8.THE D-AND F-BLOCK ELEMENTS

Single Correct Answer Type

1. On strongly heating $AgNO_3$ we get:

   a) $AgNO_2$ b) Silver nitride c) Ag d) Ag_2O

2. Transition metals in their compounds show:

   a) Ionic bonds

   b) Covalent bonds

   c) Ionic and covalent bonds

   d) Ionic and coordinate bonds

3. $4K_2Cr_2O_7 \xrightarrow{Heat} 4K_2CrO_4 + 3O_2 + X$ In the above reaction, X is

   a) CrO_3 b) Cr_2O_7 c) Cr_2O_3 d) CrO_5

4. Cynaide process is used for the extraction of

   a) Au b) Ag c) Cu d) Both (a) and (b)

5. The colour of zinc sulphide is:

   a) Yellow b) White c) Brown d) Black

6. The metal extracted by cyanide process is

   a) Silver b) Copper c) Iron d) Sodium

7. Which metal gives hydrogen gas on heating with hot concentrated alkali?

   a) Ag b) Ni c) Zn d) Cu

8. Which of the following metal ions is not coloured?

   a) Ti^{3+} b) Fe^{3+} c) V^{2+} d) Zn^{2+}

9. The process of extraction of Au and Ag ores is based on their solubility in:

   a) NH_3 b) HCl c) HNO_3 d) KCN

10. In the process of extraction of gold,
    Roasted gold ore
    $+CN^- + H_2O + O_2 \xrightarrow{} [X] + OH^-$
    $[X] + Zn \longrightarrow [Y] + Au$
    Identify the complexes $[X]$ and $[Y]$

    a) $X = [Au(CN)_2]^-, Y = [Zn(CN)_4]^{2-}$ b) $X = [Au(CN)_4]^{3-}, Y = [Zn(CN)_4]^{2-}$

    c) $X = [Au(CN)_2]^-, Y = [Zn(CN)_6]^{4-}$ d) $X = [Au(CN)_4]^-, Y = [Zn(CN)_4]^{2-}$

11. To dissolve argentite ore which of the following is used?

    a) $Na[Ag(CN)_2]$ b) $NaCN$ c) $NaCl$ d) HCl

12. The magnetic moment μ, of transition metals is related to the number of unpaired elelctrnos n as

a) $\mu = n(n+2)^2$ b) $\mu = n^2(n+2)$ c) $\mu = \frac{n}{(n+2)}$ d) $\mu = \sqrt{n(n+2)}$

13. Melting of Zn metal and then pouring it into cold water gives:

a) Zn dust b) Granulated Zn c) Hard Zn metal d) Soft Zn metal

14. Percentage of gold in Fool's gold is

a) Zero b) 8 c) 16 d) 30

15. Copper sulphate is commercially made from copper scrap by:

a) Dissolving in hot concentrated sulphuric acid

b) Action of dilute sulphuric acid and air

c) Heating with sodium sulphate

d) Heating with sulphur

16. Which of the following compounds has colour but no unpaired electrons?

a) $KMnO_4$

b) K_2MnO_4

c) $MnSO_4$

d) $MnCl_2$

17. Mercury forms amalgams with all except:

a) Al b) Zn c) Ni d) Fe

18. Granulated Zn is obtained by:

a) Suddenly cooling molten Zn

b) Adding molten Zn to water

c) Heating Zn 100 to 150°C

d) Dropping molten Zn drop by drop

19. In the first transition series, the differentiating electron enters:

a) $5d$-orbital b) $4d$-orbital c) $3d$-orbital d) $2d$-orbital

20. Identity the ore not containing iron.

a) Limonite b) Siderite c) Carnallite d) Chalcopyrites

21. Purest form of iron is

a) Cast iron b) Pig form c) Wrought iron d) Steel

22. Which metal adsorbs hydrogen?

a) Pd b) K c) Al d) Zn

23. The most abundant ore of iron is:

a) Haematite b) Limonite c) Magnetite d) Siderite

24. Metallic silver may be obtained from $AgCl$ by

a) Heating it in the current of H_2
b) Fusing it with sand
c) Treating with carbon monoxide
d) Fusing it with Na_2CO_3

25. Choose the correct statement.

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 show inert pair effect.

26. Bessemer's converter is used in the manufacture of:

a) Cast iron
b) Pig iron
c) Steel
d) Wrought iron

27. Number of electrons present in the outermost orbit of Fe atom is:

a) 3
b) 1
c) 2
d) 4

28. Which will reduce acidified potassium dichromate solution?

a) Potash alum
b) Mohr's salt
c) Chile saltpetre
d) White vitriol

29. The lanthanoids contraction relates to

a) Atomic radii
b) Atomic as well as M^{3+} radii
c) Valence electrons
d) Oxidation states

30. Transition metals show paramagnetism due to

a) High lattice energy
b) Characteristics configuration
c) Variable oxidation states
d) Unpaired electrons

31. 'Mercury' tree can be prepared:

a) By mixing up mercuric thiocyanate and gum
b) By adding Nessler's reagent to a ammonium salt solution
c) By pouring little mercury into $AgNO_3$ solution
d) By heating mercuric chloride

32. When excess of $SnCl_2$ is added to a solution of $HgCl_2$, a white ppt. turning to grey is obtained. This grey colour is due to the formation of:

a) Hg_2Cl_2
b) $SnCl_4$
c) Sn
d) Hg_2

33. Among the following, the compound that is both paramagnetic and coloured is

a) $(NH_4)_2(TiCl_6)$
b) $K_2Cr_2O_7$
c) $K_3[Cu(CN)_4]$
d) $VOSO_4$

34. All the metals form oxides of the type MO except

a) Copper
b) Barium
c) Silver
d) Lead

35. Cinnabar is an ore of:

a) Lead b) Zinc c) Silver d) Mercury

36. Heating mixture of Cu_2O and Cu_2S will give

a) Cu_2SO_3 b) $CuO+CuS$ c) $Cu+SO_3$ d) $Cu+SO_2$

37. The substance that sublimes on heating is:

a) $MgCl_2$ b) AgCl c) $HgCl_2$ d) NaCl

38. Actinides

a) Have variable valency b) Include element 12

c) Are all synthetic elements d) Have only short lived isotopes

39. The $3d$-transition series contains elements from atomic number:

a) 22 to 30 b) 21 to 30 c) 21 to 31 d) 21 to 29

40. Which of the following is not a characteristic of transition elements?

a) Variable oxidation states b) Formation of coloured compounds

c) Formation of interstitial compounds d) Natural radioactivity

41. An element which is highly toxic for plants and animals is:

a) Au b) Mn c) Hg d) Ca

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

a) Nitrogen b) Oxygen c) CO_2 d) Ar

43. Calamine is

a) $CaCO_3$ b) $MgCO_3$ c) $ZnCO_3$ d) $CaCO_3+CaO$

44. Which series of elements have nearly the same atomic radii?

a) F, Cl, Br, I b) Na, K, Rb, Cs c) Li, Be, B, C d) Fe, Co, Ni, Cu

45. Which transition elements exhibit +8 oxidation states?

a) Cu, Zn b) Ru, Os c) Ag, Au d) Cu, Cr

46. When $I^{-¿¿}$ is oxidized by $MnO_4^{-¿¿}$ in alkaline medium, $I^{-¿convets\ into¿}$

a) $IO_3^{-¿¿}$ b) I_2 c) $IO_4^{-¿¿}$ d) $IO^{-¿¿}$

47. Which of the following compounds is used as the starting material for the preparation of potassium dichromate?

a) $K_2SO_4.Cr_2(SO_4)_3.24H_2O$ (Chrome alum)

b) $PbCrO_4$ (Chrome yellow)

c) $FeCr_2O_4$ (Chromite)

d) $PbCrO_4.PbO$ (Chrome red)

48. Which metal makes steel suitable for cutting purposes by maintaining the cutting edge of the blade?

a) Mn b) Al c) W d) C

49. Which form of iron is least ductile?

a) Hard steel b) Cast iron c) Mild steel d) Wrought steel

50. Amalgams are:

a) Always solid

b) Highly coloured alloys

c) Alloys which contain mercury as one of the contents

d) Compounds of mercury

51. Which of the following is a poison?

a) Hg_2Cl_2 b) $BaSO_4$ c) $HgCl_2$ d) $NaHCO_3$

52. Addition of high proportions of manganese makes steel useful in making rails of rail roads because manganese ;

a) Gives hardness to steel and can remove oxygen and sulphur

b) Helps the formation of oxides of iron

c) Can show highest oxidation state of +7

d) None of the above

53. Pick out the correct statements from the following.

I. Cobalt (III) is more stable in octahedral complexes.
II. Zinc forms coloured ions or complexes.
III. Most of the d-block elements and their compounds are ferromagnetic.
IV. Osmium shows (VIII) oxidation state.
V. Cobalt (II) is more stable in octahedral complexes.

a) 1 and 2 b) 1 and 3 c) 2 and 4 d) 1 and 4

54. Ferrous sulphate on heating gives:

a) SO_3 b) SO_2 c) Fe_2O_3 d) All of these

55. Hydrometallurgy is based on

a) Calcination b) Roasting c) Oxidation d) Reduction

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

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

b) In the highest oxidation state, the transition metal shows basic character and form cationic complexes.

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

d) Once the d^5 configuration is exceeded, the tendency to involve all the $3d$ electrons in bonding decreases.

57. Which one of the following pairs of elements is called 'chemical twins' because of their very similar chemical properties?

a) Mn and W b) Mo and Tc c) Fe and Re d) Hf and Zr

58. Which one of the following exist in the oxidation state other than +3?

a) B b) Al c) Ce d) Ga

59. Excess of KI reacts with $CuSO_4$ solution and then $Na_2S_2O_3$ solution is added to it. Which of the statement is incorrect for this reaction?

a) CuI_2 is formed b) $Na_2S_2O_3$ is oxidised c) Cu_2I_2 is formed d) Evolved I_2 is reduced

60. Which is formed when iron reacts with carbon?

a) FeC_2 b) Fe_3C c) FeC_3 d) Fe_2C

61. From sodium agrentocyanide $Na[Ag(CN)_2]$, silver is precipitated by adding a powder of:

a) Tin b) Zinc c) Mercury d) Calcium

62. Which is used for electrical purposes?

a) German silver b) Beryllium bronze c) Constantan d) Fool's gold

63. Monel metal is an alloy of?

a) Cu, Ni, Fe, Mn b) Cu, Sn, Zn c) Cu, Sn, P d) Cu, Zn

64. Which metal is not used for making coins?

a) Gold b) Silver c) Nickel d) Tungsten

65. Which is not true?

a) ZnS is white solid which turns yellow on exposure to light

b) ZnS is precipitated on passing H_2S to aqueous Na_2ZnO_2

c) Basic zinc carbonate is $ZnCO_3.3Zn(OH)_2$

d) $HgCl_2$ reacts with NH_3(g) to give [$Hg(NH_3)_4$¿Cl_2

66. Gold is extracted by hydrometallurgical process, based on its property

a) Of being electropositive b) Of being less reactive

c) To form complexes which are water soluble d) To form salts which are water soluble

67. Which is less reactive?

a) Fe b) Ni c) Pt d) Co

68. Thermal decomposition of zinc nitrate gives:

a) Zn b) ZnO c) $Zn(NO_2)_2$ d) NO

69. Copper nitrate on strongly heating gives:

a) Cu b) Cupric oxide c) Cuprous oxide d) cupric nitrate

70. Which compound is used as a purgative in medicine?

a) $HgCl_2$ b) Hg_2Cl_2 c) CuCl d) $CuCl_2$

71. Correct formula of calomel is

a) $HgCl_2$ b) $HgCl_2.H_2O$ c) Hg_2Cl_2 d) $HgSO_4$

72. The reaction of $K_2Cr_2O_7$ with NaCl and conc H_2SO_4 gives

a) CrO_2Cl_2 b) Cr_2O_3 c) $CrCl_3$ d) $CroCl_2$

73. A compound in which a metal ion M^{x+}¿¿(Z=25) has a spin only magnetic moment of $\sqrt{24}$BM. The number of unpaired electrons in the compound and the oxidation state of the metal ion are respectively.

a) 4 and 2 b) 5 and 3 c) 3 and 2 d) 4 and 3

74. From an aqueous solution of zinc sulphate, normal zinc carbonate may be precipitated by:

a) Passing CO_2

b) Warming with $NaHCO_3$

c) Adding Na_2CO_3

d) Boiling with $CaCO_3$

75. The catalyst used for the hydrogenation of vegetable oils for making margarine is:

a) Cu b) Na c) Ni d) Zn

76. Which of the following compound is expected to be coloured?

a) Ag_2SO_4 b) CuF_2 c) MgF_2 d) $CuCl$

77. Copper can be extracted from:

a) Kupfer-nickel b) Dolomite c) Malachite d) Galena

78. Refining of impure copper with zinc impurity is to be done by electrolysis using electrodes as

	Cathode	Anode
a)	Pure copper	Pure zinc
b)	Pure zinc	Pure copper
c)	Pure copper	Impure copper
d)	Pure zinc	Impure zinc

79. Molten Ag absorbs about …… times of O_2:

a) 10 b) 20 c) 40 d) 80

80. Which of the following ion is diamagnetic?

a) $Nd^{3+¿¿}$ b) $La^{3+¿¿}$ c) $Tb^{3+¿¿}$ d) $Er^{3+¿¿}$

81. A red solid is insoluble in water. However, it becomes soluble if some KI is added to water. Heating the red solid in a test tube results in liberation of some violet coloured fumes and droplets of a metal appear on the cooler parts of the test tube. The red solid is

a) $(NH_4)_2Cr_2O_7$ b) HgI_2 c) HgO d) Pb_3O_4

82. Of the following outer electronic configurations of atoms, the highest oxidation state is achieved by which one of them?

a) ¿ b) $(n-1)d^5, ns^1$ c) $(n-1)d^3, ns^2$ d) $(n-1)d^5, ns^2$

83. The oxidation number of Mn in the product of alkaline oxidative fusion of MnO_2 is

a) 2 b) 3 c) 4 d) 6

84. Iron sheets are galvanized mainly to:

a) Harden the surface

b) Increase lustre

c) Prevent action of water

d) Prevent action of oxygen and water

85. Copper metal is not used:

a) In taps and water connections

b) As an alloy in high speed drills

c) In electric motor coils

d) In brass utensils

86. In the equation,
$4M + 8CN^{-} + 2H_2O + O_2 \longrightarrow 4[M(CN)_2]^{-} + 4OH^{-}$
Identify the metal M
a) Copper b) Iron c) Silver d) Zinc

87. Vapour phase refining of nickel is carried out by using

a) I_2 b) Cl_2 c) HCl d) CO

88. Lanthanide contraction is due to increase in

a) Shielding by $4f$-electrons b) Atomic number

c) Effective nuclear charge d) Size of $4f$-orbitals

89. Which of the following ions is coloured?

a) Cu^{+} b) Cu^{2+} c) V^{5+} d) Ti^{4+}

90. Pig iron:

a) Contains carbon and other impurities

b) Is pure form of iron

c) Is same as wrought iron

d) Is same as steel

91. In aqueous solution Eu^{2+} ion acts as

a) An oxidizing agent b) A reducing agent c) An acid d) All of these

92. Transition elements form complexes because of:

a) Small cation size b) Vacant d-orbitals c) Large ionic charge d) All are correct

93. Philosopher's wool on heating with BaO at 1100° C produce

a) $Ba + ZnCl_2$ b) $BaCdO_2$ c) $BaZnO_2$ d) $BaO_2 + Zn$

94. Which of the following trivalent ion has the largest atomic radii in the lanthanide series?

a) Ce b) Pm c) La d) Lu

95. Ferrous ion changes to X ion, on reacting with acidified hydrogen peroxide. The number of d-electrons present in X and its magnetic moment (in BM) are, respectively
a) 6 and 6.93 b) 5 and 5.92 c) 5 and 4.9 d) 4 and 5.92

96. Which of the following is amphoteric oxide?

a) SO_2 b) B_2O_3 c) ZnO d) Na_2O

97. The valence shell electronic configuration of Cr^{2+} ion is

a) $4s^0 3d^4$ b) $3p^6 4s^2$ c) $4s^2 3d^2$ d) $4s^2 3d^0$

98. Which of the following ore is an ore of copper?

a) Argentite b) Haematite c) Malachite d) Calamine

99. Chinese white is:

a) ZnS b) $ZnCO_3$ c) $ZnS + BaSO_4$ d) ZnO

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

a) The common oxidation states of cerium are +3 and +4

b) Cerium (IV) acts as an oxidizing agent

c) The +4 oxidation state of cerium is not known in solutions

d) The +3 oxidation state of cerium is more stable than the +4 oxidation state

101. If orange-red colour is absorbed from white light, the observed colour is:

a) Yellow b) Orange c) Blue d) Violet

102. Which forms interstitial compounds?

a) Fe b) Ni c) Co d) All of these

103. Steel that is resistant to acids is:

a) Carbon steel b) Molybdenum steel c) Stainless steel d) Nickel alloy steel

104. Hardness of transition elements is due to:

a) Large atomic size

b) Metallic bonding

c) Covalent bonds

d) High ionization energy

105. Which does not possess allotropic forms?

a) C b) Sn c) Fe d) P

106. When hydrogen peroxide is added to acidified potassium dichromate, a blue colour is produced due to formation of

a) CrO_3 b) Cr_2O_3 c) CrO_5 d) CrO_4^{2-}

107. In the extraction of Ag, Ag_2S is dissolved in:

a) HCl b) HNO_3 c) KCN d) H_2SO_4

108. The meniscus of mercury in a glass tube is:

a) Convex upwards b) Concave c) Plane d) Convex inwards

109. The iron obtained from the blast furnace is called:

a) Pig iron b) Cast iron c) Wrought iron d) Steel

110. Which one of the following has strongest metallic bonding?

a) Fe b) Sc c) V d) Cr

111. The alloy which contains nickel is:

a) Brass b) Bell metal c) Bronze d) German silver

112. A hard and resistant alloy generally used in tip of nib of pen is:

a) Os, Ir b) Pt, Cr c) V, Fe d) Fe, Cr

113. The extraction of which of the following metals involves bessemerization?

a) Fe b) Ag c) Al d) Cu

114. CuCl absorbs

a) CO_2 b) SO_2 c) H_2SO_4 d) CO

115. CrO_3 dissolves in aqueous NaOH to give

a) $CrO_4^{2-¿¿}$ b) $Cr(OH)_3^{-¿¿}$ c) $CrO_7^{2-¿¿}$ d) $Cr(OH)_2$

116. One of the following metals is obtained by leaching its ore with dilute cyanide solution. Identify it.

a) Titanium b) Vanadium c) Silver d) Zinc

117. German silver alloy contains

a) Zinc, silver and copper b) Nickel ,silver and copper

c) Germanium ,silver and copper d) Zinc, nickel and copper

118. Copper metal of high purity is obtained by:

a) Carbon reduction b) Hydrogen reduction c) Electrolytic method d) Thermite process

119. The solubility of silver bromide in hypo solution is due to the formation of :

a) Ag_2SO_3 b) $Ag_2S_2O_3$ c) $[Ag(S_2O_3)¿$ d) $[Ag(S_2O_3)_2¿❑^3$

120. Which of the following is a ferrous alloy?

a) Invar b) Solder c) Magnalium d) Type metal

121. Consider the following statements.

(I) $La(OH)_3$ is the least basic among hydroxides of lanthanides

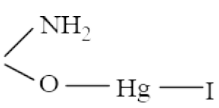
(II) $Zr^{4+¿¿}$ and $Hf^{4+¿¿}$ possess almost the same ionic radii

(III) $Ce^{4+¿¿}$ can act as an oxidizing agent

Which of the above is/are true?

a) (I) and (III) b) (II) and (III) c) (II) only d) (I) only

122. Iodide of Millon's base is:

a) $K_2[HgI_4]$ b)  c) $[Hg_2O.NH_2OH].H_2($ d) $Hg(NH_2)I+Hg$

123. The alloy of steel that is used for making automobile parts and utensils is:

a) Stainless steel b) Nickel steel c) Tungsten steel d) Chromium steel

124. Which is used as substitute for platinum in jewellery?

a) Rolled gold b) White gold c) Purple of Cassius d) Faraday's gold

125. The highest oxidation state exhibited by transition metals is

a) +7 b) +8 c) +6 d) +5

126. $Cl_2 + HgO \longrightarrow ?$

a) $Cl_2O + HgCl$ b) $Cl_2O + HgCl_2$ c) $ClO + HgCl$ d) $ClO + HgCl_2$

127. The following two reactions HNO_3 with Zn are given as (equations are not balanced)

$Zn + conc.\ HNO_3 \longrightarrow Zn(NO_3)_2 + X + H_2O(A)$

$Zn + dil.\ HNO_3 \longrightarrow Zn(NO_3)_2 + Y + H_2O(B)$

In reactions A and B, the compounds X and Y respectively, are

a) $NO_2 \wedge NO$ b) $NO_2 \wedge NO_2$ c) $NO \wedge NO_2$ d) $NO_2 \wedge NH_4NO_3$

128. Which of the following electronic configurations belong to transition elements?

a) KL $3s^2 p^6 d^5, 4s^1$

b) KL $3s^2 p^6 d^{10}, 4s^2 p^3$

c) KL$3s^2 p^6 d^{10}, 4s^2 4p^1$

d) KLM$4s^2 p^6 d^{10}, 5s^2 5p^1$

129. The magnetic moment of a transition metal ion is $\sqrt{15}$BM. Therefore, the number of unpaired electrons present in it, is

a) 3 b) 4 c) 1 d) 2

130. Which is not true in case of transition metals?

a) They are malleable and ductile

b) They have high melting and boiling points

c) They crystallise with body centred cubic and hexagonal close packed structure only

d) They show variable oxidation states although not always

131. Formation of coloured solution is possible when metal ion in the compound contains

a) Paired electrons b) Lone pair of electrons

c) Unpaired electrons d) None of these

132. Carbon in wrought iron is present as

a) Silicon carbide b) Iron carbide

c) Graphite d) Partly iron carbide and partly as graphite

133. An element is in $M^{3+¿¿}$ form. Its electronic configuration is $[Ar]3d^1$, the ion is

a) $Ca^{2+¿¿}$ b) $Sc^{+¿¿}$ c) $Ti^{4+¿¿}$ d) $Ti^{3+¿¿}$

134. Each transition series contains:

a) 12 elements b) 10 elements c) 14 elements d) 8 elements

135. Lanthanide contraction is caused due to

a) The appreciable shielding on outer electrons by $4f$-electrons from the nuclear charge.

b) The appreciable shielding on outer electrons by $5d$-electrons from the nuclear charge.

c) The same effective nuclear charge from Ce to Lu.

d) The imperfect shielding on outer electrons by $4f$-electrons from the nuclear charge.

136. The properties of Zr and Hf are similar because

a) Both belong to d-block

b) Both belong to same group of Periodic Table

c) Both have similar radii

d) Both have same number of electrons

137. In nitroprusside ion, the iron and NO exist as Fe^{11} and $NO^{+¿¿}$ rather than Fe^{III} and NO. These forms can be differentiated by :

a) Estimating the concentration of iron

b) Measuring the concentration of $CN^{-¿¿}$.

c) Measuring the solid state magnetic moment

d) Thermally decomposing the compound

138. Railway wagon axles are made by heating rods of iron embedded in charcoal powder. The process is known as

a) Case hardening b) Tempering c) Sheradizing d) Annealing

139. A substance which is not paramagnetic is:

a) $Cr(ClO_4)_3$ b) $KMnO_4$ c) $TiCl_3$ d) $VOBr_2$

140. Which pair of compounds is expected to show similar colour in aqueous medium?

a) $FeCl_3 \wedge CuCl_2$ b) $VOCl_2 \wedge CuCl_2$ c) $VOCl_2 \wedge FeCl_2$ d) $FeCl_2 \wedge MnCl_2$

141. Lunar caustic is chemically:

a) Silver chloride b) Silver nitrate c) Sodium hydroxide d) Potassium nitrate

142. Lanthanoids and actinoids resembles in:

a) Electronic configuration

b) Oxidation state

c) Ionisation energy

d) Formation of complex

143. Horn silver is:

a) AgCl b) Ag_2S c) SnS d) $AgNO_3$

144. Silver nitrate solution gives a red precipitate with:

a) Sodium iodide b) Potassium chloride c) Calcium nitrate d) Sodium chromate

145. Of the following outer electronic configurations of atoms, the highest oxidation state is achieved by which one of them?

a) $(n-1)d^8ns^2$ b) $(n-1)d^5ns^1$ c) $(n-1)d^3ns^2$ d) $(n-1)d^5ns^2$

146. Powdered silver ore is treated with NaCN solution and air is bubbled through the mixture to give:

a) AgCN b) Ag c) $Ag(CN)_2$ d) $Na[Ag(CN)_2]$

147. Chromium has most stable oxidation state of:

a) +5 b) +3 c) +2 d) +4

148. Cuprous salts are generally colourless while cuprous oxide is:

a) Green b) Blue c) Red d) Yellow

149. Which of the following manganese oxide is amphoteric?

a) MnO_2 b) Mn_2O_3 c) Mn_2O_7 d) MnO

150. Impurities of Cu and Ag from gold are removed by

a) Boiling impure gold with dil.H_2SO_4 b) Boiling impure gold with conc.H_2SO_4

c) Electrolytically d) Both (b) and (c)

151. Identify the incorrect statement among the following

a) d-block elements show irregular and erratic chemical properties among themselves. b) La and Lu have partially filled d-orbitals and no other partially filled orbital.

c) The chemistry of various lanthanoids is very similar. d) $4f$ and $5f$-orbitals are equally shielded.

152. Which of the following ions form most stable complex compound?

a) $Mn^{2+¿¿}$ b) $Ni^{2+¿¿}$ c) $Fe^{2+¿¿}$ d) $Cu^{2+¿¿}$

153. Silver halides are used in photography because they are:

a) Photosensitive

b) Soluble in hyposolution

c) Soluble in NH_4OH

d) Insoluble in acids

154. $(NH_4)_2Cr_2O_7$ on heating gives a gas which is also given by

a) Heating NH_4NO_2 b) Heating NH_4NO_3 c) $Mg_3N_2+H_2O$ d) Na(Comp.)+ H_2O_2

155. Gold dissolves in aqua regia forming:

a) Auric chloride b) Aurous chloride c) Chloroauric acid d) Aurous nitrate

156. Essential constituent of an amalgam is:

a) Fe b) An alkali metal c) Silver d) Mercury

157. In blast furnace, iron oxide is reduced by

a) Hot blast of air b) Carbon monoxide c) Carbon d) Silica

158. In M is element of actinoids series, the degree of complex formation decreases in the order

a) $M^{4+¿>M^{3+}¿}$ b) $MO_2^{+¿>MO_2^{2+}¿>M^{3+}¿>M^{4+}¿}$

c) $M^{4+¿>MO_2^{2+}¿>M^{3+}¿}$ d) $MO_2^{2+¿>MO_2^{+}¿>M^{4+}¿>M^{3+}¿}$

159. Stainless steel has iron and

a) Cr b) Cu c) Co d) Zn

160. The correct statement(s) among the following is/are;
(i) All the $d \wedge f$-block elements are metals
(ii) All $d \wedge f$-block elements form coloured ions
(iii) All $d \wedge f$-block elements are paramagnetic
a) (i) only b) (i) and (ii) c) (ii) and (ii) d) All of these

161. Which of the following pair will have effective magnetic moment equal?

a) $Ti^{2+¿¿}$ and $V^{2+¿¿}$ b) $Cr^{2+¿¿}$ and $Fe^{2+¿¿}$ c) $Cr^{3+¿¿}$ and $Mn^{2+¿¿}$ d) $V^{2+¿¿}$ and $Sc^{3+¿¿}$

162. Which of the following compounds volatises on heating?

a) $FeCl_3$ b) $HgCl_2$ c) $CaCl_2$ d) $MgCl_2$

163. Aufbau law is not valid for:

a) Cu and Ar b) Cu and Cr c) Cr and Ar d) Fe and Ag

164. Which of the following statements is not true for Mohr's salt?

a) It decolourises $KMnO_4$ solution
b) It is a double salt
c) Oxidation state of iron is +3
d) It is a primary standard

165. The $3d$-block element that exhibits maximum number of oxidation states is

a) Sc b) Ti c) Mn d) Zn

166. Number of electrons in $3d$-orbital of $V^{2+¿,Cr^{2+¿,Mn^{2+¿¿}¿}¿}$, and $Fe^{2+¿¿}$ are 3, 4, 5 and 6 respectively. Which of the following ions will have largest value of magnetic moment (μ)?
a) $V^{2+¿¿}$ b) $Cr^{2+¿¿}$ c) $Mn^{2+¿¿}$ d) $Fe^{2+¿¿}$

167. Identify the reaction that does not take place during the smelting process of copper extraction

a) $2FeS+3O_2 \longrightarrow 2FeO+2SO_2\uparrow$ b) $Cu_2O+FeS \longrightarrow Cu_2S+FeO$
c) $2Cu_2S+3O_2 \longrightarrow 2Cu_2O+2SO_2\uparrow$ d) $FeO+SiO_2 \longrightarrow FeSiO_3$

168. Which of the following is most stable?

a) $V^{3+¿¿}$ b) $Ti^{3+¿¿}$ c) $Mn^{3+¿¿}$ d) $Cr^{3+¿¿}$

169. The white anhydrous copper sulphate on heating decomposes to give:

a) $CuSO_4.5H_2O$ b) $CuSO_4.H_2O$ c) $CuO+SO_3$ d) SO_3

170. NH_3 does not form complex with:

a) AgI b) AgBr c) AgCl d) None of these

171. Which sulphide has a yellow colour?

a) CuS b) PbS c) ZnS d) CdS

172. Which of the following is not a property of transition elements?

a) Fixed valency b) Catalytic property c) Paramagnetism d) Colour

173. $Fe^{2+¿¿}$ ion can be distinguished by $Fe^{3+¿¿}$ ion by:

a) $BaCl_2$ b) $AgNO_3$ c) NH_4SCN d) None of these

174. Which one of the following transition metal ions is diamagnetic?

a) $Co^{2+¿¿}$ b) $¿^{2+¿¿}$ c) $Cu^{2+¿¿}$ d) $Zn^{2+¿¿}$

175. Elements of group 11 and 12 are:

a) Normal elements b) Transition elements c) Alkaline earth metals d) Alkali metals

176. Hard steel contains:

a) No carbon b) 0.6-1.5% carbon c) 5% carbon d) 0.5-0.2% carbon

177. Iron, once dipped in concentrated H_2SO_4, does not displace copper from sulphate solution, because:

a) It is less reactive than copper

b) A layer of sulphate is deposited on it

c) A layer of oxide is deposited on it

d) None of the above

178. Which shows a jump in second ionization potential?

a) Co b) Ni c) Zn d) Cu

179. Manganese steel contains:

a) Fe + C + Mn b) Fe + C + Al c) Fe + Mn d) Fe + Mn+ Cr

180. Which sets are the transition elements?

a) Ti, Zr, Hf b) V, Nb, Ta c) Rh, Rb, Pd d) All of these

181. The extraction of nickel involves:

a) The formation of $¿(CO)_4$

b) The decomposition of $¿(CO)_4$

c) The formation and thermal decomposition of $¿(CO)_4$

d) The formation and catalytic decomposition of $¿(CO)_4$

182. Cu_2O is:

a) Black oxide of copper b) Copper(II) oxide c) Red oxide of copper d) Cupric oxide

183. Number of electrons transferred in each case when $KMnO_4$ acts as an oxidising agent to give $MnO_2, Mn^{2+¿}, Mn(OH)_3¿$ and $MnO_4^{2-¿¿}$, 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

184. When metallic copper comes in contact with moisture, a green power/pasty coating can be seen over it. This is chemically known as

a) Copper carbonate-copper sulphate b) Copper carbonate-copper hydroxide

c) Copper sulphate-copper sulphide d) Copper sulphide-copper carbonate

185. German silver is an alloy of:

a) Copper, zinc and nickel

b) Copper and silver

c) Copper and tin

d) Copper, zinc and silver

186. Incorrect statement is

a) Atomic radii of Zr and Hf are same because of lanthanide contraction

b) Zn and Hg do not show variable valency

c) Across the lanthanides series, the basicity of lanthanide hydroxides decreases

d) Protactinium is transuranic element

187. ------is the best conductor of electricity among coinage metals:

a) Ag b) Cu c) Au d) All of these

188. Cu^{2+} ions give precipitate with $K_4Fe(CN)_6$. The colour of precipitate is:

a) Blue b) Green c) Red d) Brown

189. Across the lanthanide series, the basicity of lanthanide hydroxides

a) Increases b) Decreases

c) First increases and then decreases d) First decreases and then increases

190. A blue colouration is not obtained when:

a) Ammonium hydroxide dissolves in copper sulphate

b) Copper sulphate solution reacts with K_4]

c) Ferric chloride reacts with sodium ferrocyanide

d) Anhydrous white $CuSO_4$ is dissolved in water

191. Useful lanthanoid member is:

a) Cerium b) Lanthanum c) Neodymium d) Lutetium

192. Which of the following has got incompletely filled f-subshell?

a) Gadolinium b) Lutetium c) Lawrencium d) Tantalum

193. Silver nitrate is usually supplied in coloured bottles because it is:

a) Oxidized in air

b) Decomposed in sunlight

c) Explodes in sunlight

d) Reactive towards air in sunlight

194. Mercury is purified by:

a) Solidifying

b) Distillation in vacuum

c) Treatment with dil. HNO_3

d) Electrolytic method

195. Pt black is

a) Pt metal mixed with MnO_2

b) Velvety black power obtained by reduction of $PtCl_4$ with glucose or sodium formate

c) Pt metal coated with black colour

d) None of the above

196. 'Hydride gap' is referred to which region of the Periodic Table?

a) Groups 3, 4 and 5 b) Groups 5, 6 and 7 c) Groups 4, 5 and 6 d) Groups 7, 8 and 9

197. Which of the following electronic configuration represents the maximum magnetic moment?

a) d^3 b) d^2 c) d^8 d) d^6

198. Volatile metals Zn, Cd and Hg are purified by:

a) Liquation b) Distillation c) Cupellation d) Electrolysis

199. Zinc, cadmium and mercury are:

a) d-block elements b) p-block elements c) s-block elements d) f-block elements

200. Select the incorrect statement about transition elements

a) The last electron enters in the d-orbital

b) Their properties are in between s and p-block ellements

c) Scandium is the transition element with smallest atomic radii

d) Their common oxidation state is +3

201. Which of the following types of metals form the most efficient catalysts?

a) Alkali metals b) Alkaline earth metals

c) Transition metals d) All of these

202. In the reaction $SnCl_2 + 2HgCl_2 \longrightarrow A + SnCl_4$, A is:

a) Hg_2Cl_2 b) Hg c) HgCl d) $HgCl_3$

203. Mohr salt is made up of which combination of salt?

a) Ammonium sulphate and potash. b) Ammonium sulphate and ferrous sulphate.

c) Ammonium sulphate and copper sulphate. d) Ammonium sulphate and magnesium sulphate.

204. Maximum oxidation state is presented by:

a) $CrO_2Cl_2 \wedge MnO_4^{-¿¿}$ b) MnO_2 c) $\left[Fe(CN)_6\right]^{3-¿\wedge\left[Co(CN)_6\right]^{3-¿¿}¿}$ d) MnO

205. Lanthanides are

a) 14 elements in the sixth period (atomic no. = 90 to 103) that are filling $4f$ sub level.

b) 14 elements in the seventh period (atomic no. = 90 to 103) that are filling $5f$ sub level.

c) 14 elements in the sixth period (atomic no. = 58 to 71) that are filling $4f$ sub-level.

d) 14 elements in the seventh period (atomic no. = 58 to 71) that are filling $4f$ sub-level.

206. By annealing, steel

a) Becomes soft
b) Becomes liquid
c) Becomes hard and brittle
d) Is covered with a thin film of Fe_3O_4

207. Which chromium compound is widely used in tanning of leather?

a) Cr_2O_3
b) CrO_2Cl_2
c) $CrCl_3$
d) $K_2SO_4.Cr_2(SO_4)_3.24$

208. Purple of cassius is

a) Copper solution
b) Platinum solution
c) Gold solution
d) Copper solution

209. Which is obtained when SO_2 is bubbled through a solution of $CuCl_2$?

a) Cu
b) Cu_2Cl_2
c) $CuSO_4$
d) CuS

210. Substance which do not react with cold water but react with steam are:

a) C , Ca , SO_2
b) Fe, Al, Cl_2
c) CO_2, Na, Mg
d) C, Fe, Mg

211. Which metal has the highest melting point?

a) Pt
b) W
c) Pd
d) Au

212. Choose the correct reaction to prepare mercurous chloride (calomel)

a) $HgCl_2+Hg \xrightarrow{\Delta}$
b) $Hg+Cl_2 \longrightarrow$
c) $HgCl_2+SnCl_2 \longrightarrow$
d) Both (a) and (c)

213. Density, malleability and ductility in coinage metals increase in the order:

a) Cu, Ag, Au
b) Au, Ag, Cu
c) Ag, Au, Cu
d) Ag, Cu, Au

214. An acidified solution of $KMnO_4$ oxidizes:

a) Sulphates
b) Sulphites
c) Nitrates
d) Ferric salts

215. Magnetite is:

a) $2Fe_2O_3.3H_2O$
b) FeS_2
c) Fe_3O_4
d) Fe_2O_3

216. Least paramagnetic property is shown by

a) Fe
b) Mn
c) Ni
d) Cu

217. Platinum, Palladium, irridium, etc., are called noble metals because:

a) Alfred Nobel discovered them
b) They are inert towards many common reagents
c) They are shining, lustrous and pleasing to look
d) They are found in native state

218. Silver obtained from argentiferous lead is purified by:

a) Distillation
b) Froth floatation
c) Cupellation
d) Reaction with KCN

219. Paris green is:

a) $Cu(CH_3COO)_2$ b) $Cu_3(AsO_3)_2.2H_2O$ c) $Cu(CH_3COO)_2.3Cu(A$ d) $Co(AlO_2)_2$

220. Variable valency is shown by

a) Normal elements b) Transition elements c) Typical elements d) None of these

221. Which statement about Hg is correct?

a) Hg is the only liquid metal

b) $Hg^{2+¿¿}$ salts are more stable than $Hg_2^{2+¿¿}$ salts

c) Hg forms no amalgam with iron and platinum

d) All of the above

222. Most abundant transition element is:

a) Fe b) Sc c) Os d) None of these

223. Which one of the following acts as an oxidizing agent?

a) $Np^{4+¿¿}$ b) $Sm^{2+¿¿}$ c) $Eu^{2+¿¿}$ d) $Yb^{2+¿¿}$

224. Which of the oxide of manganese is amphoteric?

a) MnO_2 b) Mn_2O_3 c) Mn_2O_7 d) MnO

225. Which one of the following reactions will occur on heating $AgNO_3$ above its melting point?

a) $2AgNO_3 \longrightarrow 2Ag+2NO_2+O_2$ b) $2AgNO_3 \longrightarrow 2Ag+N_2+3O_2$

c) $2AgNO_3 \longrightarrow 2AgNO_2+O_2$ d) $2AgNO_3 \longrightarrow 2Ag+2NO+2O_2$

226. Which of the following is paramagnetic?

a) $CuCl_2$ b) $CaCl_2$ c) $CdCl_2$ d) None of these

227. Which does not give a precipitate with excess of NaOH?

a) $HgCl_2$ b) $HgNO_3$ c) $FeSO_4$ d) $ZnSO_4$

228. Thermite is a mixture of iron oxide and:

a) Zn powder b) K metal c) Na–Hg d) Al powder

229. Ruby copper is:

a) Cu_2O b) $Cu(OH)_2$ c) $CuCl_2$ d) Cu_2Cl_2

230. The actinoids showing +7 oxidation state are

a) U, Np b) Pu, Am c) Np, Pu d) Am, Cm

231. Which match is incorrect?

a) Ammonia soda process – manufacture of potassium carbonate

b) Bessemer's process – manufacture of steel

c) Mac Arthur and Forest process – extraction of silver

d) Dow's process – manufacture of phenol

232. Carbon content of

a) Steel is in between those of cast iron and wrought iron.

b) Cast iron is in between those of steel and wrought iron.

c) Wrought iron is in between those of steel and cast iron.

d) Steel is higher than that of pig iron.

233. Which of the following pair is coloured in aqueous solution?

a) Sc^{3+}, Co^{2+} b) Zn^{2+}, Cu^{+} c) Zn^{2+}, Ti^{3+} d) Sc^{3+}, Ti^{3+}

234. $ZnSO_4$ on heating to 800°C gives:

a) $ZnO + SO_2 + O_2$ b) $Zn + SO_2$ c) $ZnS + O_2$ d) $Zn + SO_2 + O_2$

235. The ionization potential of transition metals is …. than p-block elements.

a) Less b) More c) Equal d) None of these

236. Spiegeleisn is an alloy of

a) Fe, Co and Cr b) Fe, Co and Mg c) Fe, Mg and C d) Fe, C and Mn

237. Which of the following group of transition metals is called coinage metals?

a) Cu, Ag, Au b) Ru, Rh, Pd c) Fe, CO, Ni d) Os, Ir, Pt

238. Cadmipone is a mixture of:

a) CdS and $BaSO_4$ b) $CaSO_4$ and BaS c) CaS and $ZnSO_4$ d) $CaSO_4$ and ZnS

239. 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) $Ti^{3+} < V^{3+} < Cr^{2+} < Mn^{3+}$: increasing magnetic moment

c) Ti < V < Cr < Mn : increasing melting points

d) Ti < V < Mn < Cr : increasing 2nd ionization enthalpy

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

a) +3,+2 b) +3,+6 c) +2,+6 d) +2,+3

241. The compound which gives oxygen on moderate heating is:

a) Zinc oxide b) Mercuric oxide c) Aluminium oxide d) Ferric oxide

242. The form of iron having the highest carbon content is

a) Cast iron b) Wrought iron c) Stainless steel d) Mild steel

243. An ore of silver is:

a) Argentite b) Stibnite c) Haematite d) Bauxite

244. Roasting of HgS in air produces:

a) HgO b) $HgSO_3$ c) $HgSO_4$ d) Hg

245. Transuranic elements begins with

a) Np b) Cm c) Pu d) U

246. A solution when diluted with H_2O and boiled gives a white ppt. On addition of excess NH_4Cl/NH_4OH, the volume of precipitate decreases due to dissolution leaving behind a white gelatinous precipitate. The precipitate which dissolves in NH_4OH/NH_4Cl is:

a) $Zn(OH)_2$ b) $Al(OH)_3$ c) $Mg(OH)_2$ d) $Ca(OH)_2$

247. Which of the following is not correct about transition metals?

a) Their compounds are generally coloured.

b) They can form ionic or covalent compounds.

c) Their melting and boiling points are high.

d) They do not exhibit variable valency.

248. Which one of the following does not decolourise an acidified $KMnO_4$ solution?

a) SO_2 b) $FeCl_3$ c) H_2O_2 d) $FeSO_4$

249. Which of the following pairs of elements cannot form an alloy?

a) Zn, Cu b) Fe, Hg c) Fe, C d) Hg, Na

250. Which is known as purple of Cassius?

a) Colloidal silver solution

b) Colloidal gold solution

c) Aqueous solution of soap

d) As_2S_3 colloidal solution

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

a) $Cu^{+¿¿}$ b) $Zn^{2+¿¿}$ c) $Cr^{3+¿¿}$ d) $Ti^{4+¿¿}$

252. The outer electronic configuration of Gd (At. No 64) is

a) $4f^3 5d^5 6s^2$ b) $4f^8 5d^0 6s^2$ c) $4f^4 5d^4 6s^2$ d) $4f^7 5d^1 s^2$

253. Mercury is a liquid metal because

a) It has a completely filled s-orbital.

b) It has a small atomic size.

c) It has a completely filled d-orbital that prevents $d-d$ overlapping of orbitals.

d) It has a completely filled d- orbital that causes $d-d$ overlapping.

254. Composition of azurite mineral is

a) $CuCO_3.CuO$ b) $Cu(HCO_3)_2.Cu(OH)_2$ c) $2CuCO_3.Cu(OH)_2$ d) $CuCO_3.2Cu(OH)_2$

255. What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid?

a) $Cr^{3+¿\wedge Cr_2O_7^{2-}\,are\,formed¿¿}$

b) $Cr_2O_7^{2-¿\wedge H_2O\ are\ formed¿}$

c) $CrO_4^{2-¿\,is\,reduced¿}+3\,state\ of\ Cr$

d) None of the above

256. 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

257. Which of the following is also known as "Fools gold"?

a) Wurtzite b) Iron pyrites c) Chalcocite d) Silver glance

258. When steam is passed over heated iron, one of the products is:

a) FeO b) Fe_2O_3 c) Fe_3O_4 d) $FeSO_4$

259. In the electrolytic refining of zinc

a) Graphite is at the anode. b) The impure metal is at the cathode.

c) The metal ion get reduced at the anode. d) Acidified zinc sulphate is the electrolyte.

260. Which pair of lanthanides is used in glass, blowers, goggles?

a) Np, Pu b) Pu, Gd c) Fm, Ho d) Pr, Ho

261. One of the following metals forms a volatile compound and this property is taken advantage for its extraction. This metal is

a) Iron b) Nickel c) Cobalt d) Tungsten

262. Pig iron is converted into steel by reducing the amount of carbon contained in it, in a:

a) Blast furnace b) Pyrite burner c) Bessemer's converter d) None of these

263. Which one of the following forms a complex of coordination number 2 with excess of $CN^{-¿¿}$ions?

a) $Cu^{+¿¿}$ b) $Ag^{+¿¿}$ c) $¿^{2+¿¿}$ d) $Fe^{2+¿¿}$

264. The radius of $La^{3+¿¿}$ (Atomic number of La = 57) is 1.06 Å. Which one of the following given values will be closest to the radius of $Lu^{3+¿¿}$?
(Atomic number of Lu=71)

a) 1.60 Å b) 1.40 Å c) 1.06 Å d) 0.85 Å

265. When oxyhaemoglobin changes to deoxyhaemoglobin, $Fe^{2+¿¿}$ ion changes from

a) Diamagnetic to paramagnetic b) Paramagnetic to diamagnetic

c) Diamagnetic to ferromagnetic d) Paramagnetic to ferromagnetic

266. Which statement is incorrect?

a) Silver glance mainly contains silver sulphide

b) Gold is found in native state

c) Zinc blende mainly contains zinc chloride

d) Copper pyrites also contain Fe_2S_3

267. Amongst $TiF_6^{2-¿¿}$, $CoF_6^{3-¿¿}$, Cu_2Cl_2 and $NiCl_4^{2-¿¿}$
(atomic no Ti=22, Co=27, Cu=29,Ni=28) the colourless species are

a) $CoF_6^{3-¿¿}$and $NiCl_4^{2-¿¿}$ b) $TiF_6^{2-¿¿}$and $CoF_6^{3-¿¿}$, c) Cu_2Cl_2 and $NiCl_4^{2-¿¿}$ d) $TiF_6^{2-¿¿}$and Cu_2Cl_2

268. Among the following series of transition metal ions, the one where all metal ions have $3d^2$ electronic configuration is:

a) $Ti^{3+}, V^{2+}, Cr^{3+}, Mn^{4+}$

b) $Ti^{+}, V^{4+}, Cr^{6+}, Mn^{7+}$

c) $Ti^{4+}, V^{3+}, Cr^{2+}, Mn^{3+}$

d) $Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+}$

269. Calomel (Hg_2Cl_2) on reaction with ammonium hydroxide gives

a) HgO b) Hg_2O

c) $NH_2 — Hg — Hg — Cl$ d) $HgNH_2Cl$

270. Steel resistant to acid is:

a) Carbon steel b) Molybdenum steel c) Stainless steel d) Nickel steel

271. Non-stoichiometric compounds are formed by:

a) Alkali metals

b) Transition elements

c) Noble gases

d) More than one of the above elements

272. d-block elements generally form:

a) Covalent hydrides b) Metallic hydrides c) Interstitial hydrides d) Salt-like hydrides

273. The element present in red blood cells of human blood is:

a) Fe b) Ra c) Co d) All of these

274. The element which exhibit both vertical and horizontal similarities are:

a) Inert gas elements

b) Representative elements

c) Rare elements

d) Transition elements

275. Which occurs in nature in free state?

a) Fe b) Co c) Ni d) Pt

276. H_2S is passed in aqueous solution of ….. to give a white precipitate of ZnS.

a) $ZnCl_2$ b) $Zn(NO_3)_2$ c) $(CH_3COO)_2Zn$ d) None of these

277. Which of the following are d-block elements but not regarded as transition elements?

a) Cu, Ag, Au b) Zn, Cd, Hg c) Fe, Co, Ni d) Ru, Rh, Pd

278. Which is the least soluble in water?

a) $AgCl$ b) Ag_2S c) AgI d) $AgBr$

279. Which of the following elements is alloyed with copper to form brass?

a) Bismuth b) Zinc c) Lead d) Antimony

280. When $KMnO_4$ reacts with acidified $FeSO_4$:

a) Only $FeSO_4$ is oxidized

b) Only $KMnO_4$is oxidized

c) $FeSO_4$ is oxidized and $KMnO_4$ is reduced

d) None of the above

281. The nitrate of which metal leaves metallic globule on heating strongly?

a) $Cu(NO_3)_2$ b) $AgNO_3$ c) $NaNO_3$ d) $Pb(NO_3)_2$

282. Mond process is used in the extraction of:

a) Co b) Ni c) Mo d) Zn

283. Blue colour/precipitate will be obtained when $K_4[Fe(CN)_6]$ reacts with:

a) Fe(II) ions b) Cu(II) ions c) Fe(III) ions d) Cu(I) ions

284. Two of the constituents of German silver are

a) Ag + Cu b) Ag + Zn c) Cu + Zn d) Cu + Sn

285. A metal is left exposed to air for sometime. It becomes coated with basic green carbonate. The metal is:

a) K b) Cu c) Zn d) Al

286. Zn and Cd do not show variable valency, because:

a) They have only two electrons in outermost subshells

b) Their d-subshells are complete

c) Their d-subshells are incomplete

d) They are relatively soft metals

287. One of the important uses of ferrous sulphate is in the:

a) Manufacture of blue-black ink

b) Manufacture of chalks

c) Preparation of hydrogen sulphide

d) Preparation of sulphur dioxide

288. Blue vitriol is:

a) $CuSO_4.7H_2O$ b) $ZnSO_4.7H_2O$ c) $CuSO_4.5H_2O$ d) $FeSO_4.7H_2O$

289. Zn does not show variable valency because of

a) Complete d-subshell b) Inert pair effect c) $4s^2$-subshell d) None of these

290. Which of the following statement (s) is/are correct with reference to the ferrous and ferric ions?

a) Fe^{3+}¿¿ given brown colour with ammonium thiocyanate

b) Fe^{3+} gives brown colour with potassium ferricyanide

c) Fe^{3+} gives red colour with potassium thiocyanate

d) Fe^{2+} gives red precipitate with potassium ferricyanide

291. In vapour state $Cu(NO_3)_2$ and $Cu_2(CH_3COO)_4.2H_2O$ exist as:

a) Dimer, monomer b) Monomer, dimer c) Monomer, monomer d) Dimer, dimer

292. Which oxide is least stable at room temperature?

a) CuO b) Ag_2O c) ZnO d) Sb_2O_3

293. Which of the following metal is correctly matched with its ore?

Metal	Ore		
a) Zinc	Calamine	b) Silver	Ilmenite
c) Magnesium	Cassiterite	d) Tin	Azurite

294. Iron is obtained on large scale from haematite(Fe_2O_3):

a) By reduction

b) By oxidation

c) By reduction followed by oxidation

d) By oxidation followed by reduction

295. Which oxide of manganese is amphoteric?

a) MnO b) MnO_2 c) Mn_2O_7 d) Mn_2O_3

296. Which among the following metals does not dissolve in aqua regia?

a) Pt b) Pd c) Au d) Ir

297. The one which has lowest ox. no. of Hg:

a) $Hg(NO_2)_2$ b) $HgCl_2$ c) $Hg(NO_3)_2$ d) Hg_2Cl_2

298. The fraction of chlorine precipitated by $AgNO_3$ solution from $[Co(NH_3)_5Cl]Cl_2$ is:

a) 1/2 b) 2/3 c) 1/3 d) 1/4

299. Which statement is correct?

a) Cd rods are used in atomic reactors to slow down nuclear reaction

b) Cd is a good absorber of neutrons

c) CdS is used as pigment

d) All of the above

300. Acidified solution of chromic acid on treatment with hydrogen peroxide yields

a) CrO_5+H_2O b) $H_2Cr_2O_7+H_2O+O_2$

c) $Cr_2O_3+H_2O+O_2$ d) $CrO_3+H_2O+O_2$

301. Substance used in glazing pottery is:

a) ZnO b) $ZnCl_2$ c) Alum d) Calome

302. The brown ring complex compound is formulated as $\left[Fe\left(H_2O\right)_5\left(NO\right)\right]SO_4$. The oxidation state of iron is:

a) +1 b) +2 c) +3 d) +4

303. For the four successive transition elements (Cr, Mn, Fe and Co), the stability of +2 oxidation state will be there in which of the following order?

a) Cr > Mn > Co > Fe

b) Mn > Fe > Cr > Co

c) Fe > Mn > Co > Cr

d) Co > Mn > Fe > Cr

(At. Nos. Cr = 24, Mn = 25, Fe = 26, Co = 27)

304. Which of the following methods can't be used to prepare anhydrous zinc chloride?

a) Passing dry chlorine over heated zinc

b) Passing dry hydrogen chloride over heated zinc

c) Heating the crystal of $ZnCl_2 \cdot 2H_2O$

d) Distilling metallic zinc with mercury (II) chloride

305. Prussian blue is due to formation of

a) $Fe\left[Fe\left(CN\right)_6\right]_3$ b) $Fe_2[Fe\left(CN\right)_6]$ c) $Fe_4\left[Fe\left(CN\right)_6\right]_3$ d) $Fe_3[Fe\left(CN\right)_6]$

306. For which one of the following ions, the colour is not due to a $d-d$ transition?

a) $CrO_4^{2-¿¿}$ b) $Cu\left(NH_3\right)_4^{2+¿¿}$ c) $Ti\left(H_2O\right)_6^{3+¿¿}$ d) $CoF_6^{3-¿¿}$

307. Which of the following statement is not correct?

a) $La\left(OH\right)_3$ is less basic than $Lu\left(OH\right)_3$

b) In lanthanide series ionic radius of $Ln^{3+¿¿}$ ions decrease

c) Zn, Cd, Hg are colourless and are diamagnetic

d) Mn shows maximum oxidation state is +7

308. Which of the following lanthanide is commonly used?

a) Lanthanum b) Nobelium c) Thorium d) Cerium

309. Blueprint papers have a coating of:

a) Mixture of potassium ferricyanide and ammonium ferric citrate or ferric oxalate

b) Sodium nitroprusside

c) Prussian blue

d) None of the above

310. Colour in transition metal compounds is attributed to:

a) Small sized metal ions

b) Absorption of light in the UV region

c) Complete ns-subshell

d) $d-d$ transition

311. Which is not ferromagnetic?

a) Fe b) Co c) Ni d) V

312. Various methods have been employed for protecting iron from rusting. Which of the following is incorrect?

a) Zinc plating is more permanent than chrome plating

b) Zinc protects iron but gets corroded itself

c) Tin plating is cheap but unreliable

d) None of the above

313. A clock spring is heated to a high temperature and then suddenly plunged into cold water. This treatment will cause the metal to become:

a) Soft and ductile

b) More springy than before

c) Hard and brittle (case hardening)

d) Strongly magnetic

314. Which has the lowest melting point?

a) Cs b) Na c) Hg d) Sn

315. The temperature of the slag zone in the metallurgy of iron using blast furnace is

a) 1200-1500°c b) 1500-1600°c c) 400-700°c d) 800-1000°c

316. Oxygen is absorbed by molten Ag, which is evolved on cooling and the silver particles are scattered; the phenomenon is known as:

a) Silvering of mirror b) Spitting of silver c) Frosting of silver d) Hairing of silver

317. Which of the following statements regarding copper salts is not true?

a) Copper(I) Disproportionates into Cu and Cu(II) in aqueous solution

b) Copper(I) can be stabilised by the formation of insoluble complex compounds such as $CuCl_2^{-¿¿}$ and $Cu(CN)_2^{-¿¿}$

c) Copper(I) oxide is red powder

d) Hydrated $CuSO_4$ is $Cu(H_2O)_4¿SO_4.H_2O$

318. Which compound cannot be prepared?

a) $Zn(OH)_2$ b) $Cd(OH)_2$ c) $Hg(OH)_2$ d) $HgCl_2$

319. The colour of solution obtained by adding excess of KI in the solution of $HgCl_2$ is:

a) Orange b) Brown c) Red d) Colourless

320. Which of the following is the correct sequence of atomic weights of given elements?

a) $Co>¿>Fe$ b) $Fe>Co>¿$ c) $Fe>¿>Co$ d) $¿>Co>Fe$

321. Which of the following is known as lunar caustic when in the fused state?

a) Silver nitrate b) Silver sulphate c) Silver chloride d) Sodium sulphate

322. 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

323. Which metal is ferromagnetic?

a) Cr b) Fe c) Zn d) Al

324. Which of the following is called white vitriol?

a) $ZnCl_2$ b) $MgSO_4 \cdot 7H_2O$ c) $Al_2(SO_4)_3$ d) $ZnSO_4 \cdot 7H_2O$

325. The process of heating of steel to temperature much below redness and then slowly cooling is called:

a) Annealing b) Hardening c) Tempering d) Case hardening

326. "925 fine silver" means an alloy of

a) 7.5 % of Ag and 92.5 % Cu b) 92.5 % Ag and 7.5% Cu

c) 80% Ag and 20% Cu d) 90% Ag and 10% Cu

327. The compound used in preservation of wood is:

a) NaCl b) $HgCl_2$ c) $ZnCl_2$ d) $CaCl_2$

328. In photography we use

a) AgI b) NH_3 c) $AgCl$ d) $AgBr$

329. Brass, bronze and German silver have one common metal. This is

a) Zn b) Fe c) Al d) Cu

330. Transition metal used for making joins in jewellery is

a) Zn b) Cu c) Ag d) Cd

331. Which of the following elements has the maximum first ionization potential?

a) V b) Ti c) Mn d) Cr

332. Fulminating gold is:

a) $CuFeS_2$

b) FeS_2

c) $Au(NH_2) = NH \vee AuN_2H_3$

d) $AuCl_3$

333. The transition metal present in vitamin B_{12} is:

a) Fe b) Co c) Ni d) Na

334. The most convenient method to protect bottom of ship made of iron is

a) Coating with red lead oxide
b) Connecting with 'Pb' block
c) Connecting with 'Mg' block
d) White tin plating

335. The reaction $MnO_4^{-} + e \longrightarrow MnO_4^{2-}$ takes place in:

a) Basic medium
b) Acidic medium
c) Neutral medium
d) Both acidic and basic medium

336. Which metal is used in making cathode containers of dry cell?

a) Zn
b) Bi
c) Cr
d) Fe

337. Railway wagon axles are made by heating iron rods embedded in charcoal powder. This process is known as

a) Tempering
b) Case hardening
c) Sherardising
d) Annealing

338. The methods chiefly used for the extraction of lead and tin from their ores are respectively

a) Self reduction and carbon reduction
b) Self reduction and electrolytic reduction
c) carbon reduction and self reduction
d) Cyanide process and carbon reduction

339. The most stable oxidation state of lanthanides is

a) +2
b) +4
c) 0
d) +3

340. In context of the lanthanoids, which of the following statements is not correct?

a) There is a gradual decrease in the radii of the members with increasing atomic number in the series.
b) All the members exhibit +3 oxidation state.
c) Because of similar properties the separation of lanthanoids is not easy.
d) A vailability of $4f$-electrons results in the formation of compounds in +4 state for all members of the series.

341. The matte obtained in the extraction of copper contains:

a) $FeSiO_2$
b) $SiO_2 + FeS$
c) $FeS + Cu_2S$
d) $CuS + SiO_2 + FeO$

342. The electronic configuration of actinoids can to be assigned with degree of certainty because of

a) Overlapping of inner orbitals
b) Free movement of electrons over all the orbitals
c) Small energy difference between $5f$ and $6d$ levels
d) None of the above

343. In Mac Arthur forrest method, silver is extracted from the solution of $Na[Ag(CN)_2]$ by the use of

a) Fe
b) Mg
c) Cu
d) Zn

344. Transition elements are coloured

a) Due to unpaired d-ellectrons
b) Due to small size
c) Due to metallic nature
d) All of the above

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

a) $3d^2 4s^2$ b) $3d^3 4s^2$ c) $3d^5 4s^1$ d) $3d^5 4s^2$

346. Lanthanide contraction occurs because

a) f-orbitals are incompletely filled

b) f-orbital electrons are easily lost

c) f-orbital do not come out on the surface of atom and are buried inside

d) f-orbital electron are poor shielders of nuclear charge

347. Silver nitrate produces a black stain on skin due to:

a) Its corrosive action

b) Its reduction to metallic silver

c) Its strong reducing action

d) The formation of a complex compound

348. The most stable ion is:

a) $Mn^{2+¿¿}$ b) $Sc^{4+¿¿}$ c) $Fe^{2+¿¿}$ d) $Mn^{3+¿¿}$

349. The +3 ion of which one of the following has half-filled $4f$ sunshell?

a) La b) Lu c) Gd d) Ce

350. Calomel may be freed from traces of metallic mercury by washing with:

a) dil. HNO_3 b) dil. H_2SO_4 c) Water d) Aqua regia

351. One of the following is false for Hg:

a) It can evolve hydrogen from H_2S

b) It is metal

c) It has high specific heat

d) It is less reactive than H_2

352. Brass is an alloy of:

a) Zn and Cu b) Cu and Sn c) Zn and Sn d) Cu, Zn and sn

353. Maximum paramagnetism in $3d$-series is shown by:

a) Mn b) Co c) Ni d) Fe

354. The metal used for making armoured steel for tanks and domestic safes is:

a) Manganese b) Aluminium c) Lead d) Chromium

355. Which of the following metals has been used in making boats because it has resistance to corrosion by seawater?

a) W b) Cu c) Ni d) Ti

356. Which ore contains both iron and copper?

a) Cuprite b) Chalcocite c) Chalcopyrite d) Malachite

357. $K_2Cr_2O_7 \xrightarrow{\Delta} K_2CrO_4 + O_2 + X$. In the above reaction X is

a) CrO_3 b) Cr_2O_7 c) Cr_2O_3 d) CrO_5

358. Blood red colour solution is produced when ferric chloride solution is treated with:

a) KCN b) KSCN c) KCNO d) $K_3[Fe(CN)_6]$

359. The group of metals which is known as ferrous metals is:

a) Fe, Co, Ni b) Ru, Rh, Pd c) Os, Ir, Pt d) Cr, Mn, Cu

360. In the chemical reaction;
$Ag_2O + H_2O + 2e^{-} \rightarrow 2Ag + 2OH^{-}$
a) Water is oxidised b) Electrons are reduced c) Silver is oxidised d) Silver is reduced

361. Which is not correct for transition metals?

a) Variable oxidation states

b) Complex formation

c) Partially filled d-orbitals

d) All the ions are colourless

362. Magnetic moment of $[Ag(CN)_2]^{-}$ is zero. How many unpaired electrons are there?

a) Zero b) 4 c) 3 d) 1

363. The first man-made atom is:

a) Os b) Na c) Zr d) Tc

364. Amongst the following, the lowest degree of paramagnetism per mole of the compound at 298 K will be shown by

a) $MnSO_4.4H_2O$ b) $NiSO_4.6H_2O$ c) $FeSO_4.6H_2O$ d) $CuSO_4.5H_2O$

365. Which compound does not dissolve in hot, dil. HNO_3?

a) HgS b) PbS c) CuS d) CdS

366. Heteropoly acids are formed by:

a) Be b) Fe c) Mo d) Cr

367. When mercury (I) chloride is heated and the vapour so evolved are cooled, the substance on sublimation thus collected consists of
a) Mercury and mercury (II) chloride b) Mercury (II) chloride

c) Mercury (I) and mercury (II) chloride d) Mercury

368. Steel contains:

a) 2.5–4.5%C b) 0.5–1.5%C c) 0.12–0.25%C d) 1–2%C

369. Silver halides are used in photography because they are:

a) Photosensitive

b) Soluble in hypo solution

c) Soluble in NH_4OH

d) Insoluble in acids

370. A lady's 18 carat gold wedding ring has become discoloured with some minute drops of mercury from a broken thermometer. Which of the following treatments would restore it to its original condition?
a) Place it in hot strong nitric acid

b) Place it in cold dilute hydrochloric acid

c) Heat it gently in a sand-bath

d) Heat it in chlorine

371. Oxidation state of Hg in amalgam is:

a) Zero b) One c) Two d) Three

372. In the manufacture of iron from an iron oxide ore, limestone is added because it acts as:

a) An oxidizing agent b) A reducing agent c) A flux d) A precipitating agent

373. The coordination number of copper in the complex formed by adding excess of NH_3 to $CuSO_4$ solution is:

a) 4 b) 2 c) 6 d) 5

374. In order to refine "blister copper" it is melted in a furnace and is stirred with green logs of wood. The purpose is:

a) To expel the dissolved gases in the blister copper

b) To bring the impurities to surfaces and oxidise them

c) To increase the carbon content of copper

d) To reduce the metallic oxide impurities with hydrocarbon gases liberated from the wood

375. Permanent magnets are generally made of alloys of

a) Mn b) Co c) Pb d) Zn

376. Which metal sulphide is not black?

a) NiS b) CoS c) CuS d) ZnS

377. The white solid that turns black on addition of NH_4OH is:

a) AgCl b) $PbCl_2$ c) Hg_2Cl_2 d) Hg_2I_2

378. Which of the following represents ammonium molybdate?

a) $(NH_4)_2MoO_4$ b) $(NH_4)MoO_2$ c) $(NH_4)_2MoO_3$ d) $NH_4.12MoO_3$

379. Gold and silver are called noble metals, because:

a) They do not normally react

b) Even acids cannot dissolve them

c) They are used in jewellery

d) They are worn by noble men

380. The colour of $_{62}Sm^{3+¿¿}$ is yellow. The expected colour of $_{66}Dy^{3+¿¿}$ is

a) Yellow b) Red c) Blue d) Green

381. Which is not an ore of iron?

a) Haematite b) Magnetite c) Cassiterite d) Limonite

382. On adding excess of NH_3 solution to $CuSO_4$ solution, the dark blue colour is due to

a) $\left[Cu\left(NH_3\right)\right]^{+¿¿}$ b) $\left[Cu\left(NH_3\right)_4\right]^{2+¿¿}$ c) $\left[Cu\left(NH_3\right)_2\right]^{2+¿¿}$ d) None of these

383. Other forms of iron can be produced from:

a) Cast iron b) Wrought iron c) Pig iron d) Steel

384. The variety of iron having highest melting point is:

a) Pig iron b) Cast iron c) Wrought iron d) Steel

385. Most of the transition metals are paramagnetic due to the presence of:

a) Completed d-orbitals b) Completed f-orbitals c) Unpaired electrons d) None of these

386. Spelter is:

a) Impure Cu b) Impure zinc c) ZnO d) CuO

387. Which of the following is philosopher's wool?

a) ZnO b) HgO c) Ag_2O d) CuO

388. The density of transition metals….in a series.

a) Gradually increases b) Gradually decreases c) Remains constant d) None of these

389. Silver containing lead as impurity is purified by

a) Poling b) Cupellation c) Lavigation d) Distillation

390. Which of the following elements is present as the impurity to the maximum extent in the pig iron?

a) Phosphorus b) Manganese c) Carbon d) Silicon

391. The magnetic moment of $Cu^{2+¿¿}$ ion is

a) 2.73 b) Zero c) 1.93 d) 1.73

392. Percentage of nickel in nickel steel is:

a) 1.5% b) 3.5% c) 6.5% d) 8.5%

393. The formula of mercurous ion is:

a) $Hg^{+¿¿}$ b) $Hg_2^{+¿¿}$ c) $Hg_2^{2+¿¿}$ d) None of these

394. Which pair consists only acidic oxides?

a) CrO_3, Mn_2O_7 b) ZnO_2, Al_2O_3 c) CaO, ZnO d) Na_2O, Al_2O_3

395. The extraction of which of the following metals involves bessemerization?

a) Fe b) Ag c) Al d) Cu

396. Nessler's reagent is:

a) $KHgI_4$ b) K_2HgI_4 c) $K_2HgI_4 + NaOH$ d) $KHgI_4 + NaOH$

397. Mac Arthur and Forest cyanide process is used in the extraction of:

a) Cu b) Ag and Au c) Fe d) Cr

398. Which is the chief ore of copper?

a) Galena b) Copper pyrites c) Sphalerite d) Siderite

399. Spiegeleisen is an alloy of:

a) Fe and Mn b) Fe, Mn and C c) Fe, Mn and Cr d) Fe and Cr

400. Among the following ions (hydrated), the colourless metal ion is

a) $Cu^{+¿¿}$ b) $Cu^{2+¿¿}$ c) $Fe^{2+¿¿}$ d) $Mn^{2+¿¿}$

401. Transition elements exhibit positive oxidation states only. This is because of:

a) Their large size of the atoms

b) Their electropositive nature

c) Their electronegative nature

d) Their paramagnetic nature

402. Transition metal with low oxidation number will act as

a) An oxidizing agent b) A base c) An acid d) None of these

403. The composition of bell metal is

a) Cu + Sn b) Cu + Ni c) Cu + Zn d) Cu + Ag

404. The most correct statement for transition metals is:

a) They possess low b.p.

b) They exhibit inert pair effect

c) They exhibit variable oxidation states

d) They do not possess catalytic property

405. During the process of electrolytic refining of copper, some metals present as impurity settle as 'anode mud'. These are

a) Fe and Ni b) Ag and Au c) Pb and Zn d) Se and Ag

406. A compound of a metal ion $M^{x+¿¿}$ (Z = 24) has a spin only magnetic moment of $\sqrt{15}$ Bohr Magnetons. The number of unpaired electrons in the compound are:

a) 2 b) 4 c) 5 d) 3

407. Lightest transition element is:

a) Fe b) Sc c) Os d) Co

408. $AuCl_3$ when heated in air gives:

a) Gold oxide b) Gold perchlorate c) Gold nitride d) AuCl

409. White vitriol is:

a) $CuSO_4.5H_2O$ b) $FeSO_4.7H_2O$ c) $ZnSO_4.7H_2O$ d) $NiSO_4.5H_2O$

410. The metal which liberates hydrogen from hot NaOH solution is:

a) Zn b) Cu c) Ag d) Fe

411. A yellow precipitate will be obtained if $AgNO_3$ is added to a solution of:

a) KIO_3 b) KI c) CHI_3 d) CH_2I_2

412. Which form of iron has lowest percentage of carbon?

a) Cast iron

b) Wrought iron

c) Steel

d) All have same percentage

413. The element that does not form a nitride is:

a) Al b) Mg c) Ag d) Ca

414. When dil. H_2SO_4 is added to aqueous solution of potassium chromate, yellow colour of solution turns to orange colour. It indicates

a) Chromate ions are reduced.

b) Chromate ions are oxidised.

c) Mono centric complex is converted into dicentric complex.

d) Oxygen gets removed from chromate ions.

415. Copper exhibits only +2 oxidation state in its stable compounds. Why?

a) Copper is transition metal in +2 state.

b) +2 state compounds of copper are formed by exothermic reactions.

c) Electron configuration of copper in +2 state is $[Ar]3d^9 4s^0$.

d) Copper gives coloured compounds in +2 state.

416. In blast furnace the highest temperature is in:

a) Reduction zone b) Slag zone c) Combustion zone d) Fusion zone

417. 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.

418. Green vitriol is

a) $FeSO_4.7H_2O$ b) $ZnSO_4.7H_2O$ c) $CuSO_4.5H_2O$ d) $CaSO_4.\frac{1}{2}H_2O$

419. Photographic films or plates have …. as an essential ingredient.

a) Silver bromide b) Silver oxide c) Silver thiosulphate d) Silver nitrate

420. During the extraction of gold the following reactions take place

$$Au + CN^- \xrightarrow{+H_2O+O_2} [X]$$

$$[X] + Zn \longrightarrow [Y] + Au$$

X and Y are respectively

a) $\left[Au(CN)_2\right]^{-}$ ¿ ∧ $\left[Zn(CN)_6\right]^{4-}$ ¿¿ ¿

b) $\left[Au(CN)_4\right]^{2-}$ ¿ ∧ $\left[Zn(CN)_4\right]^{2-}$ ¿¿ ¿

c) $\left[Au(CN)_4\right]^{3-}$ ¿ ∧ $\left[Zn(CN)_4\right]^{2-}$ ¿¿ ¿

d) $\left[Au(CN)_2\right]^{-}$ ¿ ∧ $\left[Zn(CN)_4\right]^{2-}$ ¿¿ ¿

421. Second series of transition elements starts with:

a) Yttrium b) Chromium c) Zinc d) Scandium

422. The electronic configuration of chromium is

a) $[Ne]3s^2 3p^6 3d^4 4s^2$ b) $[Ne]3s^2 3p^6 3d^5 4s^1$

c) $[Ne]3s^2 3p^5 3d^5 4s^2$ d) $[Ne]3s^2 3p^5 3d^6 4s^1$

423. Which of the following belongs to the actinoid series of elements?

a) Y b) Ta c) U d) Lu

424. Which of the following statements is not true in regard to transition elements?

a) All their ions are colourless

b) They show variable valency

c) They readily form complex compounds

d) Their ions contain partially filled d-elelctron levels

425. Sterling silver:

a) Is an alloy of Ag + Cu

b) Contains 80% Ag + 20% Cu

c) Is used in jewellery

d) All of the above

426. The impurity of sulphur makes the iron:

a) Fibrous b) Red short c) Cold short d) Malleable

427. In Cu (Z = 29):

a) 13 electrons have spin in one direction and 16 electrons in other direction

b) 14 electrons have spin in one direction and 15 electrons in other direction

c) All the electrons have spin in one direction

d) None of the above

428. Which of the following has the maximum number of unpaired d-elelments?

a) Fe^{2+} ¿¿ b) Cu^{+} ¿¿ c) Zn d) Ni^{3+} ¿¿

429. Zn cannot displace the following ions from their aqueous solutions:

a) Ag^{+} ¿¿ b) Cu^{2+} ¿¿ c) Fe^{2+} ¿¿ d) Na^{+} ¿¿

430. The lanthanide contraction is responsible for the fact that

a) Zr and Zn have the same oxidation state b) Zr and Hf have about the same radius

c) Zr and Nb have similar oxidation state
d) Zr and Y have about the same radius

431. Prussian blue is formed when:

a) Ferrous sulphate reacts with $FeCl_3$

b) Ferric sulphate reacts with $K_4[Fe(CN)_6]$

c) Ferrous ammonium sulphate reacts with $FeCl_3$

d) Ammonium sulphate reacts with $FeCl_3$

432. On the extraction of iron, the slag produced is

a) CO
b) $FeSiO_3$
c) $MgSiO_3$
d) $CaSiO_3$

433. In the purification of copper by electrolysis, which is incorrect?

a) Acidic solution of Cu(II) sulphate is used

b) $H_3O^{+¿¿}$ ion is discharged at cathode

c) Anode is made of Impure copper

d) $OH^{-¿¿}$ is discharged at anode

434. $HgCl_2$ is reduced to Hg_2Cl_2 by:

a) CH_3COOH
b) CCl_4
c) HCOOH
d) NH_3

435. Among the following the compound that is both paramagnetic and coloured is

a) $K_2Cr_2O_7$
b) $(NH_4)_2[TiCl_6]$
c) $VOSO_4$
d) $K_3[Cu(CN)_4]$

436. Ferrous sulphate $(FeSO_4.7H_2O)$ is known as

a) Vermillion
b) Glauber's salt
c) Green vitriol
d) Mohr's salt

437. Identify the reaction that does not take place in a blast furnace.

a) $CaCO_3 \longrightarrow CaO + CO_2$
b) $CaO + SiO_2 \longrightarrow CaSiO_3$
c) $2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2$
d) $CO_2 + C \longrightarrow 2CO$

438. The number of incomplete orbitals in inner transition elements is:

a) 3
b) 4
c) 2
d) 1

439. The final step in the metallurgical extraction of Cu metal from Cu pyrites takes place in a Bessemer converter. The reaction taking place is:

a) $Cu_2S + O_2 \longrightarrow 2Cu + SO_2$

b) $4Cu_2O + FeS \longrightarrow 8Cu + FeSO_4$

c) $2Cu_2O + Cu_2S \longrightarrow 6Cu + SO_2$

d) $Cu_2S + 2FeO \longrightarrow 2CuO + 2Fe + SO_2$

440. The smelting of iron in a blast furnace involves the following processes:

a) Combustion
b) Reduction
c) Slag formation
d) All of these

441. The flux used in the smelting of copper is:

a) Limestone b) Magnesia c) Silica d) Coke

442. The magnetic moment of a salt containing Zn^{2+} ion is

a) 0 b) 1.87 c) 5.92 d) 2

443. The common metal in brass, bronze and german silver is:

a) Cu b) Mg c) Al d) Zn

444. Which of the following is not a member of $3d$-transition series?

a) Fe b) Co c) Au d) Cu

445. The formula of azurite is

a) $CuCO_3.Cu(OH)_2$ b) $2CuCO_3.Cu(OH)_2$ c) $CuCO_3.2Cu(OH)_2$ d) $CuSO_4.Cu(OH)_2$

446. The formula of haematite is :

a) Fe_3O_4 b) Fe_2O_3 c) $FeCO_3$ d) FeS_2

447. A substance which turns blue when treated with water is:

a) $CuSO_4$ b) $CuSO_4.5H_2O$ c) $\cos O_4$ d) $Au_2(SO_4)_3$

448. Which metal does not form amalgam?

a) Fe b) Cu c) Ag d) Zn

449. Which of the following is correct?

a) Calomel is mercuric chloride

b) Calomel is widely used as an antiseptic

c) Calomel is used medically as purgative

d) Calomel is freely soluble in water

450. The process used in obtaining metallic silver from argentite is:

a) Fused mixture of Ag_2S and KCl is electrolysed

b) Ag_2S is reduced with CO

c) Ag_2S is roasted to Ag_2O which is reduced with C

d) Treating with NaCN solution followed by metal displacement with zinc

451. Which one of the following pairs of substances on reaction will not evolve H_2 gas?

a) Iron and H_2SO_4 (aq)

b) Iron and steam

c) Copper and HCl(g)

d) Sodium and ethyl alcohol

452. Which statement about group 12 elements is wrong?

a) Zinc forms an alloy with copper

b) Zn_2^{2+} is stable

c) Mercury gives compounds with +1 and +2 valencies

d) Hg is a liquid element

453. Which of the following is coated over iron articles to protect iron from corrosion?

a) Paint b) Zinc metal c) Tin metal d) All of these

454. The gas obtained by reactions of $K_4Fe(CN)_6$ with conc. H_2SO_4 is

a) H_2S b) CO c) NO_2 d) CO_2

455. Blister copper is

a) Impure Cu b) Cu alloy

c) Pure Cu d) Cu having 1% impurity

456. Effective magnetic moment of Sc^{3+} ion is

a) 1.73 b) 0 c) 5.92 d) 2.83

457. ZnS containing minute traces of MnS becomes:

a) Deliquescent b) Phosphorescent c) Hygroscopic d) None of these

458. Platinum metal can be dissolved in:

a) Hot concentrated hydrochloric acid

b) Hot concentrated nitric acid

c) Hot dilute sulphuric acid

d) A mixture of hydrochloric and nitric acids

459. Ruthenium carbonyl is:

a) $Ru(CO)_4$ b) $Ru(CO)_5$ c) $Ru(CO)_8$ d) $Ru(CO)_6$

460. 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

461. 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

462. In the electrolytic purification of copper some gold is found in the:

a) Cathode b) Cathode mud c) Anode mud d) None of these

463. Percentage of gold in 21.6 carat gold is:

a) 21.6 b) 90 c) 10 d) 70

464. An explosion takes place when conc. H_2SO_4 is added to $KMnO_4$.Which of the following is formed?

a) Mn_2O_7 b) MnO_2 c) $MnSO_4$ d) Mn_2O_3

465. Which statement is not correct?

a) $Fe(CO)_5$ reacts with Br_2Cl_4

b) Carbonyl complexes are usually formed with transition metals

c) All transition metals form mono metallic carbonyls

d) The decomposition of ¿$(CO)_4$ to give Ni is used in the extraction of Ni by Mond's process

466. Which is the common oxidation state of the first transition series of elements?

a) +2 b) +6 c) +8 d) +4

467. Which of the following is correct?

a) Duralumin : $Al+Cu+Mg+Ag$ b) German silver: $Cu+Zn+C$

c) Gun metal: $Cu+Zn+Sn$ d) Solder : $Pb+Al$

468. As percentage of carbon increase in iron, its hardness:

a) Decreases b) Increases c) Remains same d) None of these

469. Which oxide of Mn is acidic in nature?

a) MnO b) Mn_2O_7 c) Mn_2O_3 d) MnO_2

470. Corrosive sublimate $(HgCI_2)$ can be used to distinguish between

a) Formic acid and acetic acid b) Acetaldehyde and butanone

c) Formaldehyde and propanone d) All of the above

471. $KMnO_4$ in basic medium is used as

a) Strong oxidising agent b) Strong reducing agent

c) Strong hydrogenating agent d) Poor reducing agent

472. d-block elements are arranged in ….of periodic table.

a) Three series b) Six series c) Two series d) Four series

473. Which one of the following metals is extracted by a carbon reduction process?

a) Copper b) Iron c) Aluminium d) Magnesium

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

a) 3 BM b) 6 BM c) 4 BM d) 5 BM

475. Coinage alloy has the composition of:

a) Ag + Cu + Ni b) Au + Ag + Cu c) Au + Zn + Ag d) Ag + Fe + Cu

476. Which of the following is used for sterilization of surgical instruments?

a) $HgCl_2$ b) $ZnCl_2$ c) Hg_2Cl_2 d) ZnO

477. Rusting of iron in moist air involves:

a) Loss of electrons by Fe

b) Gain of electrons by Fe

c) Neither gain nor loss of electrons

d) Hydration of Fe

478. A chocolate brown coloured compound with acetic acid and potassium ferrocyanide is obtained from a salt solution containing:

a) Cu b) Cd c) Sn d) Hg

479. What is the oxidation state of iron in Mohr's salt?

a) +3 b) 0 c) +2 d) +1

480. Chrome green is

a) Chromium nitrate b) Chromium sulphate c) Chromium oxide d) Chromium chloride

481. Which lanthanoid compound is used as a most powerful liquid lasers after dissolving it in selenium oxychloride?

a) Cerium oxide b) Neodymium oxide c) Promethium sulphate d) Ceric sulphate

482. A transition metal ion exists in its highest oxidation state. It is expected to behave as

a) A chelating agent b) A central metal in a coordination compound

c) An oxidising agent d) A reducing agent

483. For d-block elements the first ionisation potential is of the order

a) $Zn > Fe > Cu > Cr$ b) $Sc = Ti < V = Cr$

c) $Zn < Cu < ¿ < Co$ d) $V > Cr > Mn > Fe$

484. Metallic bond is stronger in transition metals than alkali and alkaline earth metals because of:

a) More number of electrons including d-electrons

b) Large size of the atoms

c) Paramagnetism

d) Diamagnetism

485. Automobile engine blocks are made up of:

a) Stainless steel

b) Nickel-chromium steel

c) Cast iron

d) Wrought iron

486. Silver amalgam is used in:

a) Silvering of mirror b) Filling of teeth c) Both (a) and (b) d) None of these

487. Which statement is not correct?

a) Potassium dichromate oxidises a secondary alcohol into a ketone

b) Potassium permanagnate is a weaker oxidising substance than potassium dichromate

c) Potassium permanganate is a stronger oxidizing substance

d) All of the above statement are correct

488. The pair of metals which dissolve in NaOH($aq.$) is:

a) Al, Cu b) Zn, Cd c) Pb, Sn d) Zn, Al

489. The catalytic activity of the transition metals and their compounds is ascribed to their

a) Magnetic behavior

b) Chemical reactivity

c) Ability to adopt multiple oxidation states and their complexing ability

d) Unfilled d-orbitals

490. Acidified potassium dichromate is treated with hydrogen sulphide. In the reaction the oxidation number of chromium :

a) Increases from +3 to +6

b) Decreases from +6 to +3

c) Remains unchanged

d) Decreases from +6 to +2

491. Zinc reacts with conc. H_2SO_4 to produce:

a) $ZnSO_4$ b) $ZnCO_3$ c) Zn d) None of these

492. In which metal's metallurgical process carbon is used for reduction of metal oxides?

a) Na b) Ag c) Fe d) Hg

493. 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

494. Lithopone, a white pigment, consists of:

a) Al_2O_3 and $CaCO_3$ b) BaS and $PbSO_4$ c) ZnS and $BaSO_4$ d) PbS and MgO

495. The aqueous solution containing which one of the following ions will be colourless?

a) Ti^{3+} b) Mn^{2+} c) Sc^{3+} d) Fe^{2+}

496. Among the lanthanoids which was obtained by synthetic methods?

a) Lu b) Pm c) Pr d) Gd

497. The tendency to show complex formation is maximum in:

a) s-block elements b) p-block elements c) d-block elements d) f-block elements

498. $5f$-level is successively filled up in:

a) Lanthanoids b) Actinoids c) Rare gases d) Transition elements

499. Potassium manganate $(K¿¿2MnO_4)¿$ is formed when:

a) Cl_2 is passed into an aqueous $KMnO_4$ solution

b) MnO_2 is fused with KOH in air

c) Formaldehyde reacts with $KMnO_4$ in presence of strong alkali

d) $KMnO_4$ reacts with concentrated H_2SO_4

500. The sandstone in some iron ores is removed by:

a) Carbon filters b) Compressed air c) Limestone d) Sulphuric acid

501. Copper sulphate solution reacts with KCN and gives

a) $K_3[Cu(CN)_4]$ b) $CuCN$ c) $Cu(CN)_2$ d) $K_2[Cu(CN)_4]$

502. Which of the following ions has the highest magnetic moment?

a) $Ti^{3+¿¿}$ b) $Sc^{3+¿¿}$ c) $Mn^{2+¿¿}$ d) $Zn^{2+¿¿}$

503. The colour of Mohr's salt, $(NH_4)_2SO_4Fe(SO_4).6H_2O$ is:

a) White b) Green c) Violet d) Blue

504. Of the ions $Zn^{2+¿,Ni^{2+¿¿}¿}$ and $Cr^{3+¿¿}$, (atomic number of Zn=30, Ni=28, Cr=24)

a) All three are coloured

b) All three are colourless

c) Only $Zn^{2+¿¿}$ is colourless and $Ni^{2+¿¿}$ and $Cr^{3+¿¿}$ are coloured

d) Only $Ni^{2+¿¿}$ is coloured and $Zn^{2+¿¿}$ and $Cr^{3+¿¿}$ are colourless

505. A reagent that can separate Fe from Zn is:

a) NaOH b) HCl c) H_2S d) $NaNO_2$

506. $KMnO_4$ in basic medium is reduced to

a) K_2MnO_4 b) MnO_2 c) $Mn(OH)_2$ d) $Mn^{2+¿¿}$

507. Which of the following elements does not belong to the first transition series?

a) Ag b) Fe c) Cu d) V

508. Transition metals form complexes in their zero oxidation state. The example of the above fact is:

a) $Mn_2(CO)_{10}$ b) $[Cu(NH_3)_4]Cl_2$ c) $Zn_2[Fe(CN)_6]$ d) $[Ag(NH_3)_2]OH$

509. Which one of the following properties would you not expect copper to exhibit?

a) Malleability

b) High thermal conductivity

c) Low electrical conductivity

d) Ductility

510. Calomel is:

a) Hg_2Cl_2 and Hg b) $HgCl_2$ c) $Hg+HgCl_2$ d) Hg_2Cl_2

511. Which of the following reactions represents developing in photography?

a) $AgNO_3 + NaBr \longrightarrow AgBr + NaNO_3$

b) $AgBr + 2NH_3 \longrightarrow \left[Ag(NH_3)_2\right]Br$

c) $AgBr + 2Na_2S_2O_3 \longrightarrow Na_3\left[Ag(S_2O_3)_2\right] + NaBr$

d) $C_6H_4(OH)_2 + 2AgBr^x \longrightarrow C_6H_4O_2 + 2HBr + 2Ag$

512. Extraction for zinc from zinc blende is achieved by

a) Electrolytic reduction

b) Roasting followed by reduction with carbon

c) Roasting followed by reduction with another metal

d) Roasting followed by self reduction

513. Chromium compound used in tanning of leather is:

a) Cr_2O_3 b) CrO_2Cl_2 c) $CrCl_3$ d) $K_2SO_4.Cr_2(SO_4)_3.24$

514. $FeSO_4.(NH_4)_2SO_4.6H_2O$ is called

a) Green salt b) Glauber's salt c) Mohr's salt d) Alum

515. When MnO_2 is fused with KOH, a coloured compound formed, the product and its colour is

a) K_2MnO_4, ¿ colour b) $KMnO_4$, ¿ c) Mn_2O_3, brown d) Mn_3O_4, ¿

516. Anhydrous $CuCl_2$ and $CuBr_2$ exist as:

a) Monomer b) Dimer c) Trimer d) polymer

517. From a solution of $CuSO_4$, the metal used to recover copper is :

a) Na b) Ag c) Hg d) Fe

518. When MnO_4 is fused with KOH, a coloured compound is formed. The product and its colour is

a) K_2MnO_4, purple colour b) Mn_2O_3, brown

c) Mn_2O_4, black d) $KMnO_4$, purple

519. Cerium (Z = 58) is an important member of the lanthanides. Which of the following statements about cerium is incorrect?

a) The common oxidation state of cerium are +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 oxidizing agent.

520. Which metal is used for filament of electric bulb?

a) Pt b) Fe c) W d) Cu

521. Zinc does not show variable valency like d-block elements because

a) It is low melting

b) d-orbital is complete

c) It is a soft metal

d) Two electrons are present in the outermost orbit

522. In haemoglobin the iron shows oxidation state :

a) +2 b) +3 c) +1 d) +4

523. The term 'fool's gold' is used for a mineral which shines like gold. It is:

a) Iron pyrite b) Copper glance c) Cinnabar d) Cadmium sulphide

524. An aqueous solution of $CuSO_4$ and NH_4OH gives a deep blue complex of:

a) Cuprammonium sulphate

b) Cuprammonium hydroxide

c) Sodium hexametaphosphate

d) None of the above

525. Blow holes of steel are removed by adding:

a) C b) Ni c) Sand d) Spiegeleisen

526. A mixture of TiO_2 and $BaSO_4$ is called

a) Titanox b) Lithopone c) White pigment d) None of these

527. Which of the following has highest b.p.?

a) Cr b) Ti c) Fe d) Co

528. Which group of metals is known as Pt-metals?

a) Fe, Co, Ni b) Ag, Au, Cu c) Zn, Cd, Hg d) Ru, Rh, Pd

529. The compound $ZnFe_2O_4$ is

a) A normal spinel compound b) Interstitial compound

c) Coordination compound d) Double salt compound

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

a) Ferrous compounds are relatively more ionic than the corresponding ferric compounds.

b) Ferrous compounds are less volatile than the corresponding ferric compounds.

c) Ferrous compounds are more easily hydrolysed than the corresponding ferric compounds.

d) Ferrous oxide is more basic in nature than the ferric oxide.

531. Iron is manufactured from the ore

a) Haematite b) Cryolite c) Bauxite d) Chalcopyrite

532. After partial roasting the sulphide ore of copper is reduced by:

a) Reduction by carbon b) Electrolysis c) Self reduction d) Cyanide process

533. The bonds presents 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.

534. $Cu^{2+¿¿}$ ions would be reduced to cuprous ion if their solutions are mixed with an aqueous:

a) KI solution b) KCl solution c) K_2CO_3 solution d) K_2SO_4 solution

535. Which one of the following elements constitutes a major impurity in pig iron?

a) Silicon b) Oxygen c) Sulphur d) Graphite

536. Percentage of silver in German silver is:

a) 1.5% b) 2.5% c) 10% d) Zero percent

537. Oxford process is used in extraction of:

a) Fe b) Co c) Pt d) Ni

538. One of the product formed when $K_2Cr_2O_7$ reacts with conc H_2SO_4 in cold is

a) CrO_3 b) $Cr_2(SO_4)_3$ c) Cr_2O_3 d) CrO_4Cl_2

539. Addition of $K_4[Fe(CN)_6]$ solution to $FeCl_3$ solution gives:

a) Ferro-ferricyanide b) Ferri – ferrocyanide c) Ferri-ferricyanide d) None of these

540. The reaction between copper and hot concentrated sulphuric acid produces:

a) SO_2 b) SO_3 c) H_2 d) $Cu^{+¿¿}$ ions

541. Red hot steel rod on suddenly immersing in water becomes:

a) Soft and malleable b) Hard and brittle c) Tough and ductile d) Fibrous

542. Which of the following is obtained when auric chloride reacts with sodium chloride?

a) $Na[AuCl]$ b) $Na[AuCl_2]$ c) $Na[AuCl_3]$ d) $Na[AuCl_4]$

543. Lanthanum is grouped with f-block elements because

a) It has partially filled f-orbitals

b) It has both partially filled f and d-orbitals

c) The properties of lanthanum are very similar to the elements of $4f$-block

d) It is just before Ce in the Periodic Table

544. The point of dissimilarity between lanthanides and actinides is

a) Three outermost shells are partially filled b) They show oxidation state of +3 (common)

c) They are called inner transition elements d) They are radioactive in nature

545. Which of the following is called white vitriol?

a) $ZnCl_2$ b) $MgSO_4.7H_2O$ c) $Al_2(SO_4)_3$ d) $ZnSO_4.7H_2O$

546. Which metal is purified by Pattinson's process?

a) Ag b) Au c) Fe d) Sb

547. Which of the following have highest melting points?

a) p-block elements b) s- block elements c) d- block elements d) None of the above

548. Ferric oxide in furnace is reduced by:

a) C b) H_2 c) CO d) CO_2

549. Which statement 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

550. In India, iron is obtained from the ore:

a) Cassiterite b) Azurite c) Haematite d) Cryolite

551. The $Fe^{2+¿¿}$ ion is:

a) Blue b) Light green c) Very dark green d) Yellow

552. Which ion in aqueous medium has orange colour?

a) $Cr_2O_7^{2-¿¿}$ b) $Cr^{3+¿¿}$ c) $MnO_4^{-¿¿}$ d) $MnO_4^{2-¿¿}$

553. The compound widely used in making reference electrode is:

a) $ZnCl_2$ b) $CuSO_4$ c) Hg_2Cl_2 d) $HgCl_2$

554. Which statement is incorrect about transition elements

a) All elements form complexes

b) All are paramagnetic

c) All show variable valency

d) All are not coloured ions

555. The magnetic moment of a transition metal ion is 3.87 BM. The number of unpaired electrons present in it is

a) 2 b) 3 c) 4 d) 5

556. Which of the following is a lanthanoid?

a) Ta b) Rh c) Th d) Lu

557. The flux used in soldering is:

a) HgO b) ZnO c) CdO d) None of these

558. Ferric sulphate on heating gives:

a) $SO_2 \wedge SO_3$ b) SO_2 only c) SO_3 only d) S only

559. The raw materials fed into the blast furnace for making iron are:

a) FeO, $CaCO_3$ and coke

b) Fe_2O_3 , CaO and coke

c) Fe_2O_3 , $CaCO_3$ and coke

d) Fe_3O_4 , $Ca(OH)_2$ and coke

560. Which statement about corrosive sublimate is incorrect?

a) It is prepared by heating mercury in chlorine

b) It reduces stannic chloride

c) It oxidizes stannous chloride

d) It sublimes readily

561. Chalcopyrites is an ore of

a) Gallium b) Copper c) Calcium d) Magnesium

562. Siderite is an ore of

a) Cu b) Al c) Ag d) Fe

563. Which one of the following metals, is extracted on smelting of its ore in blast furnace?

a) Iron b) Sodium c) Potassium d) Magnesium

564. Chromium is used in making:

a) Bronze b) Brass c) Stainless steel d) Electrodes

565. Which lanthanide compound is used as a pigment?

a) CeO_2 b) $Ce(OH)_3$ c) $Lu(OH)_3$ d) $Tb(OH)_3$

566. In the extraction of Zn, the formation of blue flame is due to the burning of:

a) ZnO b) C c) Zn d) CO

567. Among the following the coloured compound is

a) $CuCl$ b) $K_3[Cu(CN)_4]$ c) CuF_2 d) $[Cu(CH_3CN)_4]BF_4$

568. 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) $Cr^{2+} > V^{2+} > Mn^{2+}$

569. Stainless steel contains:

a) 50%Cr b) 2.5%Cr c) 14%Cr d) 2%Cr

570. $KMnO_4$ (acidic/alkaline) is not decolourized by

a) Mohr salt b) Oxalic acid c) Benzene d) Propene

571. A solution of $Cr(NO_3)_2$ slowly turns green when concentrated HCl is added to it. It is due to the formation of:

a) $CrCl_3$ b) Cr_2O_3 c) CrO_4^{2-} d) Chloro complexes

572. Which is not an ore of gold?

a) Syvanite b) Calaverite c) Covellite d) Bismuth aurite

573. Silver iodide is used to produce artificial rain because:

a) It is easily prepared

b) Its structure is ice-like

c) It can easily be sprayed at high altitude

d) It is insoluble in rain water

574. The chemical formula of azurite is:

a) $Cu(OH)_2.2CuCO_3$ b) $CuSO_4.3Cu(OH)_2$ c) $Cu(OH)_2.CuCO_3$ d) $CuFeS_2$

575. The magnetic moment (in BM) of Zn^{2+} ion according to spin-only formula is

a) Zero b) 1.73 c) 2.84 d) 3.87

576. Zinc reacts with very dilute nitric acid to produce:

a) NO b) NH_4NO_3 c) NO_2 d) H_2

577. Which of the following may be colourless?

a) Fe^{3+} b) Cr^{3+} c) Cu^{2+} d) Cu^{+}

578. Fe ore is concentrated by:

a) Magnetic treatment b) Froth floatation c) Electrolysis d) Roasting

579. In the extraction of copper, the metal formed in the Bessemer's converter is due to the reaction:

a) $Cu_2S \longrightarrow 2Cu+S$

b) $2Cu_2O \longrightarrow 4Cu+O_2$

c) $2Cu_2S+3O_2 \longrightarrow 2Cu_2O+2SO_2$

d) $2Cu_2O+Cu_2S \longrightarrow 6Cu+SO_2$

580. In the case of d-block elements:

a) Outermost and penultimate shells are incomplete

b) Both penultimate and prepenultimate shells are incomplete

c) Outermost shell is incomplete

d) Innermost shell is incomplete

581. In electrorefining of copper, some gold is deposited as

a) Cathode b) Electrode c) Cathode mud d) Anode mud

582. 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

583. A magnetic moment of 1.73 BM will be shown by one among the following compounds:

a) $[Cu(NH_3)_4]^{2+}$ b) $[Ni(CN)_4]^{2-}$ c) $TiCl_4$ d) $[CoCl_6]^{4-}$

584. In general, the transition elements exhibit their highest oxidation states in their compounds with elements like:

a) C b) S c) S and P d) F and O

585. Silver, mercury and lead have been placed in same group of qualitative analysis, because they form:

a) Carbonates soluble in dilute HNO_3

b) Nitrates

c) Insoluble chlorides

d) Same type of coloured compounds

586. $K_2Cr_2O_7$ on strong heating gives:

a) K_2CrO_4 b) Cr_2O_3 c) O_2 d) All of these

587. $KMnO_4$ on heating above 200°C gives:

a) $K_2MnO_3+O_2+MnO_2$ b) $K_2MnO_4+MnO_2+O_2$ c) MnO_2+O_2 d) None of the above

588. The number of ions formed on dissolving one molecule of $FeSO_4(NH_4)_2SO_4.6H_2O$ is:

a) 4 b) 5 c) 3 d) 6

589. Acidic nature of $Zn(OH)_2$ is shown from the formation of the following compound with the formula:

a) Na_2ZnO_2 b) Na_2CO_3 c) $NaZnO_2$ d) None of these

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

a) Half-filled $4f$ sunshell

b) Completely filled $4f$ subshell

c) Possesses the general electronic configuration of noble gases

d) Empty $4f$ subshell

591. Rio Tinto process is used for extraction of:

a) Cu b) Ag c) Al d) Au

592. An alloy of Co, Ni and Fe used in permanent magnets is:

a) Invar b) Nichrome c) Alnico d) None of these

593. Bordeaux mixture consists of lime and:

a) $FeSO_4$ b) $CuSO_4$ c) $Cu(NO_3)_2$ d) $AgNO_3$

594. Larger number of oxidation states are exhibited by the actinoides than those by the lanthanoides, the main reason being

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 actinoides than the lanthanoides

595. F_2 is formed by reacting K_2MnF_6 with

a) MnF_4 b) SbF_5 c) $KSbF_6$ d) MnF_3

596. A reducing in atomic size with increase in atomic number is a characteristic of elements of

a) f-block b) d-block c) High atomic masses d) Radioactive series

597. Which method is based on distribution law?

a) Mond's process b) Parkes process c) Cupellation process d) Poling process

598. Schweitzer's reagent used for dissolving cellulose in the manufacture of artificial silk is:

a) $CuSO_4.5H_2O$ b) CuI c) $Cu(NH_3)_4SO_4$ d) $Cu(CH_3COO)_2.Cu(OH$

599. Formation of coloured ions by transition metals signifies

a) Absorption of light from UV range

b) Emission of light

c) Presence of unpaired electrons in s and p orbitals

d) Complimentary colours to the absorbed light

600. Invar steel, which is very little affected by temperature changes, contains 36%:

a) Co b) Ni c) Cu d) Al

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

a) $Ti^{2+¿\wedge V^{2+¿¿}¿}$ b) $Fe^{2+¿\wedge Cu^{2+¿¿}¿}$ c) $Cr^{2+¿\wedge Fe^{2+¿¿}¿}$ d) $Co^{2+¿\wedge Ti^{2+¿¿}¿}$

602. Which of the following is not an actinide?

a) Curium b) Californium c) Erbium d) Americium

603. Philosopher's wool when heated with BaO at 1100°C gives the compound :

a) $BaZnO_2$ b) $Ba+ZnO_2$ c) $BaCdO_2$ d) BaO_2+Zn

604. Brass is an alloy of Cu with

a) Al b) Sn c) Ag d) Zn

605. Actinides and lanthanides resemble in

a) Formation of complexes b) Oxidation state

c) Ionization energy d) Electronic configuration

606. Cuprous chloride is obtained from cupric chloride:

a) By heating cupric chloride with chlorine

b) By the electrolysis of cupric chloride containing HCl

c) By heating cupric chloride with conc. HCl and copper turnings

d) By passing H_2over $CuCl_2$

607. The properties of cast iron, wrought iron and steel are different because they have:

a) Different contents of sulphur

b) Different contents of carbon

c) Traces of different elements

d) Traces of different iron oxides

608. Variable valency is a general feature of …..elements.

a) s-block b) p-block c) d-block d) All of these

609. The inner transition elements are the elements in which the added electrons go to:

a) $(n-1¿\, d-¿$orbitals

b) $(n-2¿\, f$-orbitals

c) $(n-1¿\, d$-orbitals and $(n-¿1)\, f$-orbitals

d) $(n-1¿\, d$-orbitals and $ns-¿$orbitals

610. The compound insoluable in water is

a) Mercurous nitrate b) Mercurous chloride

c) Mercuric nitrate d) Mercurous perchlorate

611. A carbonate ore is

a) Carnallite b) Limonite c) Siderite d) Horn silver

612. Near the top of a blast furnace employed for the extraction of iron the metal oxides are reduced to spongy iron by:

a) Carbon b) CO c) CO_2 d) Limestone

613. Black Jack is an ore of

a) Cr b) Sn c) Zn d) Ni

614. Which of the following statements is correct?

a) Manganese salt gives violet borax bead test in the reducing flame

b) Ferric ions give a deep green precipitate on adding potassium ferricyanide solution

c) On boiling a solution having $K^{+¿,Ca^{2+¿,HCO_3^{-+¿}¿}¿}$ ions, we get a precipitate of $K_2Ca(CO_3)_2$

d) From a mixed precipitate of AgCl and AgI, ammonia solution dissolves only AgCl

615. The element showing oxidation states of +2, +3, +4, +6 and +7 is:

a) Cr b) Mn c) Co d) V

616. When H_2S is passed through $HgCl_2$ we get:

a) HgS b) HgS + Hg_2S c) Hg_2S+Hg d) Hg_2S

617. Which gas is absorbed by CuCl?

a) CO_2 b) CO c) SO_2 d) SO_3

618. Standard reduction potential of most of the transition elements is generally:

a) Negative b) Positive c) Zero d) None of these

619. Auric chloride on reaction with ferrous sulphate changes to:

a) Au b) AuCl c) Au_2SO_4 d) $Au_3(SO_4)_2$

620. Which of the following is deliquescent?

a) $ZnCl_2$ b) Hg_2Cl_2 c) $HgCl_2$ d) $CdCl_2$

621. Which of the following is correct?

a) Duralumin : $Al+Cu+Mg+Ag$ b) German silver : $Cu+Zn+C$

c) Gun metal : $CU+Zn+Sn$ d) Solder : $Pb+Al$

622. A certain metal will liberate hydrogen from dilute acids. It will react with water to form hydrogen only when the metal is heated and water is in the form of steam. The metal is probably

a) Iron b) Potassium c) Copper d) Mercury

623. Calomel reacts with ammonium hydroxide to form:

a) $Hg(NH_2)Cl$ b) $H_2N-Hg-Hg-Cl$ c) Hg_2O d) HgO

624. An example of double salt is:

a) Bleaching powder b) $K_4[Fe(CN)_6]$ c) Hypo d) Potash alum

625. Bronze is a mixture of

a) $Pb+Sn$ b) $Cu+Sn$ c) $Cu+Zn$ d) $Pb+Zn$

626. The element present in gun metal is

a) Co b) Cu c) Sc d) Ti

627. Pure conc. HNO_3 makes iron passive as the surface is covered with protective layer of:

a) $Fe(NO_3)_3$ b) Fe_3O_4 c) FeO d) Fe_2O_3

628. Thermite process is used in reduction of

a) Cr_2O_3 b) Al_2O_3 c) PbO_2 d) CuO

629. The slag obtained during the smelting process in the extraction of copper from copper pyrites is composed mainly of:

a) Cu_2S b) $FeSiO_3$ c) $CuSiO_3$ d) SiO_2

630. The mineral from which copper is manufactured is:

a) Galena b) Pyrite c) Malachite d) Chalcopyrite

631. Metal oxides which decomposes on heating is

a) ZnO b) CuO c) Al_2O_3 d) HgO

632. The correct formula for diammine silver (I) chloride is:

a) [Ag, (NH_3¿]Cl b) [Ag, $(NH_3)_2$]Cl c) [Ag, $(NH_2)_2$]Cl d) [Ag, $(NH_4)_2$]Cl

633. Which metal is used to add to gold to make it hard?

a) Cu b) Ag c) Ni d) Zn

634. On igniting Fe_2O_3 at 14000°C, the product obtained is

a) Fe_2O_3melt b) FeO c) Fe_2O_3 d) Metallic iron

635. Cosmetic powders and zinc ointments contain:

a) $ZnCl_2$ b) ZnO c) $ZnCO_3$ d) $ZnSO_4$

636. 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

637. A transition element X has the configuration $[Ar]d^4$ in its +3 oxidation state. Its atomic number is

a) 25 b) 26 c) 22 d) 19

638. The carbon content of:

a) Cast iron is in between that of steel and wrought iron

b) Pig iron is in between that of steel and wrought iron

c) Steel is in between that of cast iron and wrought iron

d) Wrought iron is in between that of steel and cast iron

639. If a compound absorbs violet colour from light, it will be :

a) Yellow b) Orange c) Blue d) Green

640. Which of the two have almost similar size?

a) $_{22}Ti \wedge _{40}Zr$ b) $_{41}Nb \wedge _{73}Ta$ c) $_{39}Y \wedge _{57}La$ d) $_{20}Ca \wedge _{31}Ir$

641. A white precipitate is formed on adding KI to $CuSO_4$ solution. It is of

a) Cu_2I_2 b) CuI_2 c) Cu_2S d) Cu_2SO_4

642. Which of the following is coloured compound?

a) CuF_2 b) CuI c) $NaCl$ d) $MgCl_2$

643. Addition of NaOH on $Zn^{2+¿¿}$ ion gives a white ppt. which on adding excess of NaOH dissolves. In this solution Zn exists in:

a) Cationic part b) Anionic part c) Both (a) and (b) d) None of these

644. $MnO_4^{-¿¿}$ reacts with bromide ion in alkaline medium to give

a) $MnBr_4$ b) $MnOBr_2$ c) $MnO_2, BrO_3^{-¿¿}$ d) MnO, BrO

645. Cyanide process is used to extraction of

a) Ag b) Ni c) Pt d) Zn

646. Which of the following weights less when weighted in magnetic field?

a) $ScCl_3$ b) $FeCl_3$ c) $TiCl_3$ d) VCl_3

647. The process of nitriding used in the treatment of steel is:

a) Heating steel in an atmosphere of ammonia

b) Heating steel to a bright redness and then cooling

c) Heating steel to bright redness and then cooling by plunging in air

d) None of the above

648. Duraluminium is an alloy contains:

a) Mg + Al

b) Mg + Cu + Al + Mn + Si

c) Mg + Cu

d) Cu + Al

649. Gun metal is

a) $Cu+Zn$ b) $Cu+Sn+Zn$ c) $Cu+Sn$ d) $Zn+Sn$

650. The tempering of steel makes it:

a) Hard b) Soft c) Heavy d) Brittle

651. Copper sulphate solution reacts with KCN to give

a) $CuCN$ b) $Cu(CN)_2$ c) $K_3[Cu(CN)_4]$ d) $K_2[Cu(CN)_4]$

652. The metallic oxide which impart purple colour to pottery is

a) Copper oxide b) Chromium oxide c) Lead oxide d) Manganese oxide

653. Formation of interstitial compounds makes the transition metal:

a) More soft b) More ductile c) More metallic d) More brittle

654. The purest zinc is made by

a) Electrolytic refining b) Zone refining

c) The van- Arkel method d) The Mond process

655. Which of the following ions has a magnetic moment of 5.93 BM?
(At. no. V=23, Cr=24, Mn=25, Fe=26)

a) $Mn^{2+¿¿}$ b) $Fe^{2+¿¿}$ c) $Cr^{2+¿¿}$ d) $V^{3+¿¿}$

656. $K_2Cr_2O_7 \xrightarrow{\Delta} K_2CrO_4+O_2+X$

In the above reaction X is

a) CrO_3 b) Cr_2O_7 c) Cr_2O_3 d) CrO_5

657. Soft and pliable steel is obtained by:

a) Tempering b) Nitriding c) Annealing d) None of these

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

a) $3d^2$ b) $3d^7$ c) $3d^5$ d) $3d^9$

659. Which substance can be used in the preparation of making ink?

a) Ag b) $AgNO_3$ c) AgBr d) $PbCO_3.Pb(OH)_2$

660. Which of the following compounds volatilises on heating?

a) $MgCl_2$ b) $HgCl_2$ c) $CaCl_2$ d) $FeCl_3$

661. Identify the statement which is not correct regarding copper sulphate

a) It reacts with $NaOH$ and glucose to give Cu_2O b) It gives CuO on strong heating in air

c) It reacts with KCl to give Cu_2Cl_2 d) It reacts with KI to give iodine

662. In solid $CuSO_4.5H_2O$, copper is coordinated to:

a) 4 water molecules b) 5 water molecules c) 1 sulphate molecule d) 1 water molecule

663. The grey cast iron contains:

a) Iron carbide b) Silicon carbide c) Silicon dioxide d) Graphite

664. When excess of sodium thiosulphate is added to dil. $AgNO_3$ solution a soluble compound X is formed. However, when dil. $Na_2S_2O_3$ solution is added to cone. $AgNO_3$ solution a white ppt. turning yellow and finally blac ppt. of Y is obtained. Which is correct pair?

a) X is Ag_2S and Y is $Na_3\left[Ag\left(S_2O_3\right)_2\right]$

b) X is $Na_3\left[Ag\left(S_2O_3\right)_2\right]$ and Y is Ag_2S

c) X is $Ag_2S_2O_3$ and Y is Ag_2S

d) X is $Ag_2S_2O_3$ and Y is $Na_3\left[\left(S_2O_3\right)_2\right]$

665. Which of the following is an acidic oxide?

a) Mn_2O_3 b) MnO_2 c) Mn_2O_7 d) MnO

666. A developer used in photography is:

a) A weak acid b) A weak base c) A mild reducing agent d) An oxidizing agent

667. Potassium permanganate acts as an oxidant in alkaline and acidic media. The final products formed from $KMnO_4$ in the two conditions are respectively

a) $MnO^{2-} \wedge Mn^{3+}$ b) $Mn^{3+} \wedge Mn^{2+}$ c) $Mn^{2+} \wedge Mn^{3+}$ d) $MnO_2 \wedge Mn^{2+}$

668. The general electronic configuration of transition element is :

a) $(n-1)d^{1-5}$ b) $(n-1)d^{1-10}ns^1$ c) $(n-1)d^{1-10}ns^{0-2}$ d) None of these

669. Mohr's salt is a:

a) Normal salt b) Acid salt c) Basic salt d) Double salt

670. Gun metal is an alloy of:

a) Cu and Al b) Cu, Sn and Zn c) Cu, Zn and Ni d) Cu and Sn

671. A metal gives two chlorides '$A \wedge$ 'B'. 'A' gives black precipitate with NH_4OH and 'B' gives white. With KI 'B' gives a red precipitate soluble in excess of KI. 'A' and 'B' are respectively:

a) $HgCl_2 \wedge Hg_2Cl_2$ b) $Hg_2Cl_2 \wedge HgCl_2$ c) $HgCl_2 \wedge ZnCl_2$ d) $ZnCl_2 \wedge HgCl_2$

672. Which of the following transition metal ions will have definite value of magnetic moment?

a) Sc^{3+} b) Ti^{3+} c) Cu^{3+} d) Zn^{2+}

673. In comparison to ferrous salts, ferric salts are:

a) More stable b) Less stable c) Equally stable d) None of these

674. Fool's gold is

a) $CuFeS_2$ b) FeS_2 c) CuS_2 d) Cu_2O

675. The material used for the lining of Bessemer's converter in the extraction of copper is:

a) Silica b) Lime c) Iron d) Cu

676. 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

677. Which of the following statements concerning transition elements is false?

a) They are all metals.

b) They easily form complex coordination compounds.

c) Compounds containing their ions are mostly coloured.

d) They show multiple oxidation states always differing by units of two.

678. Among Sc(III), Ti(IV), Pd(II) and Cu(II) ions

a) All are paramagnetic

b) All are diamagnetic

c) Sc (III), Ti (IV) are paramagnetic and Pd(II), Cu(II) are diamagnetic

d) Sc (III), Ti (IV) are diamagnetic and Pd(II), Cu(II) are paramagnetic

679. Nessler's reagent is

a) K_2HgI_4 b) K_2HgI_4+KOH c) K_2HgI_4+Hg d) K_2HgI_2+KOH

680. The spin only magnetic moment of $Fe^{2+¿¿}$ ion (in BM) is approximately.

a) 4 b) 7 c) 5 d) 6

681. Which of the following is not correct about transition metals?

a) Their compounds are generally coloured b) They can form ionic or covalent compounds

c) Their melting and boiling points are high d) They do not exhibit variable valency

682. In the metallurgy of iron, when limestone is added to the blast furnace, the calcium ion ends up as :

a) Slag b) Gangue c) Metallic calcium d) Calcium carbonate

683. KI and $CuSO_4$ solutions on mixing produce

a) $Cu_2I_2+K_2SO_4$ b) $Cu_2I_2+I_2+K_2SO_4$ c) $CuI_2+K_2SO_4$ d) $CuI_2+I_2+K_2SO_4$

684. Which one of the following statements is false?

a) During roasting, moisture is removed from the ore.

b) The ore is freed from almost all nonmetallic impurities.

c) Calcination of ore is carried out in the absence of any blast of air.

d) The concentrated zince blend is subjected to calcination during its extraction by pyrometallurgy.

685. Knowing that the chemistry of lanthanoids (Ln) is dominated by its +3 oxidation state, which of the following statements is incorrect?

a) Because of the large size of the Ln (III) ions the bonding in its compounds is predominantly ionic in character.

b) The ionic sizes of Ln (III) decrease in general with increasing atomic number.

c) Ln (III) compounds are generally colourless.

d) Ln(III) hydroxide are mainly basic in character.

686. Bell metal is an alloy of:

a) Zinc and copper b) Copper and nickel c) Zinc and lead d) Copper and tin

687. Chemical name of vermilion is:

a) Mercuric sulphide b) Mercurous sulphide c) Zinc sulphide d) Cadmium sulphide

688. The stainless steel developed in India contains the following special components:

a) Vanadium and cobalt

b) Nickel and magnesium

c) Manganese and chromium

d) Aluminium and zinc

689. Maximum number of oxidation states of the transition metals is derived from the following configuration:

a) ns-electrons

b) $(n-1)d$-electrons

c) $(n+1)d$-electrons

d) $ns+(n-1)d$-electrons

690. It is always advisable not to cover egg yolk or mustard with silver cutlery because:

a) Silver reacts with water of egg yolk to form AgOH

b) Silver reacts with sulphur of egg yolk forming black Ag_2S

c) Silver reacts with egg yolk forming Ag_2SO_4 which is a poisonous substance

d) Silver attracts UV light of the atmosphere, thereby spoiling the food

691. Which of the following is not oxidized by O_3?

a) $FeSO_4$ b) $KMnO_4$ c) KI d) K_2MnO_4

692. Mercury is transported in metal containers made of:

a) Silver b) Lead c) Iron d) Aluminium

693. Which may be consumed in the elemental form by human beings?

a) Zn b) Cu c) Ag and Cu d) Fe

694. Which one of the elements is a d-block element?

a) As b) Pt c) Pb d) Ra

695. Which metal does not react with $CuSO_4$ solution?

a) Fe b) Zn c) Mg d) Ag

696. Transition metal ions show colour because

a) They absorb light
b) They emit light
c) They are paramagnetic
d) They exhibit $d — d$ transition

697. Rinnmann's green is:

a) ZnO.CoO b) A green pigment c) Both (a) and (b) d) None of these

698. Which of the following ions is colourless in solution?

a) $V^{3+¿¿}$ b) $Cr^{3+¿¿}$ c) $Co^{2+¿¿}$ d) $Sc^{3+¿¿}$

699. Pig iron is manufactured using:

a) An electric furnace
b) A blast furnace
c) An open hearth furnace
d) None of the above

700. Blue vitriol is

a) $CuSO_4$ b) $CuSO_4 \cdot 5H_2O$ c) Cu_2SO_4 d) $CuSO_4 \cdot H_2O$

701. Each coinage metal has:

a) 18 electrons in their penultimate shell
b) 8 electrons in the outermost shell
c) 2 electrons in the outermost shell
d) 8 electrons in penultimate shell

702. Gold exhibits the variable oxidation states of:

a) +2, +3 b) +1, +3 c) +2, +4 d) +1, +2

703. Transition metals and their oxides are used in industrial processes as:

a) Detergents b) Insecticides c) Catalysis d) None of these

704. Gravity separation process is used for the concentration of

a) Calamine b) Haematite c) Chalcopyrite d) Bauxite

705. The composition of malachite is

a) $CuFeS_2$ b) $CuCO_3$ c) $CuCO_3.Cu(OH)_2$ d) $Cu(OH)_2$

706. The atomic numbers of vanadium (V), chromium (Cr), manganese(Mn), and iron (Fe) are respectively 23, 24, 25

and 26 . Which one of these may be expected to have the highest second ionisation enthalpy?

a) V b) Cr c) Mn d) Fe

707. Zinc white is a better white pigment than lead white because it:

a) Has more covering power than lead white

b) Is not blackened by the action of H_2S

c) Is soluble in water

d) Becomes yellow when heated

708. A yellow ppt. is formed when H_2S is passed through an acidified solution of:

a) $Co^{2+¿¿}$ ions b) $Cd^{2+¿¿}$ ions c) $Cu^{2+¿¿}$ ions d) $¿^{2+¿¿}$ ions

709. Which metal does not react with water or steam?

a) K b) Na c) Ca d) Cu

710. Verdigris is

a) Basic lead b) Basic copper acetate c) Basic lead acetate d) None of the above

711. The percentage of carbon is same in:

a) Cast iron and pig iron

b) Cast iron and steel

c) Pig iron and steel

d) Pig iron and wrought iron

712. $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$ is called:

a) Green salt b) Glauber's salt c) Mohr's salt d) Alum

713. Which do not decolourise $KMnO_4$ aqueous solution?

a) $C_2O_4^{2-¿¿}$ b) $HSO_3^{-¿¿}$ c) $CO_3^{2-¿¿}$ d) $SO_3^{2-¿¿}$

714. Among the following pair of ions, the lower oxidation state in aqueous solution is more stable in

a) $V^{2+¿,VO^{2+¿¿}¿}$ b) $Cr^{2+¿,Cr^{3+¿¿}¿}$ c) $Ti^{+¿,Ti^{3+¿¿}¿}$ d) $Cu^{+¿,Cu^{2+¿¿}¿}$

715. Green vitriol is formed by

a) $FeS_2+H_2O+O_2$ b) $FeS_2+H_2O+CO_2$ c) $FeS_2+CO+CO_2$ d) FeS_2+CO

716. Densities of transition metals are:

a) Low b) Very low c) High d) Very high

717. Mercury sulphide on heating with aquaregia yields:

a) $Hg(NO_3)_2$ b) $HgCl_2$ c) $Hg(NO_2)_2$ d) Hg_2Cl_2

718. All metal chlorides are soluble in water except those of:

a) Ag, Pb, Hg b) Na, K, Ca c) Zn, Cu, Cd d) Ba, Sr, Li

719. $K_3[Co(NO_2)_6]$ is:

a) Fischer's salt b) Thenard's blue c) Rinnmann's green d) Blue vitriol

720. Group 11 or IB elements are commonly known as:

a) Coinage metals

b) Transition metals

c) Typical elements

d) Representative elements

721. Most common oxidation states of Ce (cerium) are

a) +3, +4 b) +2, +3 c) +2, +4 d) +3, +5

722. The metal present in insulin is:

a) Cu b) Fe c) Zn d) Mg

723. Transition elements form alloys easily because they have:

a) Same atomic number

b) Same electronic configuration

c) Nearly same atomic size

d) None of the above

724. Muntz metal is an alloy of:

a) Cu and Sn b) Cu and Zn c) Ag and Zn d) Zn and Mn

725. A metal forms a volatile carbonyl compound and this property is taken advantages of its extraction. The metal is:

a) Iron b) Nickel c) Cobalt d) Titanium

726. The temperature of blast furnace to produce iron from its ore Fe_2O_3 varies from 500°C at the top of the furnace to about 1900°C at the bottom of the furnace. The reaction between the ore Fe_2O_3 and CO at the lowest temperature (500°C) is:

a) $3Fe_2O_3 + CO \longrightarrow 2Fe_3O_4 + CO_2$

b) $Fe_2O_3 + CO \longrightarrow 2FeO + CO_2$

c) $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

d) $Fe_2O_3 + CO \longrightarrow 2Fe + CO_2 + \frac{1}{2}O_2$

727. Adam's catalyst is:

a) Pt and PtO b) Pt c) Pt and PtO_2 d) Pt_2O and PtO

728. Which one of the following statement is not true with regard to transition elements?

a) They readily form complex compounds. b) They show variable oxidation states.

c) All their ions are colourless. d) Their ions contain partially filled d-electrons.

729. The element which forms a coloured chloride is:

a) Sb b) Na c) Zn d) Cr

730. In which of the following metallic bond is strongest?

a) V b) Fe c) Cr d) Sc

731. Which metal cation forms stronger complex salt?

a) Zn^{2+} b) Cd^{2+} c) Hg^{2+} d) All of same strength

732. The equilibrium $Cr_2O_7^{2-} + 2e \rightleftharpoons 2CrO_4^{2-}$:

a) Exists in acidic medium

b) Exists in basic medium

c) Exists in neutral medium

d) Does not exist

733. Atomic radii of Ti, Zr and Hf vary

a) $Ti > Zr > Hf$ b) $Ti < Zr < Hf$ c) $Ti < Hf < Zr$ d) $Ti < Zr = HF$

734. The basic character of the transition metal monoxide follows the order
(At. no of Ti =22, V=23, Cr=24, Fe=26)

a) $TiO > VO > CrO > FeO$ b) $VO > CrO > TiO > FeO$

c) $CrO > VO > FeO > TiO$ d) $TiO > FeO > VO > CrO$

735. MnO_2 dissolves in water to give an acid. The colour of the acid is

a) Green b) Blue c) Violet d) Red

736. Which of the following is used as indelible ink?

a) Aqueous $CuSO_4$ solution b) Aqueous $AgNO_3$ solution

c) Aqueous $NaCl$ solution d) Aqueous $NaOH$ solution

737. Which belongs to the actinides series?

a) Ce b) Cf c) Ca d) Cs

738. Pudding process is used in the manufacture of:

a) Steel b) Cast iron c) Wrought iron d) Pig iron

739. Which method is used to remove lead impurities from silver?

a) Leaching with dilute NaCN solution

b) Parkes process

c) Leaching with dilute NaCN in presence of air

d) Electrolytic purification using $AgNO_3$

740. Which of the following is the green coloured powder produced when ammonium dichromate is used in fire works?

a) Cr b) CrO_3 c) Cr_2O_3 d) $CrO(O_2)$

741. Which of the following is amphoteric?

a) V_2O_3 b) CuO c) V_2O_5 d) NiO

742. NH_3 forms complex with:

a) $CuSO_4$ b) $CdSO_4$ c) AgCl d) All of these

743. Transition metals are less reactive because of their:

a) High ionization potential and low melting point

b) High ionization potential and high melting point

c) Low ionization potential and low melting point

d) Low ionization potential and high melting point

744. The metal that does not displace hydrogen from an acid is:

a) Hg b) Zn c) Al d) Ca

745. Percentage of gold in 18 carat gold is

a) 75.0% b) 20.0% c) 80.0% d) 38.67%

746. The correct order of ionic radii of $Y^{3+¿,La^{3+¿,Eu^{3+¿,Lu^{3+¿¿¿¿}}}}$ is

a) $Y^{3+¿<¿¿}\ La^{3+¿<¿¿}\ Eu^{3+¿<¿¿}\ Lu^{3+¿¿}$ b) $Lu^{3+¿<¿¿}\ Eu^{3+¿<¿¿}\ La^{3+¿¿}\ ¿Y^{3+¿¿}$

c) $La^{3+¿<Eu^{3+¿<¿¿}¿}\ Lu^{3+¿¿}\ ¿Y^{3+¿¿}$ d) $Y^{3+¿<¿¿}\ Lu^{3+¿<¿¿}\ Eu^{3+¿<La^{3+¿¿}¿}$

747. Coinage metals show the properties of

a) Inert elements b) Normal elements c) Typical elements d) Transitional elements

748. When steel is heated red hot and then slowly cooled, the process is known as:

a) Annealing b) Hardening c) Tempering d) Nitriding

749. Which form contains the maximum percentage of carbon?

a) Wrought iron b) Cast iron c) Malleable iron d) Steel

750. During the extraction of copper, the impurity (FeS) is removed as slag by mixing the contaminated copper ore with silica and coke. The molecular formula of slag is

a) $FeSiO_3$ b) Fe_2O_3 c) $FeSi(solid)$ d) $FeSi(vapour)$

751. The correct order of $E°_{M^{2+¿/M¿}}$ values with negative sign for the four successive elements Cr, Mn, Fe and Co is

a) $Mn>Cr>Fe>Co$ b) $Cr>Fe>Mn>Co$

c) $Fe>Mn>Cr>Co$ d) $Cr>Mn>Fe>Co$

752. Which of the following is the chief ore of copper?

a) Cu_2S b) Cu_2O c) $CuFeS_2$ d) $CuCO_3.Cu(OH)_2$

753. The catalytic activity of transition metals and their compounds is ascribed mainly to:

a) Their magnetic behavior

b) Their unfilled d-orbitals

c) Their ability to adopt variable oxidation states

d) Their chemical reactivity

754. Which is used for stopping bleeding?

a) Ferric chloride b) Mohr's salt c) Green vitriol d) Sodium nitroprusside

755. On heating $ZnCl_2.H_2O$ the compound obtained is:

a) $ZnCl_2$ b) Zn(OH)Cl c) $Zn(OH)_2$ d) ZnO

756. Yellow mercury (II) oxide is obtained when

a) Hg is heated in excess of air at 623 K

b) $HgCl_2$ is treated with NaOH solution

c) $HgS$is roasted in air

d) $Hg(NO_3)_2$ is heated in presence of Hg

757. From gold aurocyanide $Na[Au(CN)_2]$, gold can be precipitated by adding powder of:

a) Zn b) Hg c) Ag d) None of these

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

a) $Yb^{3+¿<Pm^{3+¿<Ce^{3+¿<La^{3+¿¿}}}}¿$

b) $Ce^{3+¿<Yb^{3+¿<Pm^{3+¿<La^{3+¿¿}}}}¿$

c) $Yb^{3+¿<Pm^{3+¿<La^{3+¿<Ce^{3+¿¿}}}}¿$

d) $Pm^{3+¿<La^{3+¿<Ce^{3+¿<Yb^{3+¿¿}}}}¿$

759. Black HgS:

a) Dissolves in conc. HCl on boiling

b) Dissolves in boiling HCl + a crystal of $KClO_3$

c) Dissolves in NaOH

d) None of the above

760. The actinoids exhibit more number of oxidation states in general than the lanthanoids. This is because

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.

761. Hair dyes contain

a) Copper nitrate b) Gold chloride c) Silver nitrate d) Copper sulphate

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

a) H_2S b) KI c) NaOH d) NH_4OH

763. Which of the following statements is wrong?

a) An acidified solution of $K_2Cr_2O_7$ liberates iodine from iodides

b) In acidic solution dichromate ions are converted to chromate ions

c) Ammonium dichromate on heating undergoes exothermic decomposition to give Cr_2O_3

d) Potassium dichromate is used as a titrant for $Fe^{2+¿¿}$ ions

764. In the electroplating of gold the electrolyte used is:

a) Gold chloride

b) Gold nitrate

c) Gold sulphate

d) Potassium aurocyanide

765. Silver is extracted from argentiferous lead by:

a) Mond's process b) Parkes process c) Haber's process d) Bergius process

766. Aqua regia reacts with Pt to yield:

a) $Pt(NO_3)_4$ b) H_2PtCl_6 c) $PtCl_4$ d) $PtCl_2$

767. Agrentite is an ore of

a) Fe b) Al c) Cu d) Ag

768. Transition elements exhibits variable valencies because they release electrons from the following orbits

a) ns b) ns and np c) $(n-1)d$ and ns d) $(n-1)d$

769. For making good quality mirrors, plates of float glasses are used. These are obtained by floating molten glass over a liquid metal which does not solidify before glass. The metal can be:

a) Na b) Mg c) Hg d) Sn

770. How is limestone used in Fe extraction?

a) Oxidation of Fe ore b) Reduction of Fe ore

c) Formation of slag d) Purification of Fe formed

771. When copper pyrites is roasted in excess of air, a mixture of $CuO+FeO$ is formed. FeO is present as impurities. This can be removed as slag during reduction of CuO. The flux added to form slag is

a) SiO_2 which is an acid flux b) Lime stone, which is a basic flux

c) SiO_2, which is a basic flux d) CaO, which is a basic flux

772. The 'spin –only' magnetic moment [in units of Bohr magneton, (μ_β)]of ¿$^{2+}$¿¿ in aqueous solution would be (Atomic number of Ni=28)

a) 2.84 b) 4.90 c) 0 d) 1.73

773. Which of the following is used as purgative?

a) HgS b) Hg_2Cl_2 c) $HgCl_2$ d) $ZnSO_4$

774. The formula of sodium nitroprusside is:

a) $Na_4[Fe(CN)_5NOS]$ b) $Na_2[Fe(CN)_5NO]$ c) $NaFe[Fe(CN)_6]$ d) $Na_2[Fe(CN)_6NO_2]$

775. Which set represents an example of non typical transition elements?

a) Zn, Cd, Hg b) Sc, Ti, V c) Cu, Ag, Au d) Cr, Fe, Mn

776. When calomel reacts with NH_4OH solution, the compound formed is

a) $NH_2—Hg—Cl$ b) $Hg_2Cl_2NH_3$ c) $Hg(NH_3)_2Cl_2$ d) $HgCl_2NH_3$

777. The highest magnetic moment is shown by the transition metal ion with the configuration

a) $3d^2$ b) $3d^5$ c) $3d^7$ d) $3d^9$

778. Identify the alloy containing a non-metal as a constituent in it:

a) Bell metal b) Bronze c) Invar d) Steel

779. Chemical name of corrosive sublimate is:

a) Mercurous chloride b) Zinc chloride c) Mercuric chloride d) Aluminium chloride

780. Excess of KI reacts with $CuSO_4$ solution and then $Na_2S_2O_3$ solution is added to it. Which of the statements is incorrect for this reaction?

a) Cu_2I_2 formed b) CuI_2 is formed

c) $Na_2S_2O_3$ is oxidised d) Evolved I_2 is reduced

781. Cuprous ion is colourless, while cupric ion is coloured because

a) Both have half-filled p and d-orbiatls

b) Cuprous ion has a completed d-orbital and cupric ion has incomplete d-orbital

c) Cuprous ion has incomplete d-orbital and cupric ion has a complete d-orbital

d) Both have unpaired electrons in d-orbital

782. Which one of the following is a diamagnetic ion?

a) $Co^{2+¿¿}$ b) $Cu^{2+¿¿}$ c) $Mn^{2+¿¿}$ d) $Sc^{3+¿¿}$

783. Which of the following oxides of chromium is amphoteric in nature?

a) CrO b) Cr_2O_3 c) CrO_3 d) CrO_5

784. Cast iron is manufactured by remelting:

a) Pig iron and pouring into moulds

b) Steel and pouring into moulds

c) Wrought iron and pouring into moulds

d) Iron ore and pouring into moulds

785. The number of $3d$-electrons in $Cu^{+¿¿}$ ion is:

a) 8 b) 10 c) 6 d) 12

786. In the extraction of Fe from Fe_2O_3, the reducing agent used is

a) C b) Al c) Electrolytic reduction d) Cu

787. Transition elements are good conductors of current because:

a) They are metals

b) They are all solids

c) They have free electrons in outer energy orbits

d) All of the above

788. A compound is yellow when hot and white when cold. The compound is :

a) Al_2O_3 b) PbO c) CaO d) ZnO

789. A solid (*A*) which has photographic effect reacts with the solution of a sodium salt (*B*) to give a pale yellow ppt. (*C*). Sodium salt on heating gives brown vapours.

Identify A, B and C.

a) $AgNO_3, NaBr, AgBr$ b) $AgNO_3, NaCl, AgCl_2$ c) $AgNO_3, NaBr, AgCl_2$ d) $AgCl, NaBr, AgBr_2$

790. Silver possesses metallic lustre because:

a) It is a noble metal

b) It is coated with the oxide of silver

c) Valency electrons absorb white light completely

d) Valency electrons absorb and eject white light

791. Magnetic moment of manganese in $(NH_4)_2 MnBr_2$ is

a) 3.87 BM b) 5.91 BM c) 4.89 BM d) 2.82 BM

792. Which transition metal is used for the reduction of steam to hydrogen?

a) Mg b) Fe c) Sc d) Pt

793. The transition elements are more metallic than the representative elements because they have

a) Electron pairs in d-orbitals b) Availability of d-orbitals for bonding

c) The electron in d-orbitals d) Unpaired electron in metallic orbitals

794. Cerium can show the oxidation state of +4 because:

a) It resembles alkali metals

b) It has very low value of IE

c) Of its tendency to attain noble gas configuration of xenon

d) Of its tendency to attain f° configuration

: ANSWER KEY :

1)	c	2)	c	3)	c	4)	d	169)	c	170)	a	171)	d	172)	a
5)	b	6)	a	7)	c	8)	d	173)	c	174)	d	175)	b	176)	b
9)	d	10)	a	11)	b	12)	d	177)	c	178)	d	179)	a	180)	d
13)	b	14)	a	15)	b	16)	a	181)	c	182)	c	183)	a	184)	b
17)	d	18)	b	19)	c	20)	c	185)	a	186)	d	187)	a	188)	d
21)	c	22)	a	23)	a	24)	d	189)	b	190)	b	191)	a	192)	a
25)	c	26)	c	27)	c	28)	b	193)	b	194)	b	195)	b	196)	d
29)	b	30)	d	31)	c	32)	d	197)	d	198)	a	199)	a	200)	c
33)	d	34)	c	35)	d	36)	d	201)	c	202)	a	203)	b	204)	a
37)	c	38)	a	39)	b	40)	d	205)	c	206)	a	207)	d	208)	c
41)	c	42)	b	43)	c	44)	d	209)	b	210)	d	211)	b	212)	d
45)	b	46)	a	47)	c	48)	c	213)	a	214)	b	215)	c	216)	d
49)	b	50)	c	51)	c	52)	a	217)	b	218)	c	219)	c	220)	b
53)	d	54)	d	55)	d	56)	b	221)	d	222)	a	223)	a	224)	a
57)	d	58)	c	59)	a	60)	b	225)	c	226)	a	227)	d	228)	d
61)	b	62)	c	63)	a	64)	d	229)	a	230)	c	231)	a	232)	a
65)	d	66)	b	67)	c	68)	b	233)	c	234)	a	235)	a	236)	d
69)	b	70)	b	71)	c	72)	a	237)	a	238)	a	239)	c	240)	d
73)	d	74)	b	75)	c	76)	b	241)	b	242)	a	243)	a	244)	d
77)	c	78)	c	79)	b	80)	b	245)	a	246)	a	247)	d	248)	b
81)	b	82)	d	83)	d	84)	d	249)	b	250)	b	251)	c	252)	d
85)	b	86)	c	87)	d	88)	c	253)	c	254)	c	255)	b	256)	d
89)	b	90)	a	91)	b	92)	d	257)	b	258)	c	259)	d	260)	b
93)	c	94)	c	95)	b	96)	c	261)	b	262)	c	263)	b	264)	d
97)	a	98)	c	99)	d	100)	c	265)	a	266)	c	267)	d	268)	d
101)	c	102)	d	103)	b	104)	c	269)	d	270)	b	271)	b	272)	c
105)	c	106)	c	107)	c	108)	a	273)	a	274)	d	275)	d	276)	c
109)	a	110)	d	111)	d	112)	b	277)	b	278)	b	279)	b	280)	c
113)	d	114)	d	115)	a	116)	c	281)	b	282)	b	283)	c	284)	c
117)	d	118)	c	119)	d	120)	a	285)	b	286)	b	287)	a	288)	c
121)	d	122)	b	123)	a	124)	a	289)	a	290)	c	291)	b	292)	b
125)	b	126)	b	127)	d	128)	a	293)	a	294)	b	295)	b	296)	d
129)	a	130)	c	131)	c	132)	d	297)	d	298)	b	299)	d	300)	a
133)	d	134)	b	135)	d	136)	c	301)	a	302)	a	303)	b	304)	c
137)	c	138)	a	139)	b	140)	b	305)	c	306)	a	307)	a	308)	d
141)	b	142)	a	143)	a	144)	d	309)	a	310)	d	311)	d	312)	b
145)	d	146)	d	147)	b	148)	c	313)	c	314)	c	315)	d	316)	b
149)	a	150)	d	151)	d	152)	d	317)	c	318)	c	319)	d	320)	a
153)	a	154)	a	155)	c	156)	d	321)	a	322)	b	323)	b	324)	d
157)	b	158)	b	159)	a	160)	a	325)	c	326)	b	327)	c	328)	d
161)	b	162)	b	163)	b	164)	c	329)	d	330)	d	331)	c	332)	c
165)	c	166)	c	167)	b	168)	d	333)	b	334)	d	335)	a	336)	a

337)	a	338)	a	339)	d	340)	d	537)	d	538)	a	539)	b	540)	a
341)	c	342)	c	343)	d	344)	a	541)	b	542)	d	543)	c	544)	d
345)	d	346)	d	347)	b	348)	a	545)	d	546)	a	547)	c	548)	c
349)	c	350)	a	351)	d	352)	a	549)	b	550)	c	551)	b	552)	a
353)	a	354)	a	355)	d	356)	c	553)	c	554)	b	555)	b	556)	d
357)	c	358)	b	359)	a	360)	d	557)	c	558)	c	559)	c	560)	b
361)	d	362)	a	363)	d	364)	d	561)	b	562)	d	563)	a	564)	c
365)	a	366)	c	367)	a	368)	b	565)	a	566)	d	567)	c	568)	c
369)	a	370)	c	371)	a	372)	c	569)	c	570)	c	571)	d	572)	c
373)	a	374)	d	375)	b	376)	d	573)	b	574)	a	575)	a	576)	b
377)	c	378)	a	379)	a	380)	a	577)	d	578)	a	579)	d	580)	a
381)	c	382)	b	383)	c	384)	c	581)	d	582)	d	583)	a	584)	d
385)	c	386)	b	387)	a	388)	a	585)	c	586)	d	587)	a	588)	b
389)	b	390)	c	391)	d	392)	b	589)	a	590)	a	591)	a	592)	c
393)	c	394)	a	395)	d	396)	c	593)	b	594)	b	595)	b	596)	a
397)	b	398)	b	399)	b	400)	a	597)	b	598)	c	599)	d	600)	b
401)	b	402)	a	403)	a	404)	c	601)	c	602)	c	603)	a	604)	d
405)	b	406)	d	407)	b	408)	d	605)	d	606)	c	607)	b	608)	c
409)	c	410)	a	411)	b	412)	b	609)	b	610)	b	611)	c	612)	b
413)	c	414)	c	415)	b	416)	c	613)	c	614)	d	615)	b	616)	a
417)	d	418)	a	419)	a	420)	d	617)	b	618)	a	619)	a	620)	a
421)	a	422)	b	423)	c	424)	c	621)	c	622)	a	623)	a	624)	d
425)	d	426)	b	427)	b	428)	a	625)	b	626)	b	627)	b	628)	a
429)	d	430)	b	431)	b	432)	d	629)	b	630)	d	631)	d	632)	b
433)	b	434)	c	435)	c	436)	c	633)	a	634)	d	635)	b	636)	c
437)	c	438)	a	439)	c	440)	d	637)	a	638)	c	639)	b	640)	b
441)	c	442)	a	443)	a	444)	c	641)	a	642)	a	643)	b	644)	c
445)	b	446)	b	447)	a	448)	a	645)	a	646)	a	647)	a	648)	b
449)	c	450)	d	451)	c	452)	b	649)	b	650)	b	651)	c	652)	d
453)	d	454)	b	455)	d	456)	b	653)	d	654)	b	655)	a	656)	c
457)	b	458)	d	459)	b	460)	d	657)	c	658)	c	659)	b	660)	b
461)	b	462)	c	463)	b	464)	a	661)	c	662)	a	663)	d	664)	b
465)	c	466)	a	467)	c	468)	b	665)	c	666)	c	667)	d	668)	c
469)	b	470)	a	471)	a	472)	d	669)	d	670)	b	671)	b	672)	b
473)	b	474)	c	475)	a	476)	a	673)	a	674)	b	675)	b	676)	d
477)	a	478)	a	479)	c	480)	c	677)	d	678)	d	679)	b	680)	b
481)	b	482)	c	483)	a	484)	a	681)	d	682)	a	683)	b	684)	b
485)	c	486)	c	487)	b	488)	d	685)	c	686)	d	687)	a	688)	c
489)	c	490)	b	491)	a	492)	c	689)	d	690)	b	691)	b	692)	c
493)	a	494)	c	495)	c	496)	b	693)	c	694)	b	695)	d	696)	d
497)	c	498)	b	499)	b	500)	c	697)	c	698)	d	699)	b	700)	b
501)	a	502)	c	503)	b	504)	c	701)	a	702)	b	703)	c	704)	b
505)	a	506)	b	507)	a	508)	a	705)	c	706)	b	707)	b	708)	b
509)	c	510)	d	511)	d	512)	b	709)	d	710)	b	711)	a	712)	c
513)	d	514)	c	515)	a	516)	d	713)	c	714)	c	715)	a	716)	d
517)	d	518)	a	519)	c	520)	c	717)	b	718)	a	719)	a	720)	a
521)	b	522)	b	523)	a	524)	a	721)	a	722)	c	723)	c	724)	b
525)	d	526)	a	527)	b	528)	d	725)	b	726)	c	727)	a	728)	c
529)	a	530)	c	531)	a	532)	c	729)	d	730)	c	731)	c	732)	b
533)	d	534)	a	535)	d	536)	d	733)	d	734)	a	735)	c	736)	b

737)	**b**	**738)**	**c**	**739)**	**b**	**740)**	**c**
741)	**b**	**742)**	**d**	**743)**	**b**	**744)**	**a**
745)	**a**	**746)**	**d**	**747)**	**d**	**748)**	**a**
749)	**b**	**750)**	**a**	**751)**	**a**	**752)**	**c**
753)	**c**	**754)**	**a**	**755)**	**b**	**756)**	**b**
757)	**a**	**758)**	**a**	**759)**	**b**	**760)**	**d**
761)	**c**	**762)**	**b**	**763)**	**b**	**764)**	**d**
765)	**b**	**766)**	**b**	**767)**	**d**	**768)**	**c**
769)	**c**	**770)**	**c**	**771)**	**a**	**772)**	**a**
773)	**b**	**774)**	**b**	**775)**	**a**	**776)**	**a**
777)	**b**	**778)**	**d**	**779)**	**c**	**780)**	**b**
781)	**b**	**782)**	**d**	**783)**	**b**	**784)**	**a**
785)	**b**	**786)**	**a**	**787)**	**d**	**788)**	**d**
789)	**a**	**790)**	**d**	**791)**	**b**	**792)**	**b**
793)	**b**	**794)**	**d**				

: HINTS AND SOLUTIONS :

1 **(c)**

$AgNO_3 \longrightarrow Ag + NO_2 + \frac{1}{2}O_2$

2 **(c)**

Transition elements show covalency as well as ionic valency, $e.g.,\ Mn^{2+¿¿}$ ionic, $Mn^{7+¿¿}$ covalent.

3 **(c)**

Potassium dichromate on heating gives oxygen and chromic oxide (Cr_2O_3).

$4K_2Cr_2O_7 \xrightarrow{\Delta} 4K_2CrO_4 + 3O_2 + 2Cr_2O_3$

4 **(d)**

Cyanide process is used for the extraction of silver and gold.

5 **(b)**

ZnS is white in colour.

6 **(a)**

Silver metal is extracted by cyanide process.

$Ag_2S + 4NaCN \rightleftharpoons 2Na[Ag(CN)_2] + Na_2S$

Argentite sodium argentocyanide

$2Na[Ag(CN)_2] + Zn \longrightarrow Na_2[Zn(CN)_4] + 2Ag \downarrow$

Sodium tetracyano Zincate (II) ppt.

7 **(c)**

$Zn + 2NaOH \longrightarrow Na_2ZnO_2 + H_2$

∴Zn liberates hydrogen with hot conc. alkali.

8 **(d)**

$Zn^{2+¿¿}$ ion possess $(n-1)d^{10}$configuration. There are no unpaired electrons in $(n-1)d$- subshell due to which $d-d$ transitions are not possible. Hence, $Zn^{2+¿¿}$ ions are colourless.

9 **(d)**

Au and Ag salts are soluble in KCN due to complex formation others not.

10 **(a)**

$Au + 4CN^{-¿} + H_2O + \frac{1}{2}O_2 \longrightarrow 2¿¿$

¿ gold ore (X)

$2[Au(CN)_2]^{-¿} + Zn \longrightarrow [Zn(CN)_2]^{-¿+2Au¿}¿$

(X)

$Hence, [X] = [Au(CN)_2]^{-¿}, Y = [Zn(CN)_4]^{2-¿¿}¿$

11 **(b)**

Argentite is an ore of Ag having composition Ag_2S. It dissolves in NaCN due to formation of soluble complex.

$Ag_2S + 4NaCN \longrightarrow 2Na[Ag(CN)_2] + NaCl$

∴ NaCN is used to dissolve argentite.

12 **(d)**

Magnetic moment of transition metal is

$\mu = \sqrt{n(n+2)}$

13 **(b)**

It is a fact.

14 **(a)**

Fool's gold is $CuFeS_2$ which does not contain Au at all

15 **(b)**

$Cu + H_2SO_4 + \frac{1}{2}O_2 \longrightarrow CuSO_4 + H_2O$

17 **(d)**

Hg does not form amalgam with iron.

18 **(b)**

It is a process to get Zn granules.

19 **(c)**

Filling of differentiating electrons takes place in $3d$ in first transition series.

20 **(c)**

$Limonite\ Fe_2O_3.3H_2O$

$Siderite\ FeCO_3$

$Carnallite\ KCl.MgCl_2.6H_2O$

Chalcopyrites $CuFeS_2$

21 **(c)**
Wrought iron is the purest form of iron and contains carbon and other impurities from 0.2% to 0.5%.

22 **(a)**
Pd, Pt absorb H_2 in considerable amount.

23 **(a)**
It is a fact.

24 **(d)**
On fusing $AgCl$ with Na_2CO_3, metallic silver is obtained.

$$2AgCl + Na_2CO_3 \xrightarrow{Fuse} \underset{\text{metallic silver}}{2Ag\downarrow} + 2NaCl + CO_2 + \frac{1}{2}O_2$$

25 **(c)**
Transition metals exhibit variable oxidation states due to particitpation of $(n-1)d$-electron in bond formation.

26 **(c)**
In Bessemer's converter impurities of C, Mn, Si, P in pig iron are oxidized to produce steel.

27 **(c)**
$_{26}Fe$ has the configuration
$1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^6, 4s^2$.

28 **(b)**
$Fe^{2+¿¿}$ gets oxidized to $Fe^{3+¿¿}$ and $Cr_2^{6+¿¿}$ gets reduced to $Cr^{3+¿¿}$.

29 **(b)**
Lanthanide contraction relates to decrease in atomic as well as ionic size of $M^{3+¿¿}$ ions

31 **(c)**
It is a fact. The idea is used in chemical exhibitions.

32 **(d)**
$$SnCl_2 + 2HgCl_2 \longrightarrow SnCl_4 + Hg_2Cl_{2¿}$$
$$Hg_2Cl_2 + SnCl_2 \longrightarrow SnCl_4 + Hg_{¿2}$$

33 **(d)**
$V^{4+¿} \rightarrow 3d^1, 4s^0¿$
One unpaired electron, therefore, it is paramagnetic and coloured compound

34 **(c)**
All bivalent metal cations form oxide of type MO.
Copper forms two types of oxides $i.e., Cu_2O, CuO$
Barium forms BaO
Silver forms Ag_2O
Lead forms PbO, PbO_2
Hence, silver cannot form MO type of oxide because it forms monovalent cation ($Ag^{+¿¿}$).

35 **(d)**
Cinnabar is HgS.

36 **(d)**
Following reaction takes place during bessemerisation
$$2Cu_2O + Cu_2S \longrightarrow 6Cu + SO_2$$

37 **(c)**
Corrosive sublimate is $HgCl_2$ because it has corrosion nature and sublimation nature.

38 **(a)**
Actinides have variable valency due to very small difference in energies of $5f, 6d$ and $7s$ orbitals

39 **(b)**
$3d$-series contains $_{21}Sc¿_{30}Zn$ in all 10 elements.

40 **(d)**
Natural radioactivity is not a characteristic of transition elements.
General properties of transition elements are
(i) Formation of coloured salts
(ii) Formation of complex salts
(iii) Magnetic properties
(iv) Formation of interstitial compounds
(v) Formation of alloys etc.

41 **(c)**
$HgCl_2$ is dangerous poison; the antidote being white of an egg which is coagulated by the salt in the system and is eliminated by the system with salts absorbed in it, also Hg itself is very poisonous.

42 **(b)**
$$4Ag + 8NaCN + 2H_2O + O_2 \longrightarrow 4Na\left[Ag(CN)_2\right] + 4$$

43 **(c)**
Calamine is the carbonate ore of zinc ($ZnCO_3$).

44 **(d)**
Due to shielding effect.

45 **(b)**

Both show +8 oxidation states.

46 **(a)**

When $I^{-¿¿}$ is oxidised by $MnO_4^{-¿¿}$ in alkaline medium $I^{-¿¿}$ converts into $IO_3^{-¿¿}$.

$2KMnO_4 + 2KOH \longrightarrow 2K_2MnO_4 + H_2O + [O]$

$2KMnO_4 + 2H_2O \longrightarrow 2MnO_2 + 3KOH + 2[O]$

$2KMnO_4 + H_2O \xrightarrow{\text{alkaline}} 2MnO_2 + 2KOH + 3[O]$

$KI + 3[O] \longrightarrow KIO_3$

Hence,

$2KMnO_4 + KI + H_2O \longrightarrow 2KOH + 2MnO_2 + KIO_3$

47 **(c)**

$4\,Fe(CrO_2)_2 + 8\,K_2CO_3 + 7\,O_2 \longrightarrow 8\,K_2CrO_4 + 2F$

.

$2\,K_2CrO_4 + H_2SO_4 \longrightarrow K_2Cr_2O_7 + K_2SO_4 + H_2O$

48 **(c)**

Tungsten steel contains 14–20% W, 3–8% Cr; used for high speed tools as well as for cutting purposes and maintain the cutting edge of the blade.

49 **(b)**

Cast iron or pig iron contains 2 to 4.5% of carbon. It is least ductile and least pure form of iron. It is brittle and cannot be welded.

50 **(c)**

Hg-alloys with other metals are called amalgams.

51 **(c)**

$HgCl_2$ is dangerous poison, the antidote being white of an egg which is coagulated by the salt in the system and is eliminated by the system with salts absorbed in it, also Hg itself is very poisonous.

52 **(a)**

It is characteristic of Mn steel.

53 **(d)**

$CO^{3+¿¿}$ have higher charge density than $CO^{2+¿¿}$, so $CO^{3+¿¿}$ is more stable in octahedral complexes.

(ii) Zn exhibits only +2 oxidation state. So,

$Zn^{2+¿¿}$=[Ar]$3d^{10}, 4s^0$

Since, it does not contain any unpaired electron, its compounds are colourless.

(iii) d-block elements are generally paramagnetic and sometimes diamagnetic, but not ferromagnetic.

(iv) Osmium and ruthenium are VIII group elements, so can exhibit the highest oxidation state +8 in their oxides, *e.g.*, OsO_4.

Hence, statement 1 and 4 are correct.

54 **(d)**

$2\,FeSO_4 \xrightarrow{\Delta} Fe_2O_3 + SO_2 + SO_3.$

55 **(d)**

Hydrometallurgy is based on reduction. In this process, more electropositive Zn metal is used to precipitate gold, silver etc. from their complex salt solutions.

$2\,K\,Au(CN)_2 + Zn \longrightarrow K_2Zn(CN)_4 + 2\,Au$

$2\,Na\,Ag(CN)_2 + Zn \longrightarrow Na_2Zn(CN)_4 + 2\,Ag$

Alkali metals or aluminium can also reduce complex salts.

$K_2TiF_6 + 4\,K \longrightarrow 6\,KF + Ti$

$K_2ZrF_6 + 2\,Al \longrightarrow 2\,AlF_3 + 2\,K + Zr$

56 **(b)**

As oxidation state increases, electronegativity increases thus acidic characteristic increases not basic.

57 **(d)**

Zr and Hf possess similar atomic size and hence are called twins of Periodic Table. It is due to lanthanide contraction.

58 **(c)**

Boron(B), aluminium(Al) and gallium, (Ga) are present in IIIA group. They show +3 oxidation state. While cerium(Ce) is a lanthanoid. It is present in lanthanide series. It shows +3 and +4 oxidation states.

60 **(b)**

Iron carbide or Fe_3C.

61 **(b)**

$2\,Na[Ag(CN)_2] + Zn \longrightarrow Na_2Zn(CN)_4 + 2\,Ag$

This is extraction of Ag by cyanide process.

62 **(c)**

Constantan is an alloy of Cu and Ni.

63 **(a)**

Monel metal or constantan is an alloy of Cu, Ni, Fe, Mn.

64 **(d)**

It is a fact. Rest all are coinage metals.

65 **(d)**

$HgCl_2 + 2\,NH_3 \longrightarrow Hg(NH_3)_2Cl_2.$

66 **(b)**

Hydrometallurgy is the process of dissolving the

metal or its ore by the action of a suitable chemical reagent followed by recovery of the metal either by electrolysis or by the use of a suitable precipitating agent.

$$4\,Au + 8\,KCN + 2\,H_2O + O_2 \longrightarrow \underset{\text{air}}{4\,K\left[Au(CN)_2\right]} + 4\,K$$

$2\,K$¿

67 **(c)**
Pt is noble metal.

68 **(b)**

$$Zn(NO_3)_2 \longrightarrow ZnO + 2\,NO_2 + \frac{1}{2}O_2$$

69 **(b)**

$$Cu(NO_3)_2 \longrightarrow CuO + 2\,NO_2 + \frac{1}{2}O_2$$

70 **(b)**
It is a property of calomel.

72 **(a)**

$$NaCl + H_2SO_4 + K_2Cr_2O_7 \rightarrow \underset{\text{chromyl chloride}}{CrO_2Cl_2} + K_2SO_4 +$$

73 **(d)**
Spin only magnetic moment.

$$\mu = \sqrt{n(n+2)} = \sqrt{24}$$

$$\Rightarrow n^2 + 2n - 24 = 0$$

$$(n+6)(n-4) = 0$$

$$\therefore \quad n = 4$$

[$\because n = -6$ not possible.]
Here, n is the number of unpaired electrons.
The electronic configuration of the metal ion M^{x+} is
$Z(25) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^5$
Since, four unpaired electrons are present, the oxidation state must be +3.
$\therefore Z^{3+}(25) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^4$

74 **(b)**

$$ZnSO_4 + 2\,NaHCO_3 \longrightarrow ZnCO_3 + CO_2 + H_2O + N$$

75 **(c)**

$$\underset{(Unsaturated)}{Oil} + H_2 \xrightarrow{} \underset{(Saturated)}{Ghee}$$

76 **(b)**
Ag_2SO_4 contains Ag^+ $(4d^{10})$ and is colourless.
CuF_2 contains Cu^{2+} $(3d^9)$ and is coloured due to the presence of one unpaired electron in d-orbital of Cu^{2+}.
MgF_2 contains Mg^{2+} and is colourless $n/2$ CuCl contains Cu^+ $(3d^{10})$ and is colourless.

77 **(c)**
Malachite is an ore of Cu containing
$CuCO_3.Cu(OH)_2$ (green colour)

78 **(c)**
Pure copper as a cathode and impure copper as anode is used in refining of impure copper.

79 **(b)**
It is a fact.

80 **(b)**
Paramagnetism is shown by the positive ions of lanthanides except La^{3+} $(4f^0)$ and Lu^{3+} $(4f^{14})$. These ions are diamagnetic

81 **(b)**

$$HgI_2 + 2\,KI \longrightarrow \underset{\text{soluble}}{K_2HgI_4}$$

$$HgI_2 \xrightarrow{\Delta} Hg + I_2$$

82 **(d)**
Maximum oxidation state exhibited by d-block elements (O.S.) =no of ns electrons + no. of $(n-1)d$ electrons.
(a) O.S.=2+2=4 (b) O.S.=5+1=6
(c) O.S.=3+2=5 (d) O.S=5+2=7
$(n-1)\,d^5 ns^2$ configuration will achieve the highest oxidation state.

83 **(d)**

$$2\,MnO_2 + 4\,KOH + O_2 \xrightarrow[\text{Fusion}]{} 2\,K_2MnO_4 + 2\,H_2O$$

Oxidation number of Mn in K_2MnO_4 is

$$2\times(1) + x + 4(-2) = 0$$

$$x = +6$$

84 **(d)**
The process is called galvanisation and it protects iron from corrosion against the action of water and O_2.

85 **(b)**
Rest all are uses of Cu and its alloys.

86 **(c)**

$$4\,Ag + 8\,CN^- + 2\,H_2O + O_2 \longrightarrow 4\left[Ag(CN)_2\right]^- + 4\,OH^-$$

This process is called cyanide process. It is used in the extraction of silver from argentite (Ag_2S).

87 **(d)**
The refining of nickel is carried out by using CO. This process is called Mond's process.

88 **(c)**
Lanthanide contraction is due to the imperfect shielding of f-electrons due to the diffused shape of f-orbitals. Therefore, as the atomic number increases effective nuclear charge increases and this results in contraction of size of the $4f$-subshell."

90 **(a)**
In Bessemer's converter impurities of C, Mn, Si, P in pig iron are oxidized to produce steel.

92 **(d)**
These are reasons for the given fact.

93 **(c)**
Philosopher's wool on heating with BaO at 1100° C produce $BaZnO_2$.

$$BaO + ZnO \xrightarrow{1100\,^{\circ}C} Ba\,Zn\,O_2$$

95 **(b)**
Ferrous ion (Fe^{2+}) changes to ferric ion Fe^{3+} on reacting with acidified H_2O_2 as.

$$2K_4[Fe(CN)_6] + H_2SO_4\,H_2O_2 \longrightarrow 2K_3[Fe(CN)_6] + K_2SO_4 + 2H_2O$$

Electronic configuration of Fe^{3+}

$$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5$$

Number of d-electrons =5

Magnetic moment=$\sqrt{n(n+2)}$

$=\sqrt{5(5+2)}$=5.92BM

96 **(c)**
It reacts with alkalies and acids both.

98 **(c)**
$Argentite\ Ag_2S$

$Haematite\ Fe_2O_3$

$Malachite\ Cu(OH)_2.CuCO_3$

$Calamine\ ZnCO_3$

99 **(d)**
ZnO is also called Chinese white.

101 **(c)**
—do—

102 **(d)**
The transition metals form a large number of interstitial compounds in which small atoms like hydrogen, carbon, boron and nitrogen occupy interstitial sites in their lattices

103 **(b)**
It is a fact.

104 **(c)**
The presence of unfilled d-orbitals favours covalent bonding.

105 **(c)**
Fe does not show allotropy.

106 **(c)**
Acidified potassium dichromate is oxidized to unstable blue chromium peroxide, which is soluble in ether and produces blue coloured solution.

$$K_2Cr_2O_7 + H_2SO_4 + 4H_2O_2 \longrightarrow 2CrO_5 + K_2SO_4 +$$

blue colour

107 **(c)**

$$Ag_2S + 4KCN(aq.) \longrightarrow 2K[Ag(CN)_2](aq.) + K_2S$$

108 **(a)**
It is a fact.

109 **(a)**
It is a fact.

110 **(d)**
Strength of metallic bond depends upon number of unpaired electrons. As number of unpaired electrons increase, the bond strength also increases. So, Cr, Mo, show stronger bonding due to maximum number of unpaired electrons.

111 **(d)**
German silver contains Cu, Zn and Ni.

112 **(b)**
It is a fact.

113 **(d)**
The extraction to Cu metal involves bessemerisation. In this process, copper matte obtained from smelting transfered to a Bessemer converter (lined with silica) and a hot air blast is brown to obtain blister copper.

114 **(d)**

$$CuCl + CO \rightarrow CuClCO$$

115 **(a)**
CrO_3 dissolves in aqueous NaOH to give sodium chromate.

$$CrO_3 + 2NaOH \longrightarrow Na_2CrO_4 + H_2O$$

Sodium chromate

116 **(c)**

Silver metal is obtained by Mac-Arthur Forrest process which is called cyanide process. The concentrated ore of argentite is treated with dilute NaCN solution and a current of O_2 is continuously passed. Silver sulphide goes into solution in the form of soluble complex sodium argentocyanide.

$2Ag_2S + 8NaCN + O_2 + 2H_2O \longrightarrow$

$4Na[Ag(CN)_2] + 4NaOH + 2S$

The soluble complex is treated with zinc dust, when silver gets precipitated.

$2Na[Ag(CN)_2] + Zn \longrightarrow Na_2$¿

117 **(d)**

German silver alloy contains zinc, copper and nickel.

118 **(c)**

Follow electrorefining of Cu to get 100% pure Cu.

119 **(d)**

$AgBr + 2Na_2S_2O_3 \longrightarrow \underset{Soluble}{Na_3[Ag(S_2O_3)_2]} + NaBr.$

120 **(a)**

Invar is Ni-Fe alloy used in clock pendulum.

121 **(d)**

The basic character of hydroxides decreases from $La(OH)_3$ to $Lu(OH)_3$. Due to smaller size of Lu, the Lu— OH bond attains more covalent character.

122 **(b)**

It is called iodide of Millon's base.

123 **(a)**

It is a fact.

124 **(a)**

It is a fact.

125 **(b)**

Maximum oxidation state of transition metals =number of electrons in ($n-1$¿ d orbitals + number of electrons in ns orbital.

The electronic configuration of

Os=[xe]$4f^{14}, 5d^6.6s^2$

∴Maximum oxidation state 6+2=8

∴The highest oxidation state exhibited by transition metal is +8 $e.g., OsO_4$.

126 **(b)**

$2Cl_2 + HgO \longrightarrow Cl_2O + HgCl_2$

mercuric mercuric

oxide	chloride

128 **(a)**

$3d$ is partially filled.

129 **(a)**

$\mu = \sqrt{n(n+2)}$

$\Rightarrow \quad \sqrt{15} = \sqrt{n(n+2)}$

$\therefore \quad n = 3$

130 **(c)**

These show fcc, hep and bcc structures.

131 **(c)**
Formation of coloured solution is possible when metal ion in the compound contains unpaired electrons $e.g.$,
Cu^{+}:$3d^{10}\,4s^{0}$ colourless
Cu^{2+}:$3d^{9}\,4s^{0}$ blue

132 **(d)**
In wrought iron, carbon is present as Fe_3C (cementite) ie, iron carbide and graphite

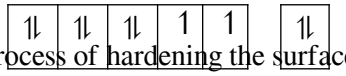
133 **(d)**
$[Ar]3s^1+3=Ti$, it means M^{3+} from Ti^{3+} ion

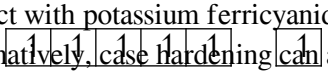
134 **(b)**
From $(n-1)d^1$ $(n-1)d^{10}$.

135 **(d)**
Lanthanoid contraction is due to ineffective shielding produced by larger f-subshell.

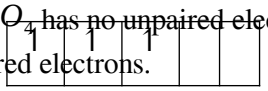
136 **(c)**
Zr and Hf have similar radii, therefore they show similar properties

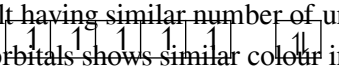
137 **(c)**
$Fe^{2+}(3d^6)$ and $Fe^{3+}(3d^5)$ will show different magnetic moment.

138 **(a)**


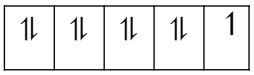
The process of hardening the surface of wrought iron by depositing a surface layer of steel on it is called case-hardening. It is done by heating wrought iron in contact with potassium ferricyanide


Alternatively, case hardening can also be done by heating wrought iron with charcoal and then plunging it in a suitable oil

139 **(b)**
$KMnO_4$ has no unpaired electron. Rest all have unpaired electrons.



140 **(b)**
Colour of transition metal ion salt is due to $d-d$ transition of unpaired electrons of d-orbital. Metal ion salt having similar number of unpaired electrons in d-orbitals shows similar colour in aqueous medium.


In $VOCl_2$ vanadium is present as V^{4+} and in $CuCl_2$, copper is present as Cu^{2+}.
So, $_{23}V=1s^2,2s^2\,2p^6,3s^2\,3p^6\,3d^3,4s^2$
$V^{4+}=1s^2,2s^2\,2p^6,3s^2\,3p^6\,3d^1$
$3d^1$

Number of unpaired electrons =1
and $_{29}Cu=1s^2,2s^2\,2p^6,3s^2\,3p^6\,3d^{10},4s^1$
$Cu^{2+}=1s^2,2s^2\,2p^6,3s^2\,3p^6\,3d^9$
$3d^9$

Number of unpaired electron =1
Hence, $VOCl_2$ and $CuCl_2$ show similar colour.

141 **(b)**
$Ag^{+}+e\longrightarrow Ag$; finely divided Ag is black in colour and thus. $AgNO_3$ causes black stain on skin. It is therefore, called lunar caustic.

142 **(a)**
Rest all properties are different.

143 **(a)**
AgCl is called in ore form as horn silver.

144 **(d)**
$Na_2CrO_4+2\,AgNO_3\longrightarrow Ag_2CrO_4+2\,NaNO_3$

145 **(d)**
$(n-1)d^8ns^2$
$(n-1)d^8$ ns^2
4(as in Ni)

$(n-1)d^5ns^1$
$(n-1)d^5$ ns^1
6(as in Cr)

$(n-1)d^3ns^2$
$(n-1)d^3$ ns^2
5(as in V)

$(n-1)d^5ns^2$
$(n-1)d^3$ ns^2
7(as in Mn)

146 **(d)**
$4\,NaCN+Ag_2S\longrightarrow 2\,NaAg(CN)_2+Na_2S$

147 **(b)**

$Cr^{3+¿¿}$ is a more stable state ($3d^3$-configuration).

148 **(c)**

Cu_2O is red oxide.

149 **(a)**

MnO and Mn_2O_3 are basic, MnO_2 is amphoteric, Mn_2O_7 basic.

150 **(d)**

Impurities of Cu and Ag from gold are removed by boiling impure gold with conc. H_2SO_4 and also by electrolytic method.

$Cu+2H_2SO_4 \xrightarrow{Heat} CuSO_4+SO_2+2H_2O$

$2Ag+2H_2SO_4 \xrightarrow{Heat} Ag_2SO_4+SO_2+2H_2O$

This method is called parting. Conc. HNO_3 can also be used for this purpose.

151 **(d)**

$4f$ and $5f$-belongs to different shell, experience different amount of shielding.

152 **(d)**

The magnitude of stability constants for some divalent metal ions of the first transition series with oxygen or nitrogen donor ligands increases in the order

$Mn^{2+¿}<Fe^{2+¿}<Co^{2+¿}<Ni^{2+¿}<Cu^{2+¿}<Zn^{2+¿}¿$

153 **(a)**

Silver halides are photosensitive and are easily reduced to Ag by mild reducing agent (hydroquinone, ferrous oxalate, etc.)

154 **(a)**

Ammounium dichromate on heating gives N_2 gas which is also given by heating of NH_4NO_2.

$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} Cr_2O_3+4H_2O+N_2\uparrow$

$NH_4NO_2 \xrightarrow{\Delta} 2H_2O+N_2\uparrow$

155 **(c)**

$2Au+3HNO_3+11HCl \longrightarrow 2HAuCl_4+3NOCl+6$

156 **(d)**

Hg-alloys with other metals are called amalgams.

157 **(b)**

In the blast furnace, iron oxide is reduced by

$3Fe_2O_3+CO \xrightarrow{300-400\,°C} 2Fe_3O_4+CO_2$

$Fe_3O_4+CO \xrightarrow{500-600\,°C} 3FeO+CO_2$

$FeO+CO \xrightarrow{700\,°C} Fe+CO_2$

158 **(b)**

The higher the charge on the metal ion, smaller is the ionic size and more is the complex forming ability. Thus, the degree of complex formation decreases in the order

$M^{4+¿}>MO_2^{2+¿}>M^{3+¿}>MO_2^{+¿}¿$

The higher tendency of complex formation of $MO_2^{2+¿¿}$ as compared to $M^{3+¿¿}$ is due to high concentration of charge on metal atom M in $MO_2^{2+¿¿}$

159 **(a)**

Stainless steel is an alloy of iron with chromium and nickel. Its composition is 82% Fe and 18% Cr +Ni. It resists corrosion and used for making automobile parts and utensils.

160 **(a)**

It is a fact.

161 **(b)**

$Cr^{2+¿¿}$ and $Fe^{2+¿¿}$

$Cr^{2+¿-3d^4¿}$

1	1	1	1	

(4 unpaired electrons)

$Fe^{2+¿-3d^6¿}$

↿⇂	1	1	1	1

(4 unpaired electrons)

162 **(b)**

$HgCl_2$ is easily volatile. It is insoluble in water and soluble in acids

163 **(b)**

In Cu configuration is $3d^{10}, 4s^1$ and not $3d^9, 4s^2$. In Cr configuration is $3d^5, 4s^1$ and not $3d^4, 4s^2$.

164 **(c)**

Fe is in +2 oxidation state in Mohr's salt.

165 **(c)**

Mn exhibits the maximum number of oxidation states.

Mn(Z=25)[Ar]$3d^5, 4s^2$

It can show +2, +3, +4, +5, +6 and +7 oxidation states.

166 **(c)**

Magnetic moment $(\mu)=\sqrt{n(n+2)}$BM where, 'n' is the number of unpaired electrons.

$_{23}V^{2+¿¿}$=[Ar]$3d^3$ (n=3)

$_{24}Cr^{2+¿¿}$=[Ar]$3d^4$ (n=4)

$_{25}Mn^{2+¿¿}$=[Ar]$3d^5$ (n=5)

$_{26}Fe^{2+¿¿}$=[Ar]$3d^6$ (n=4)

Hence magnetic moment will be maximum for $Mn^{2+¿¿}$ (equal to 5.92 BM).

167 **(b)**

The reaction,

$2FeS+3O_2 \longrightarrow 2FeO+2SO_2\uparrow$

Occurs during roasting of pyrites ore. Roasting is the process of heating concentrated ore in the stream of air to convert it into oxide.

168 **(d)**

$Mn^{2+¿,V^{4+¿,Ti^{4+¿¿}}}$ and $Cr^{3+¿¿}$ are stable oxidation state of respective elements.

169 **(c)**

$CuSO_4 \xrightarrow{1000\,K} CuO+SO_3\uparrow$

170 **(a)**

AgI is insoluble in NH_3.

171 **(d)**

CdS is yellow in colour (Follow II gp qualitative analysis).

173 **(c)**

$Fe(CNS)_3$ is a red-coloured substance.

174 **(d)**

$Zn^{2+¿¿}$ ions have all paired electrons so, it is diamagnetic .

175 **(b)**

Elements belonging to gp.3 to gp.12 are d-block elements.

176 **(b)**

It is a fact.

177 **(c)**

The formation of thin layer of oxide makes it passive.

178 **(d)**

Cu; Removal of next electron takes place from $4s$-subshell and the removal of next electron takes place from completely filled $3d^{10}$.

179 **(a)**
It is a fact.

180 **(d)**
All are transition elements.

181 **(c)**
Mond's process involves extraction of Ni.
$Ni + 4CO \xrightarrow{335\,K} Ni(CO)_4$ (Volatile);
$Ni(CO)_4 \xrightarrow{450\,K} Ni + 4CO$

182 **(c)**
Cu_2O is red oxide of Cu.CuO is black oxide of Cu.

183 **(a)**
$Mn^{7+} + 3e \longrightarrow Mn^{4+}$
$Mn^{7+} + 5e \longrightarrow Mn^{2+}$
$Mn^{7+} + 4e \longrightarrow Mn^{3+}$
$Mn^{7+} + e \longrightarrow Mn^{6+}$

184 **(b)**
$Cu + O_2 + CO_2 + H_2O \rightarrow Cu(OH)_2 \cdot CuCO_3$

185 **(a)**
German silver is an alloy of Cu + Zn + Ni (2:1:1 respectively).

187 **(a)**
Ag is best conductor of electricity among all metals.

188 **(d)**
$Cu^{2+} + Fe(CN)_6^{4-} \longrightarrow \underset{\text{Reddish brown ppt.}}{Cu_2[Fe(CN)_6]}$

189 **(b)**
Basicity of lanthanide hydroxides decreases along the lanthanides series from left to right

190 **(b)**
$CuSO_4 + 4NH_4OH \longrightarrow Cu(NH_3)_4SO_4 + 4H_2O$
$4FeCl_3 + 3Na_4Fe(CN)_6 \longrightarrow Fe_4[Fe(CN)_6]_3 + 12N$
$CuSO_4 + aq. \longrightarrow CuSO_4.5H_2O$ (Hydrated)
$2CuSO_4 + K_4Fe(CN)_6 \longrightarrow \underset{\text{Brown}}{Cu_2Fe(CN)_6} + 2K_2SO_4$

191 **(a)**
Cerium is used in gas mantles, glass polishing and in pyrophasic alloys for lighter flints.

192 **(a)**
Gadolinium (Z=64) [Xe] $4f^7, 5d^1, 6s^2$
Lutetium(Z=71)[Xe] $4f^{14}, 5d^1, 6s^2$
Lawrencium(Z=103)[Rn] $5f^{14}, 6d^1, 7s^2$
Tantalum(Z=73) [Xe]$4f^{14}, 5d^3, 6s^2$
Hence, gadolinium has got incompletely filled f-subshell.

193 **(b)**
$AgNO_3 \xrightarrow{h\nu} Ag + NO_2 + \frac{1}{2}O_2$; brown coloured bottles cut the passage of light through it.

194 **(b)**
Hg has low b.p. like other members of gp. 12.

196 **(d)**
Elements having electronegativity in the range of 1.35 – 1.82 do not form stable hydride. Thus, leads to hydride gap. These are present in the middle of the Periodic Table *i.e.*, belongs to groups 7, 8 and 9.

197 **(d)**
Magnetic moment depends upon the number of unpaired electron.
d^3: 3 Unpaired electron
d^2: 2 Unpaired electron
d^8: 2 Unpaired electron
d^6: 4 Unpaired electron

198 **(a)**
The b.p. of Zn, Cd, Hg are 1193, 1040, 1129.7K, comparatively lower values, and are called volatile metals. These are therefore, purified by distillation.

199 **(a)**
The differentiating electrons enter the ns-orbital but they have configuration $(n-1)d^{10}ns^2$.

201 **(c)**
Many of the d-block (transition) elements and their compounds act as catalyst . Catalytic property is probably due to the utilisation of $(n-1)$ d-orbitals or formation of interstitial compounds.

202 **(a)**
$2HgCl_2 + SnCl_2 \longrightarrow SnCl_4 + Hg_2Cl_2$ (white)
$Hg_2Cl_2 + SnCl_2 \longrightarrow SnCl_4 + Hg_2$ (Grey)

203 **(b)**
Mohr salt is $FeSO_4.(NH_4)_2SO_4.6H_2O$
$\therefore$ It is double salt having $FeSO_4 \wedge (NH_4)_2SO_4$.

204 **(a)**
Mn in MnO_4^- has +7 and Cr in CrO_2Cl_2 has +6

oxidation state, the highest for Mn and Cr respectively.

205 **(c)**
Lanthanides are the 14 elements of IIIB group and sixth period (At. no.=58 to 71) that are filling $4f$-subshell of antipenultimate shell from 1 to 14 . Actually, they are placed below the Periodic Table in horizontal row as lanthanide series.

206 **(a)**
When the quenched steel is heated to temperature below red hot and then allowed to cool slowly. It becomes soft. This process is known as annealing

207 **(d)**
It is a use of chrome alum.

208 **(c)**
We know that by reducing auric chloride by stannous chloride, the colloidal solution of gold is obtained. It is known as purple of cassius

209 **(b)**
$2\,CuCl_2+SO_2+2H_2O\longrightarrow Cu_2Cl_2+2HCl+H_2SO$

210 **(d)**
C, Fe, Mg react with hot water to give H_2.

211 **(b)**
Tungsten is the highest m.p. metal (3410°C).

212 **(d)**
Mercurous chloride (calomel) is prepared by heating $HgCl_2$ and Hg in iron vessel.
$HgCl_2+Hg\xrightarrow{\Delta}Hg_2Cl_2$
It can also be prepared by the reduction of mercury (II) chloride by tin (II) chloride in a limited quantity.
$2\,HgCl_2+SnCl_2\xrightarrow{\Delta}Hg_2Cl_2+SnCl_4$

213 **(a)**
It is a fact.

214 **(b)**
$SO_3^{2-}+H_2O\longrightarrow SO_4^{2-}+2H^+$
$MnO_4^-+8H^++5e\longrightarrow Mn^{2+}+4H_2O$.

215 **(c)**
It is a fact.

216 **(d)**
The element having unpaired electron is paramagnetic. More the number of unpaired electrons, more will be paramagnetic character.
Mn (25)=$1s^2,2s^2,2p^6,3s^2,3p^6,4s^2,3d^5$
$\therefore$5 unpaired electrons
Fe (26)= $1s^2,2s^2,2p^6,3s^2,3p^6,4s^2,3d^6$
$\therefore$4 unpaired electrons
Ni (28)= $1s^2,2s^2,2p^6,3s^2,3p^6,4s^2,3d^8$
$\therefore$2 unpaired electrons
Cu (29)= $1s^2,2s^2,2p^6,3s^2,3p^6,4s^2,3d^{10}$
$\therefore$1 unpaired electrons
$\therefore$Mn has maximum and Cu has least paramagnetic property.

217 **(b)**
It is a reason for the given fact.

218 **(c)**
The cupellation step in Parke's process is used to purify Ag from lead.

219 **(c)**
It is a fact.

221 **(d)**
All are facts about Hg.

222 **(a)**
The most abundant transition metal is Fe.

223 **(a)**
All those inner-transition elements having +2 oxidation state, changes to +3, and act as reducing agents. While those having +4 tend to change to +3 and act as oxidizing agents. Therefore, Np^{4+} acts as an oxidizing agent

224 **(a)**
Oxide of Mn in its intermediate oxidation state *i.e.*, +4 is MnO_2. This is amphoteric in character.

225 **(c)**
Silver nitrate decomposes to silve nitrite on heating above its melting point $(212\,°C)$.
$2\,AgNO_3\xrightarrow{212\,°C}2\,AgNO_2+O_2$
On heating above $450\,°C$ (red hot), silver nitrate decomposes to metallic silver, oxide of nitrogen and oxygen.
$2\,AgNO_3\xrightarrow{450\,°C}2\,Ag+2\,NO_2+O_2$

226 **(a)**
Cu^{2+} has one unpaired electron.

227 **(d)**

$ZnSO_4$ forms soluble zincates.

228 **(d)**

Thermite is $Fe_2O_3 + Al$ used for welding.

229 **(a)**
Cu_2O is called ruby copper.

230 **(c)**
Np and Puin $NpO_3^{+¿¿}$ and $PuO_3^{+¿¿}$ oxocations show +7 oxidation state which are not so stable

231 **(a)**
Ammonia soda process is for manufacture of Na_2CO_3.

232 **(a)**
Steel is the most important commercial variety of iron having percentage of carbon $0.25-2$ (between cast iron wrought iron).

233 **(c)**
$_{28}Ni^{2+¿¿}$ has two unpaired electrons, $_{22}Ti^{3+¿¿}$, has one unpaired electron.

235 **(a)**
Ionization energy increases along the period and therefore, they have lesser values than p-block and more value of IE than s-block elements.

237 **(a)**
Cu, Ag, Au group of element are called coinage metals as these are used in minting coins.

238 **(a)**
Cadmipone is $CdS+BaSO_4$.

239 **(c)**
Correct order of melting points is
$Mn(1246\,C)<Ti(1668\,C)<V\approx Cr(1907\,C)$

240 **(d)**
Actual composition of chromite ore$(FeCr_2O_4)$ is FeO.Cr_2O_3. In FeO, the oxidation state of Fe is +2 while in Cr_2O_3, the oxidation state of Cr is +3.

241 **(b)**
$$HgO \xrightarrow{\Delta} Hg+\frac{1}{2}O_2$$

242 **(a)**
Cast iron has the highest percentage of carbon. It contains 2 to 4.5 % of carbon along with impurities such as sulphur, silicon, phosphorus etc. It is the least pure form of iron.

243 **(a)**
Argentite is Ag_2S.

244 **(d)**
$2HgS+3O_2\longrightarrow 2HgO+2SO_2$,
$2HgO+HgS\longrightarrow 3Hg+SO_2$

245 **(a)**
Transuranic elements start after uranium and begin with Np (Neptunium)

246 **(a)**
All these compounds are less soluble in water and only $Zn(OH)_2$ is soluble in NH_4Cl+NH_4OH due to formation of tetramine zinc (II) complex.
$Zn^{2+¿}+4\,NH_4OH\longrightarrow[Zn(NH_3)_4]^{2+¿+2H_2O¿}¿$

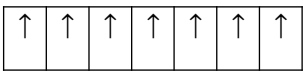
247 **(d)**
Transition metals can form ionic or covalent compounds and their melting and boiling points are high. Their compounds are generally coloured and they usually
exhibit variable valency.

248 **(b)**
Both $KMnO_4$ and $FeCl_3$ are oxidant and thus, no reaction.

249 **(b)**
Alloy is a homogeneous mixture of two or more metals. Mercury forms amalgams (alloy) with gold, silver and tin. But it does not react with iron or platinum.

250 **(b)**
Purple of Cassius is the trade name for gold sol. in water.

252 **(d)**
Gd(64)
$[Xe]_{54}$ $4f^7$



$5d^1$

All the electrons of $4f$-orbital are unpaired, hence stable.
Thus, Gd(64) has EC as $[Xe]_{54}\,4f^7\,5d^1\,6s^2$
Instead of $[Xe]_{54}\,4f^8\,6s^2$

253 **(c)**
The electronic configuration of mercury (80) is [Xe] $4f^{10},5d^{10},6s^2$. Its d-subshell is completely filled, thus it prevents the overlapping of d-orbitals ($d-d$

overlapping).

Hence, it is liquid metal at room temperature.

254 **(c)**

Azurite is the ore of copper, its molecular formula is $Cu(OH)_2.2\,CuCO_3$.

255 **(b)**

$CrO_4^{2-} + 2H^+ \longrightarrow Cr_2O_7^{2-} + H_2O$

256 **(d)**

$Zn + 2\,HCl \longrightarrow ZnCl_2 + H_2$

$Zn + \underset{Dil.}{H_2SO_4} \longrightarrow ZnSO_4 + H_2$

$4\,Zn + 10\,HNO_3 \longrightarrow 4\,Zn(NO_3)_2 + N_2O + 5\,H_2O$

Thus, NO_3^- ions are reduced to N_2O whereas in first two reactions H^+ is reduced to H_2.

257 **(b)**

Siderite —$FeCO_3$, calcite (or limestone) — $CaCO_3$, silver glance(or argentite) —Ag_2S, fool's gold (or iron pyrites) —FeS_2.

258 **(c)**

$3\,Fe + 4\,H_2O \longrightarrow Fe_3O_4 + 4\,H_2$

259 **(d)**

In the electrolytic refining of zinc, anode is made up of impure zinc while a strip of pure zinc acts as cathode. An acidified solution of zinc sulphate acts as electrolyte. When electricity is passed, following reactions occur.

At cathode

$Zn^{2+} + 2e^- \longrightarrow Zn$

pure

At anode

$Zn \longrightarrow Zn^{2+} + 2e^-$

impure

261 **(b)**

Ni combines with CO to form volatile $Ni(CO)_4$ which decomposes to give pure Ni metal and CO on heating.

$Ni(CO)_4 \xrightarrow{Heat} Ni + 4\,CO\uparrow$

Volatile metal

262 **(c)**

In Bessemer's converter impurities of C, Mn, Si, P in pig iron are oxidized to produce steel.

263 **(b)**

Ni

264 **(d)**

Due to lanthanide contraction there occurs net decrease in size. Only one 0.85 Å is smaller one.

265 **(a)**

When oxyhaemoglobin changes to deoxyhaemoglobin, Fe^{2+} ion changes from diamagnetic to paramagnetic.

266 **(c)**

Zn blende is ZnS.

267 **(d)**

Transitional metal ion having unpaired electrons are coloured while those which have no unpaired electron are colourless.

TiF_6^{2-}

Ti^{4+} :[Ar]$3d^0$;0 unpaired electrons; colourless

Cu_2Cl_2

Cu^+:[Ar]$3d^{10}$;0 unpaired electrons; colourless

CoF_6^{3-},

Co^{3+}:[Ar]$3d^6$;4 unpaired electrons; coloured

$NiCl_4^{2-}$

Ni^{2+}:[Ar]$3d^8$;2 unpaired electrons; coloured

268 **(d)**

$Ti: 3d^2 4s^2; V: 3d^3 4s^2;\ Cr: 3d^5 4s^1;$

$Mn: 3d^5 4s^2;$

$Ti^{2+}: 3d^2; V^{3+}: 3d^2; Cr^{4+}: 3d^2$ $\quad Mn^{5+}: 3d^2$

269 **(d)**

$Hg_2Cl_2 + 2\,NH_3 \longrightarrow HgNH_2Cl + Hg + NH_4Cl$

white black

270 **(b)**

Molybdenum steel is resistant to acid.

271 **(b)**

A characteristic of transition elements.

272 **(c)**

A characteristic hydride formation by d-block elements.

273 **(a)**

RBCs contain Fe in haemoglobin.

275 **(d)**

Pt is a noble metal.

276 **(c)**

ZnS (white), is precipitated in weak acidic medium

solution.

277 **(b)**
Zn, Cd, Hg are d-block elements but not regarded as transition elements because these do not have partially filled d-orbitals in their most common oxidation states

278 **(b)**
The solubility order is
$AgF > AgCl > AgBr > AgI > A g_2 S$

279 **(b)**
Brass is an alloy of copper and zinc (60−¿80% Cu and 40−¿20% Zn).

280 **(c)**
$F e^{2+¿} \longrightarrow F e^{3+¿+e;}$ $M n^{7+¿+5e \longrightarrow M n^{2+¿}}$

281 **(b)**
Ag salts on strong heating form Ag.

282 **(b)**
Mond's process involves extraction of Ni.
$¿ + 4\,CO \underset{\rightarrow}{335\,K} \ni (CO)_4$ (Volatile);
$¿(CO)_4 \underset{\rightarrow}{450\,K} \ni + 4\,CO$

283 **(c)**
$2\,F e_2(SO_4)_3 + 3\,K_4[Fe(CN)_6] \longrightarrow \underset{(Prussian¿)}{F e_4[Fe(CN)_6]_3} +$
.

284 **(c)**
German silver is an alloy of copper, zinc and nickel. It is used in utensils and resistance wire.

285 **(b)**
Due to the formation of $CuCO_3 . Cu(OH)_2$; green

286 **(b)**
It is a reason for the given fact.

287 **(a)**
$FeSO_4$ is mostly used in manufacture of blue-black ink, as a mordant in dyeing and tanning industries.

288 **(c)**
It is a trade name for $CuSO_4 . 5H_2O$.

289 **(a)**
The elements having incomplete d-orbital can show variable oxidation state (because the electrons move the two levels of d itself)

∴Zn has completely filled d-orbital.
∴It does not show variable oxidation state. It always show +2 oxidation state.

291 **(b)**
It is a fact.

292 **(b)**
$$A g_2 O \underset{\rightarrow}{\Delta} 2\,Ag + \frac{1}{2} O_2$$

293 **(a)**
Calamine $(ZnCO_3)$ is an ore of zinc.

294 **(b)**
Haematite $(F e_2 O_3)$ having FeO is first oxidized to $F e_2 O_3$ and then reduced to Fe by Co.

295 **(b)**
MnO_2 forms amphoteric oxide due to intermediate oxidation state

296 **(d)**
Ir does not dissolve in aqua regia as it is much more noble than Au and Pt

297 **(d)**
Hg has +1 oxidation state in $H g_2 C l_2$.

298 **(b)**
$[Co(N H_3)_5 Cl] C l_2$ ionizes to ¿ and $C l^{-¿¿}$. These $2\,C l^{-¿¿}$ react with $A g^{+¿¿}$ to form white ppt. of AgCl.

299 **(d)**
All are facts.

300 **(a)**
$K_2 Cr_2 O_7 + H_2 SO_4 + 4\,H_2 O_2 \rightarrow K_2 SO_4 + 2 Cr O_5 + 5$

301 **(a)**
White vitriol is $ZnSO_4 . 7H_2O$.

302 **(a)**
No in iron complex has +1 oxidation number.

303 **(b)**
$M n^{2+¿¿}$ is most stable as it has half-filled d-orbitals.

304 **(c)**
$$ZnC l_2 \cdot 2H_2O \vec{\Delta} Zn(OH)Cl + HCl + H_2O$$
$$Zn(OH)Cl \rightarrow ZnO + HCl$$

305 **(c)**
$3\,Fe(CN)_2 + 4\,Fe(CN)_3 \rightarrow F e_4[Fe(CN)_6]_3$ or

$Fe_7C_{18}N_{18}$

Prussian blue

306 **(a)**
$CrO_4^{2-¿¿}$ has no unpaired $d-¿$electron.

307 **(a)**
$La(OH)_3$is more basic than $Lu(OH)_3$. This is because ionic size of $La^{3+¿¿}$ ion is more than $Lu^{3+¿¿}$ ion

308 **(d)**
Cerium is commonly used in manufacture of alloys of lanthanide. It is also used in dying cotton or fabrics, for scavenging oxygen and sulphur from other metals and also used as catalyst.

309 **(a)**
—do—

310 **(d)**
It is a reason for the given fact.

311 **(d)**
It is a fact.

312 **(b)**
Zn does not show corrosion.

313 **(c)**
The process is called hardening of steel and it develops hard and brittle nature in steel.

314 **(c)**
Lowest m.p. among all metals is of Hg (–38.9°C).

315 **(d)**
The temperature of the slag zone in the metallurgy of iron using blast furnace is 800-1000° C.

316 **(b)**
The phenomenon is called spitting of Ag.

317 **(c)**
Cu_2O has completely filled $d-¿$orbitals in $Cu^{+¿¿}$ and thus, does not show $(d-d)$ transition.

318 **(c)**
$Hg(OH)_2$ does not exist.

319 **(d)**
K_2HgI_4, a colourless complex, is formed,
$4\,KI+HgCl_2 \longrightarrow K_2HgI_4+2\,KCl$

320 **(a)**
The atomic weight of Co, Ni and Fe are 59.90, 58.60, 55.85 respectively. Therefore, Co > Ni > Fe is the correct sequence of atomic weights

321 **(a)**
Silver nitrate is commercially known as lunar caustic.

322 **(b)**
The complex formed is $Ag(NH_3)_2Cl$ which ionizes in $Ag(NH_3)_2^{+¿¿}$ and $Cl^{-¿¿}$.

323 **(b)**
Fe is ferromagnetic, $i.e.$, retains magnetic properties if field is removed

324 **(d)**
Zinc sulphate $(ZnSO_4 \cdot 7H_2O)$ is called white vitriol. It when heated with barium sulphide, forms a white pigment lithopone

325 **(c)**
This is definition of tempering of steel. The product obtained is neither so hard nor so brittle. It is softer than steel.

326 **(b)**
"925 fine silver" means 925, parts of pure Ag in 1000 parts of an alloy. Therefore, in percentage it will be 92.5% Ag and 7.5% Cu

327 **(c)**
It is a property of $ZnCl_2$.

328 **(d)**
$AgBr$, silver bromide is used in photography.

329 **(d)**
Brass is an alloy of Cu and Zn.
Bronze is an alloy of Cu and Sn.
German silver is an alloy of Cu, Zn and Ni.
Hence, Cu is the common metal in brass, bronze and German silver.

331 **(c)**
Among the given, manganese has the most stable electronic configuration, thus it is very hard to remove an electron from is outer shell. Hence, a large amount of energy is required. Therefore, manganese has the maximum first ionization potential

332 **(c)**
It is a fact.

333 **(b)**

Vitamin B_{12} is $C_{63}H_{88}Co\,N_{14}O_{14}P$.

334 **(d)**
By white tin plating, iron can be protected by water

335 **(a)**
$2\,KMnO_4+2\,KOH \longrightarrow 2\,K_2MnO_4+H_2O+O$
or $MnO_4^{-}+e \rightarrow MnO_4^{2-}$.

336 **(a)**
Zn acts as cathode and carbon as anode in dry cells.

337 **(a)**
Annealing is the process of cooling a hot molten metal slowly. Railway wagon axles are made by heating iron rods embeded in charcoal powder (annealing) so that those might not break due to sudden change in temperature.

338 **(a)**
The methods chiefly used for the extraction of lead and tin from their ores are respectively self reduction and carbon reduction. (Because the process of heating the ore strongly in the presence of excess of air is called roasting. It is mainly used in case of sulphide ores and the process of extracting a metal by fusion of the oxide ore with carbon is known as smelting.)

339 **(d)**
The general electronic configuration for lanthanides is [Xe]$(n-2)f^{1-14}(n-1)d^1n\,s^2$.
$\because$ After the loss of both of the $6s$-electrons and also the solitary d-electrons, the lanthanoids gain stable configurations.
$\therefore$ (+3) oxidation state is most common among lanthanides.

340 **(d)**
A) There is gradual decrease in the radii of the lanthanoids with increasing atomic number-a case of lanthanide contraction, thus true.
B) Ionization potential for the formation of Lu^{3+} is comparatively low, hence +3 state is favourable, thus true.
C) Due to lanthanide contraction $-$Zr and Hf; Nb and Ta, Mo and W have the same size and thus similar propertites and thus separation is not easy , thus true.
D) Formation of +4 state requires very high energy, thus incorrect.

341 **(c)**
After smelting in blast furnace, the slag is removed from slag hole of the furnace while a molten mass containing mostly Cu_2S+ little FeS is called matte; it contains 80% metal.

342 **(c)**
There is very small difference in energies of $5f, 6d$ and $7s$ orbitals of actinoids, therefore their electronic configuration cannot assigned with a degree of certainty

343 **(d)**
In Mac-Arthur-Forrest method silver is extracted from the solution of sodium argentocyanide by using zinc.
$2\,Na[Ag(CN)_2]+Zn \longrightarrow Na_2[Zn(CN)_4]+2\,Ag\downarrow$

345 **(d)**
It is Mn and exhibits +7 oxidation state.

346 **(d)**
The size of lanthanides are smaller than expected. This is associated with the filling with the filling up of $4f$ orbitals which must be filled before the $5d$ orbitals. The electrons in f-orbitals are not effective in screening other electrons from the nuclear charge

347 **(b)**
$Ag^{+}+e \longrightarrow Ag$; finely divided Ag is black in colour and thus. $AgNO_3$ causes black stain on skin. It is therefore, called lunar caustic.

348 **(a)**
Due to $3d^5$ configuration.

349 **(c)**
$Gd=[Xe]4f^7\,5d^1\,6s^2$,
$Gd^{3+}=[Xe]4f^7$ (half-filled)

350 **(a)**
$3\,Hg+8\,HNO_3(dil.) \longrightarrow 3\,Hg(NO_3)_2+2\underset{Soluble\wedge washed}{NO}$

351 **(d)**
$E^\circ_{OP\,of\,Hg} > E^\circ_{OP\,of\,H}$. Thus, Hg is less reactive than H_2.

352 **(a)**
Brass is an alloy of Cu + Zn (60-80% + 40-20% respectively).

353 **(a)**
Maximum number of unpaired electrons are in Mn.

355 **(d)**

It is a use of Ti alloys.

356 **(c)**

Ore Chemical composition

Cuprite Cu_2O

Chalcocite Cu_2S

Chalcopyrite $CuFeS_2$

Malachite $Cu(OH)_2.CuCO_3$

In these ores, chalcopyrite ($CuFeS_2$) Contains both iron and copper.

357 **(c)**

Potassium dichromate, on heating give oxygen and chromic oxide (Cr_2O_3)

$4K_2Cr_2O_7 \xrightarrow{\Delta} 4K_2Cr_2O_4 + 3O_2 + 2Cr_2O_3$

358 **(b)**

$3KCNS + FeCl_3 \longrightarrow 3KCl + Fe(CNS)_3$.

$_{Blood-¿\,colour}$

359 **(a)**

Fe, Co, Ni are called ferrous metals.

360 **(d)**

$Ag^{+¿+e \longrightarrow Ag¿}$, *i.e*, $Ag^{+¿¿}$ is reduced.

361 **(d)**

Most of the transition metal cations are coloured.

362 **(a)**

$Ag(CN)_2^{-¿¿}$ does not contain unpaired electrons.

363 **(d)**

It is a fact.

364 **(d)**

In $MnSO_4.4H_2O$, *Mn* is present as $Mn^{2+¿¿}$

$Mn^{2+¿¿}$= $3d^5$ $4s^0$

1	1	1	1	1	

(Unpaired electrons =5)

In $CuSO_4.5H_2O$, Cu is present as $Cu^{2+¿¿}$

$Cu^{2+¿¿}$= $3d^9$ $4s^0$

⇅	⇅	⇅	⇅	1	

(Unpaired electrons =1)

In $FeSO_4.6H_2O$,Fe is present as $Fe^{2+¿¿}$

$Fe^{2+¿=3d^6¿}$ $4s^0$

⇅	1	1	1	1	

(Unpaired electrons =4)

In $NiSO_4.6H_2O$ Ni is present as $¿^{2+¿¿}$

$¿^{2+¿¿}$= $3d^8$ $4s^0$

⇅	⇅	⇅	1	1	

(Unpaired electrons =2)

Since, paramagnetic character ∝unpaired electrons .

Thus, $CuSO_4.5H_2O$ has the lowest degree of paramagnetism among the given at 298 K.

365 **(a)**

HgS is insoluble in hot dil.HNO_3.

366 **(c)**

A number of molybdic acids are known

$H_2MoO_4, H_6Mo_7O_{24}$.

367 **(a)**

$Hg_2Cl_2 \xrightarrow[¿]{\Delta} Hg + HgCl_2$

368 **(b)**

It is a fact.

369 **(a)**

AgBr decomposes on exposure to light.

370 **(c)**

Hg is volatile metal.

371 **(a)**

In amalgam, Hg has zero oxidation state.

372 **(c)**

Haematite contains SiO_2 (acidic) non-fusible impurity and this basic flux $CaCO_3$ is used.

$CaCO_3 \longrightarrow CaO + CO_2$,

$CaO + SiO_2 \longrightarrow \underset{Slag}{CaSiO_3}$

373 **(a)**

Cu forms $Cu(NH_3)_4^{2+¿¿}$ complex.

374 **(d)**

It is a reason for given fact.

375 **(b)**

Permanent magnets are generally made up of alloys of Al, Ni and Co

376 **(d)**

ZnS is white. (Follow II gp. qualitative analysis).

377 **(c)**

$Hg_2Cl_2 + 2NH_4OH \longrightarrow \underbrace{Hg + Hg(NH_2)Cl}_{\text{¿}} + NH_4Cl + 2H_2O$

378 **(a)**

The chemical formula for ammonium molybdate is $(NH_4)_2MoO_4$.

379 **(a)**

It is a reason for the given fact.

380 **(a)**

The electronic configuration of $_{62}Sm^{3+¿¿}$ is $4f^4$ and that of $_{66}Dy^{3+¿¿}$ is $4f^9$. The colour of f^n and f^{14-n} are often identical

381 **(c)**

Cassiterite is an ore of Sn.

382 **(b)**

$CuSO_4 + 4NH_3 \rightarrow \left[Cu(NH_3)_4\right]^{2+¿SO_4^{2-¿¿}¿}$

383 **(c)**

Pig iron is formed during metallurgical operations. All other forms are then prepared by using it.

384 **(c)**

—do—

385 **(c)**

An element is paramagnetic if it has unpaired electron.

386 **(b)**

Commercial zinc, about 97% pure containing lead and other impurities is called spelter.

387 **(a)**

ZnO is known as philosopher's wool because it is very light, white, soft wooly powder.

388 **(a)**

The density of transition elements gradually increases along the period or in a series, $e.g.$, $3d$-series:

$_{21}Sc(3.0\,g/mL)$ to

$_{29}Cu(8.9\,g/mL)$. $_{30}Zn$ has $7.1\,g/mL$.

389 **(b)**

Silver containing lead as impurity is purified by cupellation process.

390 **(c)**

Pig iron contains about 4% carbon. P, Mn and Si are in less percentage.

391 **(d)**

The electronic configurations of $Cu^{2+¿¿}$ is

$Cu^{2+¿¿}$:[Ar] $3d^9$

Hence, it has one unpaired electron.

Magnetic moment(μ ¿=$\sqrt{n(n+2)}$

$\sqrt{1(1+2)}$

=1.73

392 **(b)**

Ni-steel contains 3.5% Ni and is used in making cables, automobiles and aeroplane parts, armour plates, propeller shafts, etc.

393 **(c)**

Hg exists as $Hg_2^{2+¿¿}$ and not $Hg^{+¿¿}$.

394 **(a)**

CrO_3 and Mn_2O_7 are acidic oxide. Since, they react with water and form the acids.

$e.g., CrO_3 + H_2O \longrightarrow \underset{\text{chromic acid}}{H_2CrO_4}$

$Mn_2O_7 + H_2O \longrightarrow \underset{\text{permanganic acid}}{2HMnO_4}$

395 **(d)**

Copper metallurgy involves bessmerization. In Bessemer convertor, the impurities of ferric oxide forms slag with silica and copper oxide is reduced to give blister copper.

$FeO + SiO_2 \longrightarrow \underset{\text{slag}}{FeSiO_3}$

$Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$

396 **(c)**

It is a fact.

397 **(b)**

It is a fact

$4Au + 8KCN + 2H_2O + O_2 \longrightarrow 4K\left[Au(CN)_2\right] + 4K$

$2K[Au(CN)_2¿ + Zn \longrightarrow K_2\left[Zn(CN)_4\right] + 2Au$]

398 **(b)**

The chief ore of copper is copper pyrite, $CuFeS_2$.

400 **(a)**

Transitional metal ions having electronic configuration $(n\text{-}1)d^0 \vee (n-1)d^{10}$ are colourless

while those have $(n-1)d^{1-9}$ are coloured.

$Cu^{+¿}:[Ar]3d^{10}:colourless¿$

$Cu^{2+¿}:[Ar]3d^{9}:coloured¿$

$Fe^{2+¿}:[Ar]3d^{6}:coloured¿$

$Mn^{2+¿}:[Ar]3d^{5}:coloured¿$

401 **(b)**
It is a reason for the given fact.

402 **(a)**
Transition metal which have low oxidation number acts as reducing agent because of greater tendency to lose the electron. Moreover, they behave like a base

403 **(a)**
The composition of bell metal is Cu (80%) and Sn (20%).

404 **(c)**
The main characteristic feature of transition elements.

406 **(d)**
$\mu=\sqrt{n(n+2)}=\sqrt{15}$
$\therefore$n = 3
Thus, 3 unparied electron in $_{24}M, i.e., {}_{24}M^{3+¿¿}$, or $1s^2,2s^22p^6,3s^23p^63d^3$for $Cr^{3+¿¿}$.

407 **(b)**
Density of transition elements increases along the period.

408 **(d)**
$AuCl_3 \underset{\rightarrow}{h\nu \vee \Delta} AuCl+Cl_2$

409 **(c)**
White vitriol is $ZnSO_4.7H_2O$.

410 **(a)**
$Zn+2NaOH \longrightarrow Na_2ZnO_2+H_2$

411 **(b)**
$KI+AgNO_3 \longrightarrow AgI+KNO_3$

412 **(b)**
Wrought iron is the purest form of iron.

413 **(c)**
Rest all form nitrides as AlN, Mg_3N_2, Ca_3N_2.

414 **(c)**
Yellow colour of the potassium chromate changes to orange on acidification. It is due to the formation of dichromate ions

$$\underset{\text{yellow}}{2CrO_4^{2-}} + 2H^+ \underset{\text{alkali}}{\overset{\text{acid}}{\rightleftharpoons}} \underset{\text{orange}}{Cr_2O_7^{2-}} + 2H_2O$$

415 **(b)**
The Stability of $Cu^{2+¿¿}(aq)$ rather than $Cu^{+¿¿}(aq)$ is due to much more negative $\Delta_{hyd}H^0$ of $Cu^{2+¿¿}(aq)$ than $Cu^{+¿¿}$, which more than compensates for 2nd ionization enthalpy of Cu.

416 **(c)**
At the bottom: 1775K.

417 **(d)**
$2Fe+3Cl_2 \underset{\rightarrow}{\Delta} 2FeCl_3$

418 **(a)**
Green vitriol is $FeSO_4.7H_2O$.

419 **(a)**
It is a fact.

420 **(d)**
$4Au+8CN^{-¿}+2H_2O+O_2 \longrightarrow 4\left[Au(CN)_2\right]^{-¿+4OH^{-¿¿}¿}$
soluble
$2\left[Au(CN)_2\right]^{-¿}+Zn \longrightarrow 2Au(s)\downarrow+\left[Zn(CN)_4\right]^{2-¿¿}¿$

421 **(a)**
3*d*-series conatins $_{21}Sc$ to $_{30}Zn$; 4*d*-series contains $_{39}Y$ to $_{48}Cd$ and 5*d*-series contains $_{57}La$ and $_{72}Hg$ to $_{80}Hg$; 6*d*-series contains $_{89}Ac$, $_{104}Ku$ and $_{105}Ha$.

423 **(c)**
$_{92}U$ is a member of actinoid series (90 to 103).

424 **(c)**
"All their ions are colourless" this sentence is false because they are 90% coloured and only few are colourless

425 **(d)**
These are facts about sterling silver.

426 **(b)**
Steel or iron containing excessive quantities of S is brittle while hot (hot or red short), whereas excessive quantities of phosphorus make it brittle white cold (cold short).

427 **(b)**
$_{29}Cu:1s^2,2s^22p^6,3s^23p^63d^{10},4s^1\ i.e.$, 14 electrons have spin in one direction and 15 in other

direction.

428 **(a)**

$Fe^{2+} = [Ar]3d^6 4s^0 \Rightarrow 4$ unpaired electrons

$Cu^{+} = [Ar]3d^{10} 4s^0 \Rightarrow 0$ unpaired electrons

$Zn = [Ar]3d^{10} 4s^2 \Rightarrow 0$ unpaired electrons

$Ni^{3+} = [Ar]3d^7 4s^0 \Rightarrow 3$ unpaired electrons

429 **(d)**

$E^\circ_{OP\ of\ Na} > E^\circ_{OP\ of\ Zn}$.

430 **(b)**

Lanthanide contraction, cancels almost exactly the normal size increase on descending a group of transition elements, thus Nb and Ta, Zr and Hf have same covalent and ionic radii.

431 **(b)**

$2Fe_2(SO_4)_3 + 3K_4[Fe(CN)_6] \longrightarrow \underset{(Prussian\ blue)}{Fe_4[Fe(CN)_6]_3} +$

432 **(d)**

In the iron silica is present as impurity, so for the removal of impurity of silica limestone is used.

$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

$CaO + SiO_2 \longrightarrow CaSiO_3$

slag

433 **(b)**

Cu^{2+} is discharged at cathode.

434 **(c)**

HCOOH is a reducing agent.

$HCOOH + 2HgCl_2 \longrightarrow Hg_2Cl_2 + 2HCl + CO_2$

435 **(c)**

$VOSO_4$ is paramagnetic as well as coloured compound.

The oxidation state of vanadium in $VOSO_4$ is +4.

V [Z=23]=[Ar]$3d^3 4s^2$

V^{4+}[Z=23]=[Ar] $3d^1 4s^0$

It has one unpaired electron hence, it is paramagnetic in nature.

436 **(c)**

Ferrous sulphate ($FeSO_4.7H_2O$) is known as green vitriol.

437 **(c)**

The reaction takes place in blast furnace are

$3Fe_2O_3 + CO \longrightarrow 2Fe_3O_4 + CO_2$

$CaCO_3 \longrightarrow CaO + CO_2$

$C + CO_2 \longrightarrow 2CO$

$CaO + SiO_2 \longrightarrow CaSiO_3$

$2C + O_2 \longrightarrow 2CO$

Hence, the reaction $2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2$ does not take place in blast furnace.

438 **(a)**

Inner transition elements or f-block elements have 3 incomplete shells,

$i.e., (n-2)s^2 p^6 d^{10} f^{1-14}, (n-1)s^2 p^6, ns^{1-2}$.

439 **(c)**

This involves auto reduction.

440 **(d)**

Follow extraction of iron.

441 **(c)**

The gangue of FeO comes out as slag with acidic flux SiO_2.

442 **(a)**

Magnetic moment of Zn^{2+} $\mu_{effective} = \sqrt{n(n+2)}\ BM$

Where, n=number of unpaired electrons

$_{30}$Zn=$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^2$

$Zn^{2+} = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}$

$3d^{10}$

⇅	⇅	⇅	⇅	⇅

$n = 0$

So, magnetic moment of Zn^{2+}=zero.

443 **(a)**

Cu is present in all these alloys.

444 **(c)**

Au is a number of $5d$-series. Fe, Co and Cu all are the members of $3d$-series.

445 **(b)**

Azurite $[2CuCO_3.Cu(OH)_2]$ is an ore of copper.

446 **(b)**

It is a fact.

447 **(a)**

$CuSO_4(anhydrous) + aq. \longrightarrow CuSO_4.5H_2O(aq.)$.

448 **(a)**

Fe and Pt do not form amalgam with Hg.

449 **(c)**
Rest all are wrong reporting.

450 **(d)**
$Ag_2S + 4NaCN \longrightarrow 2Na[Ag(CN)_2] + Na_2S$
$2Na[Ag(CN)_2] + Zn \longrightarrow Na_2[Zn(CN)_4] + 2Ag$

451 **(c)**
Cu is placed below H in electrochemical series.

452 **(b)**
Zn forms only Zn^{2+} ion.

453 **(d)**
All these protect iron against corrosion.

454 **(b)**
$K_4[Fe(CN)_6] + 6H_2SO_4 + 6H_2O \xrightarrow{\Delta} 2K_2SO_4$
$+ FeSO_4 + 3(NH_4)_2SO_4 + 6CO\uparrow$

455 **(d)**
Blister copper is obtained by the process of bessemerisation from the copper matte in the metallurgy of Cu. It is impure. Blister copper contains about 98 to 99% pure copper and 1 to 2% impurities like Ag, Au, Zn, Ni etc.

456 **(b)**
Magnetic moment depends upon number of unpaired electrons. In Sc^{3+}, there is no unpaired electron. So, its effective magnetic moment is zero.

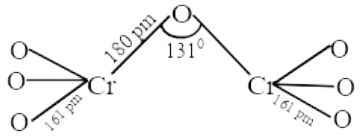
457 **(b)**
An impure sample of ZnS containing traces of MnS, CuS or Ag_2S, etc., is phosphorescent.

458 **(d)**
Pt dissolves in aqua regia $(\underset{1:3}{HNO_3 + HCl})$
$3HCl + HNO_3 \longrightarrow 2H_2O + NOCl + 2Cl$
$Pt + 4Cl \longrightarrow PtCl_4$;
$PtCl_4 + 2HCl \longrightarrow H_2PtCl_6$.

459 **(b)**
Ru forms penta carbonyl.

460 **(d)**
The process of depositing a thin uniform layer of silver on clean glass surface is called silvering of mirror. The thin film is protected by coating of red lead and turpentine mixture.
$2AgNO_3 + 2NH_4OH \longrightarrow Ag_2O + 2NH_4NO_3 + H$
$Ag_2O + HCHO \longrightarrow 2Ag + HCOOH$.

461 **(b)**
$Cr_2O_7^{2-}$ has the structures.



462 **(c)**
Anode mud left during electrolytic purification of Cu contains Au and Ag.

463 **(b)**
24 carat gold means 100% Au.

464 **(a)**
$2KMnO_4 + 2H_2SO_4 \longrightarrow Mn_2O_7 + 2KHSO_4 + H_2O$

465 **(c)**
Polymetallic carbonyls are also known for transition metals, e.g., $Co_2(CO)_3$.

466 **(a)**
Due to loss of ns^2-electrons.

467 **(c)**
Gun metal has a composition of Cu=88%
Sn=10%, Zn=2%

468 **(b)**
It is a fact.

469 **(b)**
In water it gives $HMnO_4$ (an acid).

470 **(a)**
Corrosive sublimate gives black ppt. of calomel with formic acid but it does not react with acetic acid.
$2HCOOH + 2HgCl_2 \longrightarrow Hg_2Cl_2 + CO_2 + H_2O$
$CH_3COOH + HgCl_2 \longrightarrow No\ reaction$

471 **(a)**
In basic medium, the following reaction takes place
$2KMnO_4 + 2KOH \longrightarrow 2K_2MnO_4 + H_2O + [O]$
Due to the presence of nascent oxygen [O], $KMnO_4$ (in basic medium) behaves like an strong oxidizing agent.

472 **(d)**
$3d, 4d \wedge 5d$-series are complete and $6d$-series incomplete.

473 **(b)**
The less electropositive metals such as Fe, Zn, Sn etc

are extracted from their oxides by reduction with carbon or coal.

$Fe_2O_3+3C \longrightarrow 2Fe+3CO$

$Fe_2O_3+3CO \longrightarrow 2Fe+3CO_2$

iron

474 **(c)**

The electronic configuration of Mn is

$_{25}Mn = [Ar]\ 3d^5 4s^2$

$Mn^{4+¿¿} = [Ar]3d^3$

Thus, three unpaired electrons are present .

Spin only magnetic moment , $\mu=\sqrt{n(n+2)}$

$n=3$

$\mu=\sqrt{3(3+2)}$

$=\sqrt{15}=3.87$

≈ 4 BM

475 **(a)**

It is a fact.

476 **(a)**

Due to poisonous nature of $HgCl_2$, its 0.1% solution is used as antiseptic for sterilizing hands and instruments in surgery.

477 **(a)**

$Fe \longrightarrow Fe^{2+¿+2e¿}$

478 **(a)**

$Cu^{2+¿¿}$ salts form chocolate brown ppt. of $Cu_2Fe(CN)_6$ with $K_4Fe(CN)_6$.

479 **(c)**

Mohr salt $¿(NH_4)_2SO_4.FeSO_4.6H_2O$

Here, Fe is present as $FeSO_4$. Therefore, its oxidation state can be calculated with in only $FeSO_4$.

$x+(-¿2)=0$

$x=+2$

481 **(b)**

Neodymium oxide (Nd_2O_3) dissolved in selenium oxychloride is one of the most powerful liquid lasers known so far

482 **(c)**

A transition metal ion exists in its highest oxidation state. It is expected to behave as an oxidizing agent.

483 **(a)**

The ionisation energies increase with increasing atomic number. The trend is irregular among d-block elements.

Element	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
IE (kJ/m	631	656	650	652	717	762	758	736	745	905

$\therefore Zn > Fe > Cu > Cr$ is correct order.

484 **(a)**

It is a reason for the given fact.

485 **(c)**

—do—

486 **(c)**

These are uses of Ag.

487 **(b)**

In acidic medium, $KMnO_4$ gives 5 oxygen while, acidic $K_2Cr_2O_7$ gives 3 oxygen

488 **(d)**

$Zn+2NaOH \longrightarrow Na_2ZnO_2+H_2;$

$2Al+2NaOH+2H_2O \longrightarrow 2NaAlO_2+3H_2$

489 **(c)**

The ability of transition elements to adopt multiple oxidation states and complexing ascribed their catalytic activity

490 **(b)**

$6e+Cr_2^{6+¿} \longrightarrow 2Cr^{3+¿;S^{2-¿-\beta+2n¿}¿}$

491 **(a)**

$Zn+2H_2SO_4\ (Conc.) \longrightarrow ZnSO_4+2H_2O+SO_2$

492 **(c)**

Carbon is generally used for the reduction of oxides of moderately reactive metals like Fe, Zn, etc. *e.g.*,

$Fe_2O_3+3C \longrightarrow 2Fe+3CO$

Note Highly reactive metals like Na are produced by electrolytic reduction while less reactive metals like Ag and Hg are obtained by autoreduction.

493 **(a)**

Except Au all other metals, $i.e.$, Ag, Hg and Cu are dissolved in conc. H_2SO_4 or conc. HNO_3. The compound X is $AuCl_3$ which forms a complex with HCl.

$AuCl_3 + HCl \longrightarrow H[AuCl_4]$

It is used for toning in photography.

494 **(c)**

Lithopone is used as white pigment and contains $ZnS + BaSO_4$.

495 **(c)**

$_{21}Sc(3d^1 4s^2)$ has no unpaired electron in $Sc^{3+¿¿}$ ion.

497 **(c)**

—do—

498 **(b)**

$4f$-level is successively filled in lanthanoids and $5f$-level is successively filled in actinoids.

499 **(b)**

$2MnO_2 + 4KOH + O_2 \longrightarrow 2K_2MnO_4 + 2H_2O$.

500 **(c)**

Haematite conatins SiO_2 (acidic) non-fusible impurity and this basic flux $CaCO_3$ is used.

$CaCO_3 \longrightarrow CaO + CO_2$,

$CaO + SiO_2 \longrightarrow \underset{Slag}{CaSiO_3}$.

501 **(a)**

$CuSO_4 + 2KCN \longrightarrow K_2SO_4 + \underset{\text{cupric cyanide (unstable)}}{Cu(CN)_2}$

$2Cu(CN)2 \longrightarrow 2CuCN + \underset{\text{white ppt}}{(CN)_2}$

$3KCN + CuCN \longrightarrow \underset{\text{potassium cuprocyanide (soluble complex)}}{K_3[Cu(CN)_4]}$

502 **(c)**

$Ti^{3+¿} \rightarrow 3d^1, 4s^0¿$

$Sc^{3+¿} \rightarrow 3d^0¿$

$Mn^{2+¿} \rightarrow 3d^5, 4s^0¿$

$Zn^{2+¿} \rightarrow 3d^{10}, 4s^0¿$

In $Mn^{2+¿¿}$ number of unpaired electrons =5. So, it has maximum magnetic moment according to the formula

$\mu = \sqrt{n(n+2)}\,BM$

503 **(b)**

Mohr's salt is green in colour due to $Fe^{2+¿¿}$ ions which are green.

504 **(c)**

$Ni^{2+¿¿}$ and $Cr^{2+¿¿}$ are coloured due to presence of unpaired electrons. But $Zn^{2+¿¿}$ is colourless because of absence of unpaired electrons

505 **(a)**

Zn gets dissolved in NaOH, forming Na_2ZnO_2.

506 **(b)**

In basic medium potassium permanganate is reduced to first manganate and than to manganese dioxide (colourless).

$2KMnO_4 + 2KOH \longrightarrow 2K_2MnO_4 + H_2O + O$

$2K_2MnO_4 + 2H_2O \longrightarrow 2MnO_2 + 4KOH + 2O$

$2KMnO_4 + H_2O \longrightarrow 2MnO_2 + 2KOH + 3[O]$

507 **(a)**

Ag belongs to second $(4d)$ transition series. Remaining all are in first transition series

508 **(a)**

Mn in carbonyl has zero oxidation state.

509 **(c)**

Copper is good conductor of current.

510 **(d)**

Calomel is the name for Hg_2Cl_2.

511 **(d)**

Developing involves the decomposition of AgBr to Ag. $AgBr^x$ a molecule of AgBr exposed to light is reduced to Ag by:

$C_6H_4(OH)_2 + 2AgBr^x \longrightarrow C_6H_4O_2 + 2HBr + 2Ag$

512 **(b)**

Zinc blende is roasted and then treated with coke for the reduction.

$2ZnS + 3O_2 \underset{\rightarrow}{\Delta} 2ZnO + 2SO_2 \uparrow$

$ZnO + C \underset{\rightarrow}{\Delta} Zn + CO \uparrow$

513 **(d)**

This is chrome alum used in tanning leather, mordant in dyeing and in photography for hardening of negative.

514 **(c)**

$FeSO_4.(NH_4)_2SO_4.6H_2O$ is called Mohr's salt.

515 **(a)**

$2MnO_2 + 4KOH + O_2 \longrightarrow \underset{\text{purple colour}}{2K_2MnO_4} + 2H_2O$

516 **(d)**
$CuCl_2$ and $CuBr_2$ exist as $(CuCl_2)_x$ and $(CuBr_2)_x$ polymeric bridge structure.

517 **(d)**
Na will react with water; Ag, Hg are placed below Cu in electrochemical series.

518 **(a)**
$2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$
purple green

519 **(c)**
+3 and +4 states are shown by Ce in aqueous solutions. Thus statement (c) is incorrect.

520 **(c)**
Tungsten filaments are used in bulbs.

522 **(b)**
It is a fact.

523 **(a)**
Fool's gold is $CuFeS_2$ or FeS_2.

524 **(a)**
$Cu(NH_3)_4SO_4$

525 **(d)**
Follow Bessemer's process in Fe extraction.

526 **(a)**
A mixture of TiO_2 and $BaSO_4$ is called titanox

527 **(b)**
The b.p. of Ti, Cr, Fe and Co are 3260, 2665, 3000 and 2900 K respectively.

528 **(d)**
It is a fact.

530 **(c)**
Ferric compounds are more easily hydrolysed than ferrous salts.

531 **(a)**
The important ores of iron are haematite (Fe_2O_3), magnetite (Fe_3O_4) and iron pyrites (FeS_2). Iron is manufactured from haematite ore.

532 **(c)**
The process is called auto reduction.

534 **(a)**
$2Cu^{2+} + 4KI \longrightarrow Cu_2I_2 + I_2 + 4K^+$

535 **(d)**
It is a fact.

536 **(d)**
German silver is an alloy of Cu + Zn + Ni (2:1:1 respectively).

537 **(d)**
It is a method for extraction of Ni.

538 **(a)**
$K_2Cr_2O_7 + 2H_2SO_4 \xrightarrow{Cold} 2CrO_3 + 2KHSO_4 + H_2O$
CrO_3 is highly acidic and oxidising and is called chromic acid

539 **(b)**
$4FeCl_3 + 3K_4[Fe(CN)_6] \longrightarrow Fe_4[Fe(CN)_6]_3 + 12$
Ferri – ferrocyanide (Prussian blue)
.

540 **(a)**
$Cu + 2H_2SO_4 \longrightarrow CuSO_4 + SO_2 + 2H_2O$

541 **(b)**
The process is called hardening of steel and it develops hard and brittle nature in steel.

542 **(d)**
$AuCl_3 + NaCl \longrightarrow Na[AuCl_4]$
sodium chloroaurate

545 **(d)**
Zinc sulphate hepta hydrate $(ZnSO_4.7H_2O)$ is called white vitriol. When it is heated with barium sulphide, it forms a white pigment lithopone.

546 **(a)**
Silver (Ag) metal is purified by Pattinson's process.

547 **(c)**
d-block elements have higher melting point due to greater forces of attraction between two atoms.

548 **(c)**
$Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$.

549 **(b)**
Iron is d-block element $(3d^6, 4s^2)$.

550 **(c)**
It is a fact.

551 **(b)**

$Fe^{2+¿¿}$ is light green in colour.

552 **(a)**
$Cr_2O_7^{2-¿¿}$ has orange colour in aq. Medium.

553 **(c)**
Reference electrodes are calomel electrodes.

554 **(b)**
All cations formed by transition metals are not coloured and are not paramagnetic, $.g.,\ Zn^{2+¿¿}$.

555 **(b)**
$3.87=\sqrt{n(n+2)}$, where, n is the number of unpaired electron
$(3.87)^2 = n(n+2)$
$15=n^2+2n$
$n^2+2n-15=0$
$\therefore \quad n \cong 3$

556 **(d)**
Lutetium-71 belongs to lanthanoids, the elements from 58 to 71.

557 **(c)**
It is a fact.

558 **(c)**
$Fe_2(SO_4)_3 \longrightarrow Fe_2O_3+3SO_3$.

559 **(c)**
It is a fact.

560 **(b)**
$2SnCl_2+2HgCl_2 \longrightarrow 2SnCl_4+Hg_2$; $SnCl_2$ is oxidized.

561 **(b)**
Chalcopyriteor copper pyrite is $CuFeS_2$.
$\therefore$ It is ore of copper and iron.

562 **(d)**
Siderite $(FeCO_3)$ is an ore of iron.

563 **(a)**
The process of extraction of metal by heating roasted ore with coke in the presence of a flux is called smelting. It is done in blast furnace. Iron is extracted by this process.
$Fe_2O_3+3C ¿1123 K 2Fe+3CO$
$Fe_2O_3+3CO \underset{\rightarrow}{1123 K} 2Fe+3CO_2$

564 **(c)**
Stainless steel contains 11.5% Cr.

565 **(a)**
Ceria or cerium oxide, CeO_2, a lanthanide compound is used as a pigment and as a polishing agent for glass.

566 **(d)**
$ZnO+C \longrightarrow Zn+CO$
$2CO+O_2 \longrightarrow 2CO_2$ (Blue flame on burning of CO).

567 **(c)**
In CuF_2, $Cu^{2+¿¿}$ ion exist, having d^9 configuration. Unpaired electron causes colour ($d-d$ transition). In the crystalline form, CuF_2 is blue coloured.

568 **(c)**
Spin only magnetic moments depend upon the number of unpaired electrons, more the number of unpaired electron, greater will be the spin only magnetic moment.
$_{25}Mn=1s^2,2s^22p^6,3s^23p^63d^54s^2$
$Mn^{2+¿}=1s^2,2s^22p^6,3s^23p^63d^5,4s^0¿$

1	1	1	1	1

Number of unpaired electrons=5
$_{24}Cr=1s^2,2s^22p^6,3s^23p^63d^5,4s^1$
$Cr^{2+¿}=1s^2,2s^22p^6,3s^23p^63d^4,4s^0¿$

1	1	1	1	

Number of unpaired electron=4
$23V=1s^2,2s^22p^6,3s^23p^63d^3,4s^2$
$V^{2+¿}=1s^2,2s^22p^6,3s^23p^63d^3,4s^0¿$

1	1	1		

Number of unpaired electrons =3
So, the correct order of spin only magnetic moment is
$Mn^{2+¿}>Cr^{2+¿}>V^{2+¿¿}¿$

569 **(c)**
Stainless steel contains 11-15% Cr.

570 **(c)**
Aromatic compounds which have¿∨≡ bond in the side chain decolourise acidic/ alkaline $KMnO_4$.
Benzene does not delcolourise the acidic/alkaline $KMnO_4$due to the delocalization of π-*electrons*.
While propene decolourized the alkaline $KMnO_4$ due to the presence of = bond. Ferrous ammonium

sulphate and oxalic acid decolourized the $KMnO_4$ in acidic medium.

$2\,KMnO_4+10\,FeSO_4+8\,H_2SO_4 \longrightarrow K_2SO_4+2\,MnSO_4+5\,Fe_2(SO_4)_3+8\,H_2O$

$2\,KMnO_4+5\,C_2H_2O_4+3\,H_2SO_4 \longrightarrow K_2SO_4+2\,MnSO_4+10\,CO_2+8\,H_2O$

571 **(d)**

The complex formation imparts colour.

572 **(c)**

Syvanite (AuAgTe_4); calaverite ($AuTe_2$), bismuth aurite $(BiAu_2)$.

573 **(b)**

It is a reason for the given fact.

574 **(a)**

Azurite is $Cu(OH)_2.2\,CuCO_3$.

575 **(a)**

Zn^{2+} (Z=30):[Ar]$3d^{10}4s^0$; zero unpaired electron. Hence, its magnetic moment is zero.

$\mu=\sqrt{n(n+2)}=\sqrt{0(0+2)}$

$\mu=0$

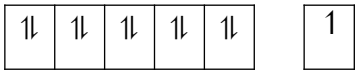
576 **(b)**

$4\,Zn+10\,HNO_3 \longrightarrow 4\,Zn(NO_3)_2+NH_4NO_3+3\,H$

577 **(d)**

Cu

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



Cu^+

$3d^{10}$ $4s^0$

Cu^+ is colourless due to the absence of unpaired electron

578 **(a)**

Fe ores possess magnetic nature.

579 **(d)**

The process is called auto reduction.

580 **(a)**

Transition elements have $(n\text{-}1)d$ and ns-shell incomplete.

581 **(d)**

In electrorefining of copper, some gold is deposited as anode mud.

582 **(d)**

$Cu^{2+}(aq.)$ is blue in colour.

583 **(a)**

The magnetic moment $\sqrt{n(n+2)}$ BM where n is no. of unpaired electron. Thus, $n=1$.

584 **(d)**

The highest oxidation state of transition elements is exhibited in their compounds with F and O, the most electronegative elements.

585 **(c)**

I gp. reagent is dil. HCl. The chlorides of Ag, Pb, Hg being insoluble are precipitated out.

586 **(d)**

$4\,K_2Cr_2O_7 \xrightarrow{671\,C} 4\,K_2CrO_4+2\,Cr_2O_3+3\,O_2$.

587 **(a)**

$2\,KMnO_4 \xrightarrow{200\,C} K_2MnO_4+MnO_2+O_2$

$2\,K_2MnO_4 \xrightarrow[Above\ 200\,C]{} 2\,K_2MnO_3+O_2$

588 **(b)**

$Fe^{2+},2SO_4^{2-},2NH_4^+$.

589 **(a)**

$\underset{Alkali}{2\,NaOH}+\underset{Acid}{Zn(OH)_2} \longrightarrow \underset{Salt}{Na_2ZnO_2}+2\,H_2O$

591 **(a)**

It is a fact.

592 **(c)**

Alnico is a series of alloys based on iron containing Ni, Al, Co and Cu. They are used to make permanent magnets.

593 **(b)**

Bordeaux mixture is $CaO+CuSO_4$.

594 **(b)**

Lanthanoids [Xe]$4f^{1-14}5d^{0-1}6s^2$

Actinoides [Rn]$5f^{1-14}6d^{0-1}7s^2$

Lanthanoides and actinoides use core d and f-orbitals also to show higher oxidation state. As actinoides have comparatively low energy difference between f

and d-orbitals, show more oxidation states.

595 **(b)**

$$K_2MnF_6 + 2SbF_5 \rightarrow 2KSbF_6 + MnF_3 + \frac{1}{2}F_2$$

In this reaction, the stronger Lewis acid SbF_6 displaces the weaker one, MnF_4 from its salt. MnF_4 is unstable and readily decomposes to give MnF_3 and fluorine

596 **(a)**

A reduction in atomic size with increase in atomic number is a characteristics of elements of f-block. This is due to lanthanide contraction

597 **(b)**

Parke's process is based on the fact that molten lead and zinc are nearly immiscible. Zinc being lighter forms the upper layer and molten lead forms the lower layer. Ag is more soluble in molten Zn than molten Pb.

598 **(c)**

It is a use of this reagent.

599 **(d)**

Transition metals due to the presence of partially, filled d-orbitals, are coloured.

The unpaired electron present in partially filled d-orbital is excited to the higher energy d-orbital by absorbing energy from visible light and thus exhibits the complementary colour. Due to which the transition metal ions appear coloured.

600 **(b)**

It contains 36% Ni.

601 **(c)**

Cr^{2+} (Z=24): [Ar]$3d^4 4s^0$; four unpaired electrons

Fe^{2+} (Z=26) : [Ar]$3d^6 4s^0$; four unpaired electrons. Cr^{2+} and Fe^{2+} have same number of unpaired electrons, hence they have the same value of magnetic moment.

602 **(c)**

Erbium is a lanthanide

603 **(a)**

$$BaO + ZnO \longrightarrow BaZnO_2$$

604 **(d)**

Brass is an alloy of copper with zinc.

606 **(c)**

$$CuCl_2 + Cu \xrightarrow{HCl} Cu_2Cl_2$$

607 **(b)**

Cast iron or pig iron (2–5% C); wrought iron (0.1 to 0.5% C), steel (0.1 to 1.5% C).

608 **(c)**

d-block elements invariably show variable valence.

609 **(b)**

This is characteristic of inner transition elements.

610 **(b)**

Mercurous chloride is insoluble in water while rest are soluble in water

611 **(c)**

$Carnallite\ KCl, MgCl_2, 6H_2O$

$Limonite\ 2Fe_2O_3, 3H_2O$

$Siderite\ FeCO_3$

$Horn¿\ AgCl$

∴ Siderite is carbonate ore.

612 **(b)**

It is a facts, $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$.

613 **(c)**

Black Jack is an ore of zinc. Other ores of zinc are zincite (ZnO), calamine ($ZnCO_3$), zinc blende or black jack (ZnS).

614 **(d)**

AgI is insoluble in NH_4OH but AgCl is soluble in NH_4OH due to the formation of $[Ag(NH_3)_2]Cl$

615 **(b)**

$e.g.,$

$\underset{+2}{MnCl_2}$, $\underset{+3}{Mn(OH)_3}$, $\underset{+4}{MnO_2}$, $\underset{+6}{K_2MnO_4}$, $KMnO_4$

616 **(a)**

$$HgCl_2 + H_2S \longrightarrow HgS + 2HCl$$

617 **(b)**

CuCl forms coordinated product with CO.

$$CuCl + CO \longrightarrow CuCl.CO$$

618 **(a)**

Except Cu, Hg, Ag, Pt and Au, where E°_{RP} are $+ve$.

619 **(a)**

$$AuCl_3 + 3FeSO_4 \longrightarrow Au + Fe_2(SO_4)_3 + FeCl_3$$

620 **(a)**

$ZnCl_2$ is deliquescent.

622 **(a)**

$Fe + H_2SO_4 \longrightarrow \underset{\text{dil.}}{FeSO_4} + H_2\uparrow$

$3Fe + 4H_2O \longrightarrow 4H_2\uparrow + \underset{\text{hot steam}}{Fe_3O_4}$

623 **(a)**

$Hg_2Cl_2 + 2NH_4OH \longrightarrow \underbrace{Hg + Hg(NH_2)Cl}_{\text{¿}} + NH$

624 **(d)**

Bleaching powder is mixed salt, $K_4Fe(CN)_6$ is complex salt, hypo is normal salt.

625 **(b)**

Bronze is a mixture of $Cu \wedge Sn$.

626 **(b)**

Gun metal is an alloy of Cu, Sn and Zn. It is used to make cartridge of rifles and pistols.

627 **(b)**

μ_{eff} value of 1.73 BM corresponds to one unpaired electron.

$Ti^{3+\text{¿}=3d^1(Ti=[Ar]3d^24s^2)\text{¿}}$

628 **(a)**

Thermite process is used for the reduction of oxides of less electropositive metals. Oxides of less electropositive metals such as Cr_2O_3, Mn_3O_4 etc are reduced by using Al. This process is called thermite process.

$Cr_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Cr + Heat$

629 **(b)**

Copper ores contain FeO as non-fusible mass.

Thus, $FeO + \underset{\text{Acidic flux}}{SiO_2} \longrightarrow \underset{\text{Slag}}{FeSiO_3}$.

630 **(d)**

Chalcopyrite is $CuFeS_2$

632 **(b)**

It is $Ag(NH_3)_2Cl$.

633 **(a)**

Cu is added in Au to prepare ornaments.

634 **(d)**

On igniting at 1400°c. Fe_2O_3 get reduced to metallic Fe.

$3Fe_2O_3 CO_2$

$Fe_3O_4 + CO \longrightarrow 3$

$FeO + CO \longrightarrow Fe + O$

635 **(b)**

These are uses of ZnO. It is also used for glazing purposes.

636 **(c)**

$Fe(OH)_3$ is formed as brown residue. Also colourless or light yellow solution will be left.

637 **(a)**

Given, X=[Ar]d^4

$\because$The complete configuration of the ion,

$X^{3+\text{¿}=1s^2,2s^2,2p^6,3s^23p^6,3d^4\text{¿}}$

$\therefore X = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5 4s^2$

$\therefore$The atomic number of the element is 25 and the element is Mn.

638 **(c)**

Cast iron or pig iron (2–5% C); wrought iron (0.1 to 0.5% C), steel (0.1 to 1.5% C).

639 **(b)**

Follow complementary colour concept.

640 **(b)**

$_{41}Nb$ and $_{73}Ta$ have similar atomic size.

641 **(a)**

A white precipitate of cuprous iodide is formed on adding KI to $CuSO_4$ solution.

$2CuSO_4 + 4KI \longrightarrow \underset{\text{white ppt.}}{2CuI} + I_2$

642 **(a)**

The d -block elements form coloured compounds. These compounds have ions with unpaired electron in d-subshell.

i) Na and Mg belong to s-block , so NaCl and $MgCl_2$ are colourless compounds.

ii) CuF_2

Oxidation state of Cu in CuF_2 is +2

$Cu^{2+\text{¿}\text{¿}}=1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^0, 3d^9$

⇅	⇅	⇅	⇅	1

$\therefore CuF_2$ in which Cu has one unpaired electron is coloured.

iii)CuI

Oxidation state of Cu in CuI =+1

Cu^{+}=$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^0, 3d^{10}$

It has no unpaired electron. So, CuI is colourless.

$\therefore$Only CuF_2 is coloured among given choices.

643 **(b)**

$2\,NaOH + Zn^{2+} \longrightarrow Na_2ZnO_2 + 2H^+$, Na_2ZnO_2 gives $2Na^+$ and $[ZnO_2]^{2-}$ ions.

644 **(c)**

$2\,MnO_4^- + Br^- + H_2O \longrightarrow 2\,MnO_2 + BrO_3^- + 2OH^-$

645 **(a)**

Cyanide process is used for extraction of silver (Ag).

$4\,Ag + 8\,NaCN + 2H_2O + O_2 \rightleftharpoons 4\,Na[Ag(CN)_2] + 4$

$2\,Na[Ag(CN)_2] + 4\,NaOH + Zn \longrightarrow$

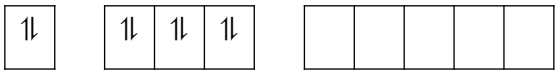
$Na_2ZnO_2 + 2H_2O + 4\,NaCN + 2\,Ag$

646 **(a)**

$ScCl_3 \rightarrow Sc^{3+} + 3Cl^-$

Sc^{3+}

$3s^2$ $3p^6$ $3d^0$



No unpaired electron, so will show diamagnetic character so, will weightless in magnetic field

647 **(a)**

It is the definition of nitriding of steel.

648 **(b)**

A light hard aluminium alloy containing 4% Cu and small amounts of Mg, Mn and Si.

649 **(b)**

Gun metal is an alloy of $Cu + Sn + Zn$.

650 **(b)**

This is definition of tempering of steel. The product obtained is neither so hard nor so brittle. It is softer than steel.

651 **(c)**

$CuSO_4 + 2\,KCN \rightarrow Cu(CN)_2 + K_2SO_4$

$2\,Cu(CN)_2 \rightarrow Cu_2(CN)_2 + (CN)_2$

$Cu_2(CN)_2 + 6\,KCN \rightarrow 2K_3[Cu(CN)_4]$

652 **(d)**

MnO_2 imparts purple colour to pottery

653 **(d)**

It is a fact.

654 **(b)**

Purest zinc is made by zone refining method.

655 **(a)**

Magnetic moment $= \sqrt{n(n+2)}\,BM$

Where, n =number of unpaired electrons

$5.93 = \sqrt{n(n+2)}$

$n = 5$

Mn^{2+} ion ($3d^5$) has 5 unpaired electrons and magnetic moment is 5.93 BM.

656 **(c)**

Potassium dichromate, on heating gives oxygen and chromic oxide (Cr_2O_3).

$4\,K_2Cr_2O_7 \xrightarrow{\Delta} 4\,K_2CrO_4 + 3O_2 + 2\,Cr_2O_3$

657 **(c)**

Annealing is the process of heating steel to bright red and then cooling it slowly. Steel thus, becomes soft and pliable.

659 **(b)**

It is a fact.

660 **(b)**

$HgCl_2$ compound is easily volatile. They are insoluble in water and soluble in acids.

661 **(c)**

Among all the given reactions, $CuSO_4$ does not react with KCl to give Cu_2Cl_2

662 **(a)**

It is $[Cu(H_2O)_4]SO_4.H_2O$; one H_2O is held by sulphate ion by H-bonding.

663 **(d)**

It is a fact.

664 **(b)**

$AgNO_3 + 2\,Na_2S_2O_3 \longrightarrow Na_3[Ag(S_2O_3)_2] + NaN$

(Dil. $AgNO_3$; Excess $Na_2S_2O_3$; Soluble)

$2\,AgNO_3 + Na_2S_2O_3 \longrightarrow Ag_2S_2O_3 + 2\,NaNO_3$

(Conc. $AgNO_3$; Dil. $Na_2S_2O_3$)

$Ag_2S_2O_3 \longrightarrow Ag_2S + SO_3$

665 **(c)**

Mn_2O_7 is an acidic oxide of manganese. It dissolve in water to give violet coloured solution of permanganic acid.

$Mn_2O_7 + H_2O \longrightarrow 2\,HMnO_4$

666 **(c)**

A developer is a weak reducing agent, $e.g.$ Ferrous

oxalate; the parts affected by light on photographic plate are reduced to the maximum extent whereas part not affected by light remains unaffected.

667 **(d)**

In acidic medium,

$+7 \quad +2$

$KMnO_4 \longrightarrow MnSO_4$

In weak basic medium

$KMnO_4 \longrightarrow MnO_2$

668 **(c)**

Transition metals are d-block elements.

669 **(d)**

It is $FeSo_4.(NH_4)_2SO_4.6H_2O$. Gives test of each ion in solution.

670 **(b)**

Gun metal is an alloy of Cu + Sn + Zn (87:10:3 respectively).

672 **(b)**

Value of magnetic moment depends upon number of unpaired electrons. All except $Ti^{3+}(3d^1)$ have either fully filled d-subshell ($i.e.$, Zn^{2+}, Cu^{+}) or empty d-subshell (ie, Sc^{3+}). As such only Ti^{3+} has a net value of magnetic moment.

Magnetic moment of $Ti^{3+} = \sqrt{n(n+2)}\,BM$

$= \sqrt{1(1+2)}\,BM$

$= \sqrt{3} = 1.73\,BM$

673 **(a)**

Fe^{3+} is more stable than Fe^{2+} because of half-filled nature.

674 **(b)**

Fool's gold is FeS_2.

675 **(b)**

Bessemer's converter is provided with basic lining of lime or MgO to withstand high temperature.

676 **(d)**

Verdigris is $CuCO_3.Cu(OH)_2$ or $CuSO_4.Cu(OH)_2$; these are green deposits formed on copper on exposure to air. Used as paints and pigments.

677 **(d)**

Transition element exhibit variable oxidation states because their d-electrons also take part in bonding along with s-electrons. However, the difference between two oxidation states is not always two.

678 **(d)**

$Sc^{3+}(3d^0), Ti^{4+}(3d^0)$ are diamagnetic due to absence of unpaired electrons. While $Pd^{2+}(4d^8), Cu^{2+}(3d^9)$ contain two, and one unpaired electron respectively. Hence, these are paramagnetic

679 **(b)**

$2KI + HgI_2 \rightarrow \underbrace{K_2HgI_4 + KOH}_{Nessler's\ reagent}$

680 **(b)**

$_{26}Fe = [Ar]3d^5 4s^2$; $Fe^{2+} = [Ar]3d^6$

Number of unpaired electrons, $n=4$

$\mu = \sqrt{n(n+2)} = \sqrt{4(4+2)} = 4.89$

681 **(d)**

$_{30}Zn \rightarrow [Ar]3d^{10}4s^2$

$\because$ It d-orbital is complete

$\therefore$ It does not show variable valency

682 **(a)**

$CaCO_3 + SiO_2 \longrightarrow \underset{Slag}{CaSiO_3} + CO_2.$

683 **(b)**

$CuSO_4 + 2KI \longrightarrow CuI_2 + K_2SO_4$

$2CuI_2 \longrightarrow Cu_2I_2 + I_2$

cuprous iodide

white ppt.

684 **(b)**

The nonmetallic impurities such as mica, earth particles etc associated with ore. These impurities are known as gangue.

685 **(c)**

The most common oxidation state of lanthanoid is +3. Lanthanoids in +3 oxidation state usually have unpaired electrons in f-subshell and impart characteristic colour in solid as well as in solution state due to $f-f$ transition.

(Except lanthanum and lutetium)

686 **(d)**

Bell metal is an alloy of Cu + Sn (80:20).

687 **(a)**

Vermilion is HgS, a red variety used as pigment.

688 **(c)**

It is a fact.

689 **(d)**
In transition metals, electrons from penultimate d-subshell also take part in bonding.

690 **(b)**
Both mustard and egg yolk contain sulphur in form of compounds in large amount which reacts with Ag.
$2Ag + S \longrightarrow Ag_2S$(black)

691 **(b)**
$KMnO_4$ will not oxidised further by ozone as manganese is already present in its highest possible oxidation state, ie, +7

692 **(c)**
Hg does not form amalgam with iron.

693 **(c)**
Sweets, pans (betel leaves), etc., covered by Ag foils are used as eatable items. Cu in form of dissolved Cu if water placed in Cu vessel.

694 **(b)**
Only Pt belongs to d-block.

695 **(d)**
E°_{OP} of $Cu > E^{\circ}_{OP}$ of Ag.

696 **(d)**
Only those transition metal ions which contain unpaired electrons, are coloured. Since colour appears when the unpaired d-electron absorb energy and gets excited to the higher energy d-orbital. Hence, the reason of appearance of colour is $d-d$ transition.

697 **(c)**
These are facts.

698 **(d)**
V(23¿=¿Ar¿$3d^3, 4s^2$
$V^{3+¿¿}$=[Ar] $3d^2, 4s^0$ (two unpaired electrons)
Cr(24)=[Ar] $3d^5, 4s^1$
$Cr^{3+¿¿}$=[Ar] $3d^3, 4s^0$ (three unpaired electrons)
Co(27)= [Ar] $3d^7, 4s^2$
$CO^{3+¿¿}$=[Ar] $3d^7, 4s^0$ (three unpaired electrons)
Sc(21)= [Ar] $3d^1, 4s^2$
$Sc^{3+¿¿}$=[Ar] $3d^0, 4s^2$ (no unpaired electrons)
Thus, in $Sc^{3+¿¿}$ no unpaired d-electron is present. Hence, no $d-d$ transition is possible and it is colourless ion.

699 **(b)**
Follow metallurgy of iron.

701 **(a)**
Follow electronic configuration $(n-1)s^2 p^6 d^{10} ns^1$ of coinage family.

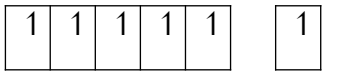
702 **(b)**
It is a fact.

703 **(c)**
Transition metals and their compounds are very good catalysts, $e.g.$, $CuCl_2$ in Deacon's process, Ni in hydrogenation of oils.

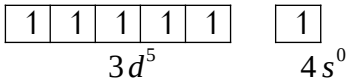
704 **(b)**
Gravity separation process is used for the concentration of haematite.

705 **(c)**
Malachite is an ore of copper. Its composition is $CuCO_3.Cu(OH)_2$.

706 **(b)**
Cr :[Ar]



$Cr^{+¿¿}$:[Ar]



This is stable EC, hence formation of $Cr^{2+¿¿}$ by second IP requires maximum enthalpy.

707 **(b)**
It is a reason for the given fact.

708 **(b)**
CdS is yellow solid.

709 **(d)**
—do—

710 **(b)**
Basic copper acetate (verdigris $-(CH_3COO)_2Cu \cdot Cu(OH)_2$) is blue green powder used in green pigment and in dyes. Also in manufacture of insecticides and fungicides

711 **(a)**
Pig iron on heating in a vertical furnace and then pouring into moulds gives cast iron. Both contain

2–5% carbon.

713 **(c)**
Potassium permanganate is a powerful oxidizing agent in neutral, alkaline or acidic solution because it liberates nascent oxygen. The aqueous solutions of $KMnO_4$ can be decolourized by $C_2O_4^{2-}$, HSO_3^- and SO_3^{2-} while CO_3^{2-} cannot decolourise $KMnO_4$ aqueous solution.

714 **(c)**
Ti^{+} ions are more stable than Ti^{3+} and thus Ti^{3+} ions charge to Ti^{+} ions thereby acting as oxidizing agents
Ti^{3+} compounds $+2e^{-} \rightarrow Ti^{+}$ compounds
(less stable oxidizing agent) (More stable oxidising agent)

715 **(a)**
Green vitriol is formed by oxidation of iron pyrite in presence of air and water.
$2FeS_2 + 2H_2O + 7O_2 \longrightarrow 2FeSO_4 + 2H_2SO_4$
pyrites green vitriol

716 **(d)**
Transition elements have high densities.

717 **(b)**
$3HgS + 2HNO_3 + 6HCl \longrightarrow 3HgCl_2 + 3S + 2NO +$

718 **(a)**
Chlorides of Ag, Pb and Hg are insoluble in water.

719 **(a)**
Fischer's salt is $K_3[Co(NO_2)_6]$.

720 **(a)**
Cu, Ag and Au have been used in coins since ancient times.

721 **(a)**
Cerium $Ce_{58} = [Xe]4f^1, 5d^1, 6s^2$
It most stable oxidation state is +3but +4 is also existing.

722 **(c)**
The hormone insulin excreted from pancreas contains Zn.

723 **(c)**
It is a reason for the given fact.

724 **(b)**
Muntz metal is Cu + Zn alloy (3:2) respectively more stronger than brass.

725 **(b)**
$Ni(CO)_4$ is a gas which decomposes to Ni and CO on strong heating.

726 **(c)**
At 500°C Fe_2O_3 is reduced by CO to Fe and CO_2.

727 **(a)**
It is a fact.

728 **(c)**
Most of the transition metal ions due to presence of unpaired d-electrons are coloured.

729 **(d)**
Cr ions are coloured.

730 **(c)**
Strength of metallic bond depends upon number of upon number of unpaired electron. As number of unpaired electron increases, the bond strength increases. So, Cr, Mo, W show stronger bonding due to maximum number of unpaired electrons

731 **(c)**
Hg^{2+} complex salts are more stable.

732 **(b)**
$2e + Cr_2O_7^{2-} \rightleftharpoons 2CrO_4^{2-}$ exists in basic medium.

733 **(d)**
Ti, Zr and Hf belong to IV B group of Periodic Table and in a group atomic radii increases on moving down. However, the transition metals of $4d$-series have nearly the same radii as metals of $5d$-series. Hence the order of atomic radii is
$Ti < Zr \approx HF$
Due to nearly equal atomic radii, Zr and Hf are called chemical twins.

734 **(a)**
Basic character of oxides decreases from left to right in a period of Periodic Table

735 **(c)**
$Mn_2O_7 + H_2O \rightarrow 2HMnO_4$
$HMnO_4$ is permanganic acid, which is violet in colour

736 **(b)**
Aqueous silver nitrate solution is used as indelible

ink.

737 **(b)**
The fourteen elements which follow actinium from thorium(Z=90) to lawrencium (z=103) are called actinoids. They involve the filling of $5f$-subshell. Californium (Cf) has the atomic number 98 and its configuration is as
$Cf\,(Z=98):[Rn]5f^{10},6d^{0},7s^{2}$
Hence, it is a member of actinide series.

738 **(c)**
Wrought iron is obtained from pig iron by removing its impurities by pudding process in which cast iron is heated on the hearth of reverberatory furnace.

739 **(b)**
Follow text.

740 **(c)**
Ammonium dichromate on heating gives green coloured powder of Cr_2O_3.
$2(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} 2(NH_4)_2CrO_4 + Cr_2O_3 + 3O_2$
chromic oxide

741 **(b)**
CuO is amphoteric.

742 **(d)**
All these form soluble complexes with NH_3.

743 **(b)**
It is a reason for the low reactivity of transition elements.

744 **(a)**
$E^{\circ}_{OP\,of\,H} > E^{\circ}_{OP\,of\,Hg}$.

745 **(a)**
$\because$ 24 carat gold ¿ 100 %
$\therefore$ 18 carat gold¿ $\frac{100\times 18}{24}=75\%$

746 **(d)**
Ionic radii of lanthanide¿ decreases with increase in atomic numbe.
Y^{3+}¿ Lu^{3+}¿ Eu^{3+}¿
Because Eu and Lu are the members of lanthanide series (so they show lanthanide contraction) and La is the representative element. Y^{3+}¿ ion has lower ionic radii as comparison to La^{3+}¿ because it lies immediately above in Periodic Table.

747 **(d)**
Coinage metals (Cu, Ag, Au) shows the properties of transitional elements as in their common oxidation states they possess partially filled d-subshells

748 **(a)**
Annealing is the process of heating steel to bright red and then cooling it slowly. Steel thus, becomes soft and pliable.

749 **(b)**
Cast iron or pig iron (2-5% C); wrought iron (0.1 to 0.5% C), stell (0.1 to 1.5% C).

750 **(a)**
During the extraction of copper, the impurity (FeS) is removed as slag by mixing the contaminated copper ore with silica and coke.
$2FeS + 3O_2 \longrightarrow 2FeO + 2SO_2$
$FeO + SiO_2 \longrightarrow FeSiO_3$
silica ferrous silicate (slag)

751 **(a)**
Usually across the first transition series, the negative values for standard electrode potential decrease except for Mn due to stable d^5 –configuration.
So, correct order : $Mn > Cr > Fe > Co$

752 **(c)**
Copper pyrite $(CuFeS_2)$ is the chief ore of copper.

753 **(c)**
It is a fact.

754 **(a)**
$FeCl_3$ acts as coagulating agent for blood.

755 **(b)**
$ZnCl_2.H_2O \longrightarrow Zn(OH)Cl + HCl$

756 **(b)**
$HgCl_2 + 2NaOH \rightarrow HgO + H_2O + 2NaCl$
yellow

757 **(a)**
$2Na[Au(CN)_2] + Zn \longrightarrow Na_2[Zn(CN)_4] + 2Au.$

758 **(a)**
Due to lanthanoid contraction order will be
Yb^{3+}¿ Pm^{3+}¿ Ce^{3+}¿ La^{3+}¿

759 **(b)**

$HgS+2HCl+3\underset{(KClO_3)}{[O]}\longrightarrow HgCl_2+H_2O+SO_2$

760 **(d)**

The actinoids ($5f$-elements) exhibits more number of oxidation states in general than the lanthanoid because $5f$-orbitals extend farther from the nucleus than the $4f$-orbitals.

761 **(c)**

Silver nitrate is used in making hair dyes because it reduced to metallic silver and finely divided silver is black in colour.

762 **(b)**

$2KI+HgCl_2\longrightarrow Hg\underset{Scarlet¿}{I_2}¿+2KC$

763 **(b)**

$Cr_2O_7^{2-¿¿}$ changes to $CrO_4^{2-¿¿}$ in basic medium .

764 **(d)**

For electroplating of gold, electrolyte used is a mixture of 3.4%AuCN, 19% KCN and Na_3PO_4 a buffer or K[Au$(CN)_2$].

765 **(b)**

Parke's process for desilverisation of lead involves extraction of Ag from Ag-Pb mixture.

766 **(b)**

Pt dissolves in aqua regia $(\underset{1:3}{HNO_3+HCl})$

$3HCl+HNO_3\longrightarrow 2H_2O+NOCl+2Cl$

$Pt+4Cl\longrightarrow PtCl_4$;

$PtCl_4+2HCl\longrightarrow H_2PtCl_6$.

767 **(d)**

Argentite is Ag_2S, an ore of silver.

768 **(c)**

Variable valency is due to the participation of electron from $(n-1)d$ and ns levels in bond formation

769 **(c)**

Hg is liquid at room temperature.

770 **(c)**

In Fe extraction limestone is used for the formation of slag. The central zone where the temperature varies from 800-1000°C; the lime-stone present in the charge decomposes into calcium oxide and carbon dioxide.

$CaO_3\underset{\rightarrow}{1000\,°C}\,CaO+CO_2$

The calcium oxide acts as flux and combines with silica present as an impurity to form a fusible slag of $CaSiO_3$.

$CaO+SiO_2\longrightarrow CaSiO_3$

771 **(a)**

The compounds which combine with impurities present in ore (at high temperature) and remove them as a fusible substance (slag), are known as flux. When basic impurities are present, an acidic flux is used and *vice-versa.*

$FeO+SiO_2\rightarrow FeSiO_3$

basic impurity acidic flux slag

772 **(a)**

$¿^{2+¿¿}$=[Ar]$3d^8$

⇅	⇅	⇅	1	1

Number of unpaired electrons=2

Hence, magnetic moment=$\sqrt{n(n+2)}$

$=\sqrt{8}$=2.84

773 **(b)**

HgS is used in ayurvedic medicine as makardhwaja.

$HgCl_2$ is poisonous and its antidote is egg white.

$ZnSO_4$ is used in eye lotion.

Hg_2Cl_2 is used as purgative in medicine and in making standard calomel electrode.

774 **(b)**

It is the desired chemical formula.

775 **(a)**

The differentiating electrons enter the ns-orbital but they have configuration$(n-1)d^{10}ns^2$.

776 **(a)**

$HgCl_2+2NH_3\underset{\rightarrow}{H_2O}\,Hg+NH_2HgCl+NH_4Cl$

mercuric amino chloride

$\therefore HgCl_2$on reaction with$NH_4OH(¿NH_3+H_2O)$ forms mercuric amino chloride.

777 **(b)**

Magnetic moment =$\sqrt{n(n+2)}\,BM$

Where, n is the number of unpaired electrons.

Maximum the value of unpaired electron, greater the

value of magnetic moment. So, $3d^5$ has highest value of magnetic moment.

778 **(d)**
Carbon (non-metal) is present in steel.

779 **(c)**
Corrosive sublimate is $HgCl_2$ because it has corrosion nature and sublimation nature.

780 **(b)**
$CuSO_4 + 2KI \longrightarrow CuI_2 + K_2SO_4$
unstable
$2CuI_2 \longrightarrow Cu_2I_2 + I_2$
$Thus, CuI_2 is not formed.$

781 **(b)**
Cuprous ion ¿ (completely filled d-subshell)
$3d^{10}$

⇅	⇅	⇅	⇅	⇅

Cupric ion ¿ (one unpaired electron)
$3d^9$

⇅	⇅	⇅	⇅	1

783 **(b)**
Cr_2O_3 is amphoteric as it reacts with acid and alkalies both.

784 **(a)**
Pig iron on heating in a vertical furnace and then pouring into moulds gives cast iron. Both contain 2–5% carbon.

785 **(b)**
$_{29}Cu^{+¿¿}$ has configuration
$1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^{10}$.

786 **(a)**
In the blast furnace, iron ore is reduced by coke and carbon monoxide at different temperatures.
$C + O_2 \longrightarrow CO_2$
$CO_2 + C \xrightarrow{1500\,°C} 2CO$
$3Fe_2O_3 + CO \xrightarrow{400\,°C} 2Fe_3O_4 + CO_2$
$Fe_3O_4 + CO \xrightarrow{600\,°C} 3FeO + CO_2$
$FeO + CO \xrightarrow{700\,°C} Fe + CO_2$

787 **(d)**
These are reasons for the given fact.

788 **(d)**
ZnO possess this characteristics.

789 **(a)**
A solid $[AgNO¿¿3(A)]$¿silver nitrate which has photographic effects reacts with the solution of NaBr(B) to give a pale yellow ppt. of AgBr which is difficulty soluble in NH_4OH. $NaBr(B)$ on heating gives brown vapours of bromine.
$AgNO_3 + NaBr \longrightarrow AgBr + NaNO_3$
'A' 'B' 'C'
light yellow ppt.

790 **(d)**
It is a reason for the given fact.

791 **(b)**
$_{25}$Mn=$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^5$

1	1	1	1	1

∵Number of unpaired electrons in Mn =5
∴Magnetic moment of Mn =$\sqrt{n(n+2)}$
¿$\sqrt{5(5+2)} = \sqrt{35} = 5.91\,BM$

792 **(b)**
$3Fe + ¿4H_2O \xrightarrow[¿hot]{Steam} Fe_3O_4 + 4H_2¿$

793 **(b)**
Transition elements are more metallic than representative elements due to the availability of d-orbitals for bonding

794 **(d)**
Cerium can attain +4 oxidation state by losing ns and $(n-2)f$-electrons to have f^0 configuration.