanoids.

Answer: B

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65. The oxidation state of final product formed by the reaction between Kl and acidifed potassium dichromate solution is :

A. $+4$

B. $+6$

C. $+2$

D. $+3$

Answer: D

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Multiple Choice Questions Level Iii

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

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

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

C. In the highest oxidation states of the first five transition elements (Sc to Mn). All the 4 s

and 3d electrons are used for bonding

D. Once the d^5 configuration is exceeded. The tendency to involve all the 3d electrons in bonding decreases.

Answer: B

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

A. $Fe > Mn > Cr > Co$

B. $Cr > Mn > Fe > Co$

C. $Mn > Cr > Fe > Co$

D. $Cr > Fe > Mn > Co$

Answer: C

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3. The outer electronic configuration of Gd (Atomic No:64) is :

A. $4f^4 5d^4 6s^2$

B. $4f^7 5d^1 6s^2$

C. $4f^3 5d^5 6s^2$

D. $4f^6 5d^0 6s^2$

Answer: B

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4. IN context of the lanthanoids, which of the following statements is not correct ?

A. Because of similar properties the seperation of lanthanoids is not easy.

B. Availability of 4f electrons results in the formation of compounds in +4 state for all the members of the series.

C. There is a gradual decrease in the radii of the members with increasing atomic number in the series.

D. All the members exhibit +3 oxidation state.

Answer: B

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5. Iron exhibits +2 and +3 oxidation states. Which of the following statements about iron is incorrect ?

A. Ferrous compounds are more easily hydrolysed than the corresponding ferric compounds

B. Ferrous oxide is more basic in nature than the ferric oxide.

C. Ferrous compounds are relatively more ionic than the corresponding ferric componds.

D. Ferrous compounds are less volatile than the corresponding ferric compounds.

Answer: A

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6. Which of the following arrangements does not represent the correct order of the property stated against it ?

A. $V^2 < Cr^{2+} < Mn^{2+} < Fe^{2+}$: paramagnetic behaviour

B. $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2+}$: ionic size

C. $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in aqueous solution.

D. $Sc < ti < Cr < Mn$: number of oxidation states.

Answer: A

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7. Which series of reactions correctly represents chemical reactions related to iron and its compound ?

A.

$$Fe \xrightarrow{\text{dil.}\,H_2SO_4} FeSO_4 \xrightarrow{H_2SO_4 \cdot O_2} Fe_2(SO_4) \xrightarrow{\text{heat}} Fe$$

B. $Fe \xrightarrow{O_2\text{heat}} FeO \xrightarrow{\text{dil.}\,H_2SO_4} FeSO_4 \xrightarrow{\text{heat}} Fe$

C. $Fe \overset{Cl_2\text{heat}}{F} eCl_3 \xrightarrow{\text{heat.air}} FeCl_2 \xrightarrow{Zn} Fe$

D. $Fe \xrightarrow{O_2\text{heat}} Fe_3O_4 \xrightarrow{\text{Co.}500^\circ C} FeO \xrightarrow{C \odot 700^\circ C} Fe$

Answer: D

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8. The color of $KMnO_4$ is due to :

A. $M \rightarrow L$ charge transfer

B. d-d transition

C. $L \rightarrow M$ charge transfer transition

D. $\sigma - \sigma^{\cdot}$ transition.

Answer: C

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Recent Examination Questions

1. MnO_4^- ions are reduced in acidic condition to Mn^{2+} ions whereas they are reduced in neutral condition to MnO_2. The oxidataion of 25 mL of a solution X containing Fe^{2+} ions required in acidic medium 20 mL of a solution Y containing MnO_4^- ions. What volume of solution Y would be required to oxidise 25 mL of solution Y containing Fe^{2+} ions in neutral condition ?

A. 11.4 mL

B. 12.0 mL

C. 33.3 mL

D. 25.0 mL

Answer: C

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2. The spin only magnetic moment of Mn^{4+} ion is nearly

A. 3BM

B. 6 BM

C. 4 BM

D. 5 BM

Answer: C

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3. In chromite are , the oxidation number of iron and chromium respectively .....

A. $+3, +2$

B. $+3+6$

C. $+2, +6$

D. $+2, +3$

Answer: D

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4. In a transition series, with the increase in atomic number, the paramagnetism

A. increases gradually

B. decreases gradually

C. first increases to a maximum and then decreases

D. first decreases to a maximum and then increases

Answer: C

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5. $50cm^3$ of 0.04 M $K_2Cr_2O_7$ in acidic medium oxidizes a sample of H_2S gas to sulphur. Volume of 0.03 $MKMnO_4$ required to oxidize the same amount of H_2S gas to sulphur, in acidic medium is

A. $60cm^3$

B. $80cm^3$

C. $90cm^3$

D. $120cm^3$

Answer: B

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6. A crystalline solid X reacts with dil HCI to liberate a gas Y. Y decolourises acidified KMnO4. When a gas 'Z' is slowly passed into an aqueous solution of Y, colloidal sulphur is obtained. X and Z could be, respectively

A. $Na_2S.\ SO_3$

B. $Na_2SO_4.\ H_2S$

C. $Na_2SO_3.\ H_2S$

D. $Na_2SO_4,\ SO_2$

Answer: C

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7. The electronic configuration of Gd^{2+} is (at.no.Gd is 64)

A. [Xe] $4f^7 5d^1 6s^2$

B. [Xe] $4f^8$

C. [Xe] $4f^7 5d^1$

D. [Xe] $4f^7$

Answer: C

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8. On heating potassium permanganate, one of the following compound is not obtained :

A. MnO_2

B. O_2

C. K_2MnO_4

D. MnO.

Answer: D

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9. A transition element with atomic number 24 will have its magnetic moment :

A. 5.92 B.M

B. 6.93 B.M

C. It will be diamagnetic

D. It will be more than 8 B.M.

Answer: B

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10. In tetrahedral permagnate ion π bonding type between metal and oxygen is :

A. $p^{\pi} - p^{\pi}$

B. $d^{\pi} - p^{\pi}$

C. $d^{\pi} - d^{\pi}$

D. $d^{\pi} - S$

Answer: B

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11. Which of the following pairs has the same size ?

A. Fe^{2+}, Ni^{2+}

B. Zr^{4+}, Ti^{4+}

C. Zr^{4+}, Hf^{4+}

D. Zn^{2+}, Hf^{4+}

Answer: C

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