CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

APPENDIX INORGANIC VOLUME 2

Intex

1. Which of the ores mentioned in table in Table can be concentrated by magnetic separation method?

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2. What is the significance of leaching in the extraction of aluminium?

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3. The reaction

$Cr_2O_3 + 2A < oAl_2O_3 + 2Cr$

$(\triangle G^{\ominus} = -421kJ))$

Is thermodynamically feasible as is apparent from the Gibbs energy value. Why does it not take place at room temperature?

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4. It is true that under certain condition, Mg can reduce Al_2O_3 and Al can reduce MgO? What are those conditions?

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5. Why are pentahalides more covalent than trihalides?

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6. Why is BiH_3 the strongest reducing agent amongst all the hydrides of group 15 elements?

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7. Why is N_2 less reactive at room temperature?

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8. Mention the conditions required to maximise the yield of ammonia.

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9. When an excess of ammonia solution is added to $CuSO_4$ which solution is formed

(a) $[Cu(NH_3)_2]^{2+}$

(b) $[Cu(NH_3)_4]^{\oplus}$

(c) $[Cu(NH_3)_2]^{\oplus}$

(d) $[Cu(NH_3)_4]^{2+}$.

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10. What is the covalence of nitrogen in N_2O_5?

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11. Bond angle in $PH_4^{\oplus}$ is higher than that in PH_3 Why?

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12. What happens when white phosphorus is heated with concentrated $NaOH$ solution in an inert atmosphere of CO_2?

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13. What happens when PCl_5 is heated?

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14. Write a balanced equation for the hydrolytic reaction of PCl_5 in heavy water.

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15. What is the basicity of H_3PO_4?

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16. What happens when H_2PO_3 is heated?

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17. List the important sources of sulphur.

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18. Write the order of thermal stability of the hydrides of group 16 elements.

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19. Why is H_2O a liquid and H_2S a gas?

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20. Which of the following does not react with oxygen directly? Zn, Ti, Pt, Fe.

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21. Complete the following reaction

(i). $C_2H_4 + O_2 \rightarrow$

(ii). $4Al + 3O_2 \rightarrow$

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22. Why does O_3 act as a powerful oxidising agent?

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23. How is O_3 estimated quantitavely?

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24. What happens when sulphur dioxide is passed through an aqueous solution of Fe(III) salt?

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25. Comment on the nature of two S-O bonds formed In SO_2 molecule. Are the two $S-O$ bonds in this molecule equal?

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26. How is the presence of SO_2 detected?

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27. Mention three areas in which H_2SO_4 plays an important role.

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28. Write the conditions to maximise the yield of H_2SO_4 by contact process.

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29. Why is $K_{a_2} < < K_{a_1}$ for H_2SO_4 in water?

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30. Considering the parameters such as bond dissociation enthalphy, electron gain enthalpy and hydration entalpy, compare the oxidising power of F_2 and Cl_2.

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31. Give two examples to show the anomalous behavious of fluorine.

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32. Sea is the greatest source of some halogens. Comment.

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33. Give the reason for bleaching action of Cl_2.

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34. Name two poisonous gases which can be prepared from chlorine gas.

Watch Video Solution

35. Why is ICl more reactive than I_2?

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36. Why is helium used in diving apparatus?

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37. Balance the following equation:

$$XeF_6 + H_2O \rightarrow XeO_2F_2 + HF$$

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38. Why has it been difficult to study the chemistry of radon?

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39. Silver atom has completely filled d orbitals $(4d^{10})$ in its ground state. How can you say it is a transition element?

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40. In the series $Sc(Z = 21)$ to $Zn(Z = 30)$ the enthalpy of atomisation of zinc is the lowest, i.e., 126 kJ mol^{-1}. Why?

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41. Which of the 3d-seres of the transition metals exhibits the largest number of oxidation states ?

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42. The $E^0(M^{2+}/M)$ value for copper is positive $(+0.34V)$. What is possibly the reason for this?

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43. How would you account for the irregular of ionisation enthalpies (first) in the first series of the transition elements?

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44. Why is the highest oxidation state of a metal exhibited in its oxide or fluoride only?

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45. Which is a stronger reducing agent Cr^{2+} or Fe^{2+} and why?

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46. Calculate the spin only magentic moment of M^{2+} ion $(Z = 27)$.

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47. Explain why Cu^{+} ion is not stable in aqueous solutions ?

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48. Give reason. (a) Cerium (Ce) exhibits +4 oxidation state.(b) Actinoid contraction is greater from element to element than lanthanoid contraction.

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49. Wrtie the formulas for the following coordination compounds:

(i). Tetraamminediaquacobalt(III) chloride.

(ii). Potassium tetracyanidonichelate(II).

(iii). Tris(ethane-1,2-diamine) chromium(III) chloride.

(iv) Amminebromidochloridonitrito-N-Platinate(II).

(v). Dichlororidobis (ethane-1,2-diamine) platinum(IV) nitrate.

(vi). Iron(III) hexacyanidoferrate(II).

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50. Write the $IUPAC$ names for the following coordination compounds:

(i). $[Co(NH_3)_6]Cl_3$

(ii). $[Co(NH_3)_5Cl]Cl_2$

(iii). $K_2[Fe(CN)_6]$

(iv). $K_3[Fe(C_2O_4)_3]$

(v). $K_2[PdCl_4]$

(vi). $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$

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51. Indicate the types of isomerism exhibited by the following complexes and draw the structures for these isomers:

(i). $K[Cr(H_2O)_2C_2O_3)_2]$

(ii). $[Co(en)_3]Cl_3$

(iii). $[Co(NH_3)_5(NO_2)](NO_3)_2$

(iv). $Pt[(NH_3)(H_2O)Cl_2]$

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52. Give evidence that $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$ are ionisation isomers.

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53. Explain the following giving reasons

(a) $[NiCI_4]^{2-}$ is tetrahedral and paramagnetic whereas $[Ni(CN)_4]^{2-}$ is square plannar and dimagnetic

(b) $[Fe(H_2O)_6]^{3+}$ ion is more paramagnetic than $[Fe(CN)_6]^{3-}$ ion

(c) $Ni(CO)_4$ is tetrahedral while $[Ni(CN)_4]^{2-}$ ion is square planar

(d) $[Co(F_6)]^{3-}$ is a high spin complex whereas $[Co(CN)_6]^{3-}$ ion is a low spin complex .

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54. Give reason for the fact that amongst $Ni(CO)_4, [Ni(CN)_4]^{2-}$ and $NiCI_4^{2-}$: $Ni(CO)_4$ and $[Ni(CN)_4]^{2-}$ are diamagnetic whereas $[NiCI_4]^2$ is paramagnetic.

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55. $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Explain.

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56. Explain $[Co(NH_3)_6]^{3+}$ is an inner orbital complex whereas $[Ni(NH_3)_6]^{2+}$ is an outer orbital complex.

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57. Predict the number of unpaired electrons in the square planar $[Pt(CN)_4]^{2-}$ ion.

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58. The hexaquo manganese(II) ion contains five unpaired electrons, while the hexacyanoion contains only one unpaired electron. Explain using the crystal field theory.

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59. Calculate the overall complex dissociation equilibrium constant for the $[Cu(NH_3)_4]^{2+}$ ion, given that β_4 for this complex is 2.1×10^{13}

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Exercises

1. Copper can be extracted by hydrometallurgy but not zinc. Explain?

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2. What is the role of depressant in froth floatation process?

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3. Why is the extraction of copper from pyrites more difficult than that from its oxide ore through reduction?

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4. Explain:

(i). Zone refining

(ii). Column chromatography.

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5. Out of C and CO, which is a better reducing agent at 673K?

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6. Name the common elements present in the anode mud in electrolytic refining of copper. Why are they so present?

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7. Write down the chemical reactions taking place in the extraction of zinc from zinc blende.

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8. State the role of silica in the metallurgy of copper.

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9. What is meant by the term "chromatography"?

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10. What criterion is followed for the selectrion of the stationary phase in chromatography?

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11. Describe a method for refining nickel.

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12. How can you separate alumina from silica in a bauxite ore associated with silica? Give equations, if any.

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13. Giving examples differentiate between roasting and calcination.

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14. How is cast iron different from pig iron?

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15. Differentiate between minerals and ores.

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16. Why copper matte is put in silica lined converter?

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17. What is the role of cryolite in the metallurgy of aluminium?

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18. How is leaching carried out in case of low grade copper ores?

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19. Why is zinc not extracted from zinc oxide through reduction using CO?

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20. The value of $\triangle_f G^{\ominus}(Cr_2O_3) = -540 kJmol^{-1}$ and $\triangle_f G^{\ominus}(Al_2O_3) = -827 kJmol^{-1}$. Is reduction of Cr_2O_3 possible with Al?

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21. Out of C and CO, which is a better reducing agent at 673K?

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22. The choice of a reducing agent in a particular case depends on thermodynamic factor. How far do you agree with this statement ? Support your opinion with example.

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23. What is the role of graphite rod in the electrometallurgy of aluminium?

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24. Outline the principles of refining of metals by the following methods :

(a) Electrolytic refining

(b) Zone refining

(c) Vapour phase refining.

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25. Predict conditions under which Al might be expected to reduce MgO.

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26. Why does the reactivity of nitrogen differ from phosphorus?

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27. Discuss the trends in chemical reactivity of group 15 elements.

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28. Why does NH_3 form hydrogen bond but PH_3 does not?

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29. How is nitrogen prepared in the laboratory? Write the chemical equations of the reactions involved.

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30. How is ammonia manufactured industrially?

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31. Illustrate how copper metal can give different product on reaction with HNO_3.

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32. Give the resonating structures of NO_2 and N_2O_5.

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33. The HNH angle value is higher than HPH, HAsH and HSbH angles. Why?

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34. Why does $R_3P = 0$ exist but $R_3N = 0$ does not $(R =$ alkyl group)?

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35. Explain why NH_3 is basic while BiH_3 is only feebly basic ?

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36. Nitrogen exists as diatomic molecule and phosphorus as P_4. Why?

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37. Write main differences between the properties of white phospghorus and red phosphorus.

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38. Why does nitrogen show catenation properties less than prosphorus.

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39. Give the disproportionation reaction of H_3PO_3.

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40. Can PCl_5 act as an oxidising as well as a reducing agent? Justify.

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41. Justify the placement of O, S, Se, Te and Po in the same group of the periodic table in terms of electronic configuration, oxidation state and hydride formation.

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42. Why is dioxygen a gas but sulphur a solid?

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43. Knowing the electron gain enthalpy values for $O \rightarrow O^{\ominus}$ and $O \rightarrow O^{2-}$ as $-141 kJmol^{-1}$ and $+702 kJmol^{-1}$ respectively, how can you account for the formation of a large number of oxides having O^{2-} species and not $O^{\ominus}$?

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44. Which aerosols deplete ozone?

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45. How is SO_2 an air pollutant?

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46. Why are halogens strong oxidising agents ?

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47. Explain why fluorine forms only one oxoacid, HOF.

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48. Although chlorine and oxygen have nearly same electronegativity yet only oxygen from hydrogen bond explain it ?

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49. Write two uses of ClO_2.

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50. Why are halogens coloured?

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51. Write the reaction of F_2 and Cl_2 with water.

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52. How can you prepare Cl_2 from HCl and HCI from Cl_2? Write reactions only.

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53. What inspired N. Bartlett for carrying out reaction between Xe and PtF_6?

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54. What are the oxidation states of phosphorus in the following:

(i)H_3PO_3 , (ii)PCl_3 , (iii)Ca_3P_2

(iv)Na_3PO_4 , (v)POF_3

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55. Write balanced equation for the following:

(i). $NaCl$ is heated with sulphuric acid in the presence of MnO_2.

(ii). Chlorine gas is passed into a solution of NaI in water.

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56. With what neutral molecule is $ClO^{\ominus}$ isoelectronic Is that molecule a Lewise Base?

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57. How are XeO_3 and $XeOF_4$ prepared?

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58. Arrange the following in the order of property indicated for each set:

(i). $F_2, Cl_2, Br_2I_2 -$ increasing bond dissociation enthaply.

(ii). HF, HCl, HBr, HI- increasing acid strength.

(iii). $NH_3, PH_3, AsH_3, SbH_3, BiH_3 -$ increasing base strength.

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59. Which one of the following does not exist?

(i). $XeOF_4$

(ii). NeF_2

(iii). XeF_4

(iv). XeF_6

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60. Give the formula and describe the structure of a noble gas which is isostructural with

(i). $Icl_4^{\ominus}$

(ii). $IBr_2^{\ominus}$

(iii). BrO_3

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61. Why do noble gases have comparatively large atomic sizes?

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62. List the used of nean and argon gases.

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63. Write down the electronic configuration of:

(i). Cr^{3+}

(ii). Prn^{3+}

(iii). $Cu^{\oplus}$

(iv). Ce^{4+}

(v). Co^{2+}

(iv). Lu^{2+}

(vii). Mn^{2+}

(viii). Th^{4+}

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64. Why are Mn^{2+} compounds more stable than Fe^{2+} toward oxidation to their $+3$ state?

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65. Explain briefly how $+2$ state become more and stable in the first half of the first row transition elements with increasing atomic number?

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66. To what extent do the electronic configurations, decide the stability of oxidation states in the first series of the transition elements? Illustrate your answer with examples.

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67. What may be the stable oxidation state of the transition elements with the following d electron configurations in the ground state of their atoms: $3d^3, 3d^5, 3d^4$?

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68. Name the oxometal anions of the first series of the transition metals in which the metal exhibits the oxidation state equal to its group number.

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69. What is lanthanoid contraction? What are the consequences of lanthanold contraction?

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70. What are the characteristics of th transition elements and why are they called transition elements? Which of the d-block elements may not be regarded as the transition elements?

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71. In What way is the electronic configuration of the transition elements different from the of the non-transition elements?

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

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73. What are interstitial compounds? Why are such compounds well known for the transition metals?

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74. How is the variability in oxidation states fo transition metals different from that of the non transition metaals?

Illustrate with examples.

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75. Describe the oxidising action of potassium dichromate and write the ionic equations of reaction with:

(i). Iodide

(ii). Iron (II) solution and

(III). H_2S

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76. For $\frac{M^{2+}}{M}$ and $\frac{M^{3+}}{M^{2+}}$ systems the $E^{\ominus}$ values for some metals are as follows.

$$\frac{Cr^{2+}}{Cr} - 0.9V, \frac{Cr^{3+}}{Cr^{2+}} - 0.4V$$

$$\frac{Mn^{2+}}{Mn} - 1.2V, \frac{Mn^{3+}}{Mn^{2+}} + 1.5V$$
$$\frac{Fe^{2+}}{Fe} - 0.4, \frac{Fe^{3+}}{Fe^{2+}} + 0.8V$$

Use this data comment upon:

(i). The stability of Fe^{3+} in acid solutio as compared to that of Cr^{3+} or Mn^{3+} and ltbtgt (ii). The case with which iron can be oxidised as compared to a similar process for either chromium or manganese metal.

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77. Predict which of the followingwill be coloured in aqueous solution?

$Ti^{3+}, V^{3+}, Cu^{\oplus}, Sc^{3+}, Mn^{2+}, Fe^{2+}$ and Co^{2+}

Give reasons for each.

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78. Compare the chemistry of actinoids with that of the lanthanoids with special referene to :

(i). Electronic configuration.

(iii). Oxidation state

(ii). Atomic and ionic sizes and

(iv). Chemical reactivity.

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79. How would you account for the following.

(i). Of the d^4 species. Cr^{2+} is strongly reducing while manganese (III) is strongly oxidising.

(ii). Cobalt (II) is stable in aqueous solution but in the presence of complexing reagents it is easily oxidised.

(iii). The d^1 configuration is very unstable in ions.

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80. What is meant by 'disproportionation'? Give two examples of disproportionation reaction in aqueous solution.

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81. Which metal in the first series of transition metals exhibits+1 oxidation state most frequently and why?

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82. Calculate the number of unpaired electrons in the following gaseous ions: Mn^{3+}, Cr^{3+}, V^{3+} and Ti^{3+}. Which one of these is the most stable in aqueous solution?

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83. Give examples and suggest reason for the following features of the transition metals Chemistry.

(ii). A transition metal exhibits highest oxidation state in oxides and fluorides.

(iii). The highest oxidation state is exhibited in oxoanions of a metal.

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84. Indicate the steps in the preparation of:

(i). $K_2Cr_2O_7$ from chromite ore.

(ii). $KMnO_4$ from pyrolusite ore

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85. What are alloys? Name an important alloy which contains some of the lanthanoid metals . Mention its uses.

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86. What are inner transition elements? Decide which of the following atomic number are the atomic numbers of the inner trasitions elements: $29, 59, 74, 95, 102, 104$.

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87. The chemistry of the actinoid elements is not so smooth as that of the lanthanoid. Justify this statement by giving some example from the oxidation state of these elements

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88. Which is the last element in the series of the actinods? Write the electronic configuration of this element. Comment on the possible oxidation state of this element.

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89. Use Hund's rule to derive the electronic configuration of Ce^{3+} ion, and calculatel its magntic moment on the basis of spin-only formula.

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90. Name the member of the lanthanoids series which exhibit+4 oxidation states and those which exhibit+2 oxidation state. Try to correlate this types of behavior with the electronic configuration of these elements.

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91. Compare the chemistry of actinoids with that of the lanthanoids with special reference to:

▶ Watch Video Solution

92. Write the electronic configuration of the elements with the atomic number $61, 91, 101$ and 109.

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93. Compare the general characteristics of the first series of the transition metals with those of the seconds and third series metals in the respective vertical columns. Give special emphasis on the following points.

(i). Electronic configuration and

(ii). Oxidation states.

(iii) ionisation enthalpies and

(iv) Atomic.

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94. Write doen the number of 3d electrons in each of the following ions: $Ti^{2+}, V^{2+}, Cr^{3+}, Mn^{2+}, Fe^{2+}, Fe^{2+}, Co^{2+}, Ni^{2+}$ and Cu^{2+} indicate how would you expect the five 3d orbitals to be occupied for these hydrated ions (octahedral).

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95. Comment on the statement that elements of the first transition series possess many properties different from those of heavier transition elements.

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96. What can be inferred from the magnetic moment values of the following camplex species?

$Example$	$MagneticMoment(BM)$
$K_4[Mn(CN)_6]$	2.2
$[Fe(H_2O)_6]$	5.3
$K_2(MnCl_4]$	5.9

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97. Which one of the following postulates of Werner's theory is incorrect ?

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98. $FeSO_4$ solution mixed with $(NH_4)_2SO_4$ solution is $1:1$ molar ratio gives the test of Fe^{2+} ion but $CuSO_4$ solution mixed with aqueous ammonia in $1:4$ molar ratio does not give the test of Cu^{2+} ion. Explain why?

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99. Explain with two examples each of the following coordination entity, ligand, coordination number, coordination polyhedron, homoleptic and heteroleptic.

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100. What is meant by unidentate and ambidentate ligands? Give two examples for each.

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101. Specify the oxidation numbers of the metals in the following coordination entities:

(i). $[Co(H_2O)(CN)(en)_2]^{2+}$

(ii). $[CoBr_2(en)_2]^{\oplus}$

(iii). $[PtCl_4]^{2-}$ ltbtgt (iv). $K_3[Fe(CN)_6]$

(v). $[Cr(NH_3)_3Cl_3]$

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102. Using $IUPAC$ norms write the fomulas for the following

(i). Tetrahydroxozincate(II).

(ii). Potassium tetrachloridopalladate(II).

(iii). Diamminedlchloridoplatinum(II).

(iv). Potassium tetracyanidonickelate(II).

(v). Pentaamminenitrito-O-Cobalt(III).

(vi). Hexaamminecobalt(III) sulphate

(vii). Potassium tri(oxalato)chromate(III).

(viii). Hexaammlneplatinum(IV)

(ix). Tetrabromidocuprate(II).

(x). Pentaamminenitrito-N-cobalt(III).

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103. Using IUPAC norms write the systematic names of the following:

(i). $[Co(NH_3)_6]Cl_3$

(ii). $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$

(iii). $[Ti(H_2O)_6]^{3+}$

(iv). $[Co(NH_3)_4Cl(NO_2)]Cl$

(v). $[Mn(H_2O)_6]^{2+}$

(vi). $[NiCl_4]^{2-}$

(vii). $[Ni(NH_3)_6]Cl_2$

(viii). $[Co(en)_3]^{3+}$

(ix). $[Ni(CO)_4]$

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104. How many geometrical isomers are possible in the following corrdination entities?

(i). $[Cr(C_2O_4)_3]^{3-}$

(ii). $[Co(NH_3)_3Cl_3]$

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105. Draw the structures of optical isomers of:

(i). $[Cr(C_2O_4)_3]^{3-}$

(ii). $[PtCl_2(en)_2]^{2+}$

(iii). $[Cr(NH_3)_2Cl_2(en)]^{\oplus}$

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106. Draw the structures of optical isomers of:

(i). $[Cr(C_2O_4)_3]^{3-}$

(ii). $[PtCl_2(en)_2]^{2+}$

(iii). $[Cr(NH_3)_2Cl_2(en)]^{\oplus}$

107. Write all the geometrical isomers of $[Pt(NH_3)(Br)(Cl)(py)]$ and how many of these will exhibit optical isomers?

108. Aqueous copper sulphate solution (blue in colour) gives:

(i). A green precipitate with aqueous potassium fluoride and

(ii). A bright green solution with aqueous potassium chloride. Explain these experimental results.

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109. What is the coordination entity formed when excess of aqueous KCN is added to an aqueous solution of copper sulphate? Why is that no precipitate of copper sulphlde is obtained when $H_2S(g)$ is passed through this solution?

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110. Discuss the nature of bonding in the following coordination entities on the basis of valence bond theory:

(i). $[Fe(CN)_6]^{4-}$

(ii). $[FeF_6]^{3-}$

(iii). $[Co(C_2O_4)_3]^{3-}$

(iv). $[CoF_6]^{3-}$

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111. What is crystal field splitting energy? How does the magnitude of $\triangle_0$ decide the actual configuration of d orbitals in a coordination entity?

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112. What is spectrochemical series?

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113. What is crystal field splitting energy? How does the magnitude of $\triangle_0$ decide the actual configuration of d orbitals in a coordination entity?

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114. $[Cr(NH_3)_6]^{3+}$ is paramagnetic while $[Ni(CN)_4]^{2-}$ is diamagnetic. Explain why?

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115. Assertion: A solution of $[Ni(H_2O)_6]^{2+}$ is green but a solution of $[Ni(CN)_4]^{2-}$ is colourless

Reason: $[Ni(CN)_4]^{2-}$ is square planar complex .

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116. $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Explain.

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117. BONDING IN METAL CARBONYLS

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118. Give the oxidation state, d-orbitals occupation and coordination number of the central metal ion in the following complexes:

(i). $K_3[Co(C_2O_4)_3]$

(ii). $cis - [Cr(en)_2Cl_2]Cl$

(iii). $(NH_4)_2[CoF_4]$

(iv). $[Mn(H_2O)]SO_4$

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119. Wrtie down the IUPAC name for each of the following complexes and indicate the oxidation state, electronic configuration and coordination number. Also give stereochemistry and magnetic moment of the complex.

(i). $K[Cr(H_2O)_2(C_2O_4)_2].3H_2O$

(ii). $[Co(NH_3)_5Cl]Cl_2$

(iii). $[CrCl_3(py)_3]$

(iv). $Cs[FeCl_4I$

(v). $K_4[Mn(CN)_6]$

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120. STABILITY OF COORDINATION COMPOUND

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121. What is meant by the chelate effect? Give and example.

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122. How many ions are produced from the complex $Co(NH_3)_6Cl_2$ in solution?

(i). 6

(ii). 4

(iii). 3

(iv). 2

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123. Amongst the following ions which one has the highest magnetic moment value?

(i). $[Cr(H_2O)_6]^{3+}$

(ii). $[Fe(H_2O)_6]^{2+}$

(iii). $[Zn(H_2O)_6)]^{2+}$

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124. The oxidation number of hyrogen is

(i) 0

(ii) $+1$

(iii) -1

(iv) $+1$ only.

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125. Among the following, the most stable complex is

(i). $[Fe(H_2O)_6]^{3+}$

(ii). $[Fe(NH_3)_6]^{3+}$

(iii). $[Fe(C_2O_4)_3]^{3-}$

(iv). $[FeCl_6]^{3-}$

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126. The correct order for the wavelength of absorption in the visible region is

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Short Answer Type

1. Which metals are generally extracted by the electrolytic processes ? What positions these metals generally occupy in the periodic table?

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2. What type of ores are roasted?

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3. Give the names of the four most abundant elements in the earth's crust? Arrange them in decreasing abundance.

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4. What is a mineral? How does it differ from an ore?

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5. Why do some metals occur in the native state?

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6. Name the method used for refining of :

(a). Zirconium.

(b). Nickel.

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7. Can iron be purified by amalgamation?

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8. Both iron and aluminium combine slowly with oxygen at room temperature. Why is this reaction a problem for iron but not for aluminium?

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9. What is the name given to solid phase of earth?

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10. Give one example where hydrometallurgy is used for metal extraction?

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11. Name the method of metal refining which is generally used when a metal of high degree of purity is needed.

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12. When is electrolytic reduction applied for getting a metal?

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13. What name is given to carbon reduction process for extracting the metal?

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14. An ore has impurities which are attracted by magnet suggest process for its benefication.

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15. In moist air, copper corrodes to produce a green layer on the surface. Give reason.

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16. The value of $\triangle_f G^{\ominus}(Cr_2O_3) = -540 kJ mol^{-1}$ and $\triangle_f G^{\ominus}(Al_2O_3) = -827 kJ mol^{-1}$. Is reduction of Cr_2O_3 possible with Al?

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17. What do you understand by roasting in presence of NaCl?

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18. Why NF_3 cannot be hydrolysed, while NCl_3 can be readily hydrolysed?

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19. Why NI_5 does not exist While PCl_5 exists?

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20. Why the boiling point of ammonia is greater than phosphine?

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21. Why NO is paramagnetic?

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22. Give reason why elemental nitrogen exitsts as diatomic molecule whereas elemental phosphours is a tetraatomic molecule.

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23. Why nitrogen gas is inert?

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24. Why phosphorus is more reactive than nitrogen?

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25. Why nitrogen does not form penthalides?

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26. Why bismuth does not from pentahalides?

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27. What type of hydridisation is involveed in the formation of pentahalides is involved in the formation of pentahalides of group 15 elements?

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28. An element X belongs to group I or 2 or 15. Its oxide react with water to produce highly acidic solution the elements belong to which group ?

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29. A simole oxide of carbon and that another non-metal have the same Cp/Cv ratio but a difference of 2 in their molecular weights. The other non-metal could be?

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30. Which among the following is strongest reducing agent? BiH_3, AsH_3, PH_3 and NH_3

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31. Which among N_2O, P_2O_5, Sb_2O and Bi_2O_5 is most unstable?

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32. The electronegativity of nitrogen and chlorine is 3.0 Why nitrogen is inert at room temperature , while chlorine is very reactive?

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33. Arrange the following in the increasing order of the properties stated against them.

(a) (i)NH_3 , (ii)PH_3, (iii)AsH_3 , (iv)SbH_3-boiling point.

(b)(i)Bi^{3+} ,(ii)Sb^{3+} , (iii)As^{3+}-stability of $+3$ oxidation state.

(c)(i)NH_3, (ii)PH_3 , (iii)AsH_3 , (iv)SbH_3 , (v)BiH_3-reducing character.

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34. Arrange the above hydrides in order of increasing basic nature.

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35. Which is most stable among above hydrides?

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36. What are the neutral oxides of nitrogen?

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37. What are the paramagnetic oxides of nitrogen?

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38. Name the halides formed by nitrogen.

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39. Why $+5$ state is uncommon in bismuth.

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40. What is the principle of using ammonia in refrigeration?

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41. Which element of group 15 undergoes sublimation?

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42. Which of the elemetns of group 15 are metalloids?

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43. What is the nature of the compounds of group 15 elements?

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44. What is the number of unpaired electrons present in the valency shell of group elements?

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45. The maximum covalency of nitrogen is

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46. What are common oxidation states of group 15 elements?

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47. What are the possible oxidation states of nitogen?

▶ Watch Video Solution

48. What is the relation between oxidation number of the central atom and covalent nature of the compound?

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49. Name the element of group 15 which has highest electronegativity.

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50. Among the hydrides of group 15 elements which has highest boiling point?

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51. Among the hydrides of group 15 elements which is neutral?

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52. Why PCl_3 fumes in moisture?

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53. Arrange the acids H_2SO_4, H_2SeO_4 and H_2TeO_4 in decreasing order of their strength.

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54. Name the most catenating element of group 16.

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55. Give the name of the metalloid in group 16.

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56. Maximum covalency of oxygen is 4. Why?

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57. Name the radioactive chalcogen.

▶ Watch Video Solution

58. What type of bonds do chalcogens from in $+4$ and $+6$ oxidation states?

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59. Why hypo is used in photography?

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60. Which allotropic form of oxygen is unstable?

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61. Which is more acidic: SO_2, SeO_2, and TeO_2?

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62. Why oxygen molecule is diatomic whereas sulphur molecules is octa atomic?

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63. Among TeF_6, SeF_6 and SF_6 which is more stable?

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64. Arrange H_2TeO_3, H_2SeO_3 and H_2SO_3 in increasing order of acid strength.

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65. What is the relation between acid strength and atomic number of central atom?

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66. What is the relation between acidic nature of oxoacid and electronegativity of the central atom?

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67. Is formation of ozone from oxygen an endothermic or exothermic reaction?

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68. Arrange the hydrides of group 16 elements in order of increasing boiling point.

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69. Arrange SO_3, SeO_3 and TeO_3 in order of increasing acid strength.

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70. Arrange the hydrides of group 16 elements in increasing order of reducing power.

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71. Arrange the hydrides of group 16 elements in order of increasing acid nature.

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72. Arrange the hydrised of group 16 in order of increasing bond angle.

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73. Write the formula of oxide, superoxide and peroxide of caesium.

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74. Why sulphur exhibits even oxidation states only?

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75. Arrange H_2S, H_2O, H_2Se and H_2Te in increasing order of reducing strength.

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76. What is the shape of SO_3 molecule in gaseous state?

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77. In which compounds oxygen exhibits positive state?

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78. What is the atomicity of sulphur?

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79. What is the oxidation state of S in H_2SO_4?

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80. Name the hydride of group 16 elements which is liquid at room temperature.

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81. Which allotropic form of sulphur is most stable at room temperature?

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82. What is the maximum number of bonds formed by flourine?

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83. Name the halogens that can form true chemical bonds with noble gases?

Watch Video Solution

84. Name three gases which are used in warfare as posionous gases and prepared by chlorine.

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85. Name the most metalllic element among halogens?

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86. What is geometry of $ClO_2^{\ominus}$, $ClO_3^{\ominus}$ and $ClO_4^{\ominus}$ ions?

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87. Arrange halogens in increasing order of electron affinities.

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88. Arrange the halongens in order of bond dissociation energies.

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89. Arrange the hydrogen halides in decreasing order of their reducing power.

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90. What happens to acid strength among the acids of chlorine with an increase in oxidation number?

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91. Name the anhydride of hypochlorous acid?

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92. Arrange the hydrogen halides in increasing order of acid strengths.

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93. Chlorine heptoxide was was dissolved in water. As a result an acid was obtained. Name the acid formed?

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94. Which halogen has the gretest electron affinity?

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95. Which gas is called super halogen?

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96. Name the anhydride of perchloric acid.

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97. Which is corrosion resistant plastic of fluorine?

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98. What is the order of oxidising nature of oxides of chlorine?

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99. What is the shape of chlorne monoxide molecule?

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100. Give the order of stability of hydrogen halides?

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101. Which halogen oxidises water to ozone?

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102. Which halogen has the least bond energy?

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103. Which halogen is the most powerful oxidising agent?

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104. Why fluorine ghas only one oxidation state?

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105. Arrange oxides of chlorine in decreasing order of reactivity.

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106. Name two elements resisting oxidation by chlorine.

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107. Which halogen has the largest atomic size?

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108. Which oxide of chlorine is paramagnetic?

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109. What is the percentage of chlorine in a good sample of bleaching power?

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110. Why halogens are very reactive?

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111. Why fluorine is most reactive?

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112. Why chlorine does not bleach in the absence of moisture?

Watch Video Solution

113. What happens when fluorine gas is passed through water?

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114. What is the hydridisation of O in Cl_2O?

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115. Which of the following is the only exothermic oxide of chlorine?

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116. Give examples of paramagnetic oxide of chlorine.

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117. Give the name of least stable and most stable oxides of chlorine.

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118. Arrange oxyanions of chlorine in decreasing order of stability.

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119. Arrange hypohalous acids in decreasing order of acidic nature.

Watch Video Solution

120. Arrange hypohalous acids in decreasing order of stability.

Watch Video Solution

121. Arrange hypohalous acids acids in decreasing order of oxidising nature.

Watch Video Solution

122. What is the order of polarising nature of noble gases?

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123. What is the order of boiling point of noble gases?

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124. What is the order iof ionisation enthalpy values of noble gases?

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125. State the hydridisation of central atom in XeF_2 and XeF_4 molecules.

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126. State the total number of electron pairs surrounding the central atom in XeF_2, XeF_4 and XeF_6.

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127. Name the first noble gas compound.

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128. Give the name of six noble gas compounds known to you.

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129. Why Xe forms more compounds than Kr?

Watch Video Solution

130. why only F and O form compounds with Xe?

Watch Video Solution

131. Why He, Ne and Ar do not form compounds while Xe does?

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132. What does life saving mixture for an asthama patient comprises of?

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133. Give the name of noble gas which is commonly used in xrygenic studies?

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134. Xenon hexafluoride react with silica to form a xenon compound (X). The oxidation state of Xe in (X) is

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135. How does the ionic/covalent character of the compounds of a transition metal vary with its oxidation state?

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136. Name the elements which are not really transition elements but are discussed with them. Why is is so?

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137. Copper (I) compounds are white and diamagnetic while copper(II) compounds are coloured and paramagnetic. Explain.

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138. What happends when chromates are kept in acidic solution and dichromates in the alkaline solution?

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139. The most common and stable oxidation state of a lanthanide is

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140. In the transition series, starting from lanthanum $La(Z=57)$, the next element hafnium $Hf(Z=72)$ has an atomic number of 72. Why do we observe this jump in atomic number?

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141. Why does vanadium pentoxide act as a catalyst?

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142. The size of the trivalent cations in the lantlianide series decreases steadily as the atomic number increases. What is this known as?

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143. Give the general electronic configuration of actinides.

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144. Write any two uses of pyrophoric alloys.

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145. What is the maximum oxidation state shown by actinides?

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146. Name one ore each of manganese and chromium.

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147. In the transition series with an increase in atomic number, the atomic radius does not change very much. Why is it so?

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148. What is the effect of increasing pH on $K_2Cr_2O_7$ solution?

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149. What is the basic difference between the electronic configuration of transition and inner transition elements?

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150. Why do transition elements show similarities along the horizontal period?

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151. Out of Al, Zn, Mg and Fe, which is the densest element?

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152. Why do transition elements configuration of the element with atomic number 102.

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153. Explain why transition elements have manuy irregularties in their electronic configuration.

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154. The paramagnetic character in $3d$ transition series elements increases up to Mn and then decreases. Explain why.

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155. Scandium forms no coloured ions, yet it is regarded as a transition elements. Explain why?

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156. Assertion : Hydrochloric acid is not used to acidify a $KMnO_4$ solution in volumetric analysis of Fe^{2+} and $C_2O_4^{2-}$ because.

Reason : Part of the oxygen produced from $KMnO_4$ and HCl is used up in oxidising HCl to Cl_2.

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157. Why Sm^{2+}, Eu^{2+} and Yb^{2+} ions in solution are good reducing agent but an aqueous solution of Ce^{4+} is a good oxidising agent?

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158. Why is the separation of lanthanide elements difficult?

▶ Watch Video Solution

159. The second ionisation enthalpies of both Cr and Cu are higher than those of the next element. Explain.

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160. Name the compound used for measuring the hardness of water, i.e., for estimation of Ca^{2+} and Mg^{2+} ions.

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161. How will you distinguish between the following isomer pairs?

(a). (i). $[Cr(NH_3)_5Br]SO_4$ and (ii). $Cr(NH_3)_5(SO_4)]Br$

(b). (i). $[Co(H_2O)_6]Cl_3$ and (ii) $[Co(H_2O)_5Cl]Cl_2H_2O$

(c). (i). $cis[Pt(NH_3)_2Br_2]$ and (ii) trans

$[Pt(NH_3)_2Br_2]$

(d). The two enantiomers of $[CrCl_2(en)_2]^{\oplus}$

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162. The magnitude of stability constant gives an indication of the stability of _____in___ .

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163. What are the most common coordination numbers encountered in coordination compounds?

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164. Name the central atom present in haemoglobin and chlorophyll.

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165. Wilkinson's catalyst is used as a homogeneous hydrogenation catalyst for the conversion of alkenes to alkanes. It is a complex of

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166. What is spectrochemical series?

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167. What is crystal field splitting energy? How does the magnitude of $\triangle_0$ decide the actual configuration of d orbitals in a coordination entity?

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168. What are t_{2g} and e_g orbitals?

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169. Give the geometry and magnetic character of $[NiBr_4]^{2-}$

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170. How is tetrabutyl tim prepared?

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171. What is te coordination number of Fe in $[Fe(EDTA)]^{\ominus}$?

Watch Video Solution

172. Name the two broad categories of organometallic compounds.

Watch Video Solution

173. In the formula $Fe(\eta^5 - C_5H_5)$, what does the prefix η^5 denote?

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174. Give names of two complexes which are used in medicines.

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175. Name the ionisation isomer of $[Cr(H_2O)_5Cl]SO_4$.

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176. Which is used in cancer chemotherapy? .

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177. What is the solution in which photographic film is washed? What reaction takes place?

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178. Why complexes are prefferred in the electrolytic bath for electroplating?

▶ Watch Video Solution

179. What happens when potassium ferrocyanide solution is added to a ferric salt solution?

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