



# CHEMISTRY

# **BOOKS - CENGAGE CHEMISTRY (ENGLISH)**

# **APPENDIX INORGANIC VOLUME 2**



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?

**3.** The reaction  $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr(\Delta G^\circ = -421KJ)$  is thermodynamically feasible due to -ve value of  $\Delta G$ . Why does this reaction not take place at room temperature ?



**6.** Why is  $BiH_3$  the strongest reducing agent amongst all the hydrides of

Group 15 elements ?



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

- (a)  $\left[ Cu(NH_3)_2 
  ight]^{2+}$
- (b)  $\left[ Cu(NH_3)_4 
  ight]^\oplus$



### 13. What happens when $PCl_5$ is heated?



17. List the important sources of sulphur.





- (i)  $C_2H_4+O_2
  ightarrow$
- (ii)  $4Al+3O_2 
  ightarrow$



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

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**23.** How is  $O_3$  estimated quantitatively?



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

**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 ?







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

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



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

33.	Give	the	reason	for	b	leaching	action	of	$Cl_2$ .
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<b>34.</b> Name two poisonous gases which can be prepared from chlorine gas.
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<b>35.</b> Why is ICI more reactive than $I_2$ ?
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<b>36.</b> Why is helium used in diving apparatus?
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37. Balance the following equation:  $XeF_6 + H_2O 
ightarrow XeO_2F_2 + HF$ 



**41.** Which of the 3d series of the transition metals exhibits the largest number of oxidation states and why?



**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 variation of ionization enthalpies (first and second) in the first series of the transition elements

?



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

fluoride only?



**48.** Actinoid contraction is greater from element to element than lanthanoid contraction. Why?

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**49.** Write the formulas for the following coordination compounds:

(i) Tetraamminediaquacobalt(III) chloride (ii) Potassium
 tetracyanidonickelate(II) (iii) hane–1,2–diamine) chromium(III) chloride (iv)
 Amminebromidochloridonitrito-N-platinate(II) (v) Dichloridobis(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).  $\left[ Co(NH_3)_6 \right] Cl_3$
- (ii).  $\left[ Co(NH_3)_5 Cl \right] Cl_2$

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

(iv).  $K_3 ig[Fe(C_2O_4)_3ig]$ 



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

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

(i)  $K[Cr(H_2O)_2(C_2O_4)_2$ 

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

- (iii)  $\left[ Co(NH_3)_5(NO_2) \right] (NO_3)_2$
- (iv)  $[Pt(NH_3)(H_2O)Cl_2]$

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**52.** Give evidence that  $[Co(NH_3)_5Cl]SO_4$  and  $[Co(NH_3)_5(SO_4)]Cl$  are

ionisation isomers.



#### 53. Explain the following giving reasons

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



**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.  $\left[Fe(H_2O)_6\right]^{3+}$  is strongly paramagnetic whereas  $\left[Fe(CN)_6\right]^{3-}$  is

weakly paramagnetic Explain.



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

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**58.** The hexaquo managanese (II) ion contains five unpaired electrons, while the hexacyanion contains only one unpaired electron. Explain using Crystal Field Theory.

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**59.** (a) What is meant by unidentate, didentate and ambidentate ligands? Give two examples for each.

(b) Calculate the overall complex dissociation equilibrium constant for

the  $Cu(NH_3)_{4^{2+}}$  ion, given that eta 4 for this complex is  $2.1 imes 10^{13}.$ 





## 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?

4. Outline the principples behind the refining of metals by the following

methods :

(i) Zone refining method

(ii)Chormatographaphic method

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

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6. Name the common elements present in the anode mud in electrolytic

refining of copper. Why are they so present ?



7. Write down the reactions taking place in different zones in the blast

furnace during the extraction of iron.

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<b>8.</b> Write chemical reactions taking place in the extraction of zinc from zinc
blende.
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<b>9.</b> What is the function of $SiO_2$ in the metallurgy of copper?
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**10.** Answer the Following:

(i) What si the role of cryolite in the metallurgy of aluminium?

(ii) Differentiate between roasting and calcination.			
(iii) What is meant by the term 'chromatography'?			
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<b>11.</b> What criterion is followed for the selection of the stationary phase in			
chromatography?			
<b>Watch Video Solution</b>			
<b>12.</b> Describe a method for refining nickel.			
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13. How can you separate alumina from silica in a bauxite ore associated

with silica? Give equations, if any.

## 14. Giving examples, differentiate between 'roasting' and 'calcination'.

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<b>15.</b> How is cast iron different from pig iron ?
<ul><li>16. Differentiate between "minerals" and "ores".</li><li>Watch Video Solution</li></ul>
<b>17.</b> Why copper matte is put in silica lined converter?
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**18.** What is the role of cryolite in the metallurgy of aluminium?



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22. Out of C and CO, which is a better reducing agent for ZnO ?

**23.** 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 two examples.

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**24.** Name the processes from which chlorine is obtained as a by-product. What will happen if an aqueous solution of NaCl is subjected to electrolysis?

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

**26.** Outline the principles of refining of metals by the following methods:

(i) Zone refining

(ii) Vapour phase refining

**D** Watch Video Solution

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

(Hint: See Intext question 6.4)

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**28.** Discuss the general characteristics of Group 15 elements with reference to their electronic configuration, oxidation state, atomic size, ionisation enthalpy and electronegativity.



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

**33.** State three different chemical compounds other than acids manufactured industrially from sulphuric acid.



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

[Hint: Can be explained on the basis of  $sp_3$  hybridisation in  $NH_3$  and only

s-p bonding between hydrogen and other elements of the group].



41. Why does nitrogen show catenation properties less than phosphorus

?

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<b>42.</b> Give the disproportionation reaction of $H_3PO_3$ .
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<b>43.</b> Can $PCl_5$ act as an oxidising as well as a reducing agent? Justify.
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<b>44.</b> 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.

# 45. Why is dioxygen a gas but sulphur a solid?



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

(Hint: Consider lattice energy factor in the formation of compounds).

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47. Which aerosols deplete ozone?

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**48.** Describe the manufacture of  $H_2SO_4$  by contact process?







57. What inspired N. Bartlett for carrying out reaction between Xe and

 $PtF_5$  ?



**61.** With what neutral molecule is  $ClO^-$  isoelectronic? Is that molecule a

Lewis base ?



**62.** How are  $XeO_3$  and  $XeOF_4$  prepared?

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

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64. Which one of the following does not exist?

**65.** Give the formula and describe the structure of a noble gas which is

isostructural with

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

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

(iii).  $BrO_3$ 

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

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67. List the uses of neon and argon gases.



**68.** Write down the electronic configuration of: ltBrgt (i)  $Cr^{3+}$ 

(ii)  $Pm^{3+}$ (iii) $Cu^+$ (iv)  $Ce^{4+}$  $Co^{2+}$ 

(vi)  $Lu^{2\,+}$ 

(vii)  $Mn^{2\,+}$ 

(viii)  $Th^{4\,+}$ 

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**69.** Why are  $Mn^{2+}$  compounds more stable than  $Fe^{2+}$  towards oxidation to their +3 state? **Watch Video Solution** 

70. Explain briefly how +2 state becomes more and more stable in the first

half of the first row transition elements with increasing atomic number?
**71.** 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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**72.** What may be the stable oxidation state of the transition element with the following d electron configurations in the ground state of their atoms :  $3d^3$ ,  $3d^5$ ,  $3d^8$  and  $3d^4$ ?

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**73.** 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.

**74.** What is lanthanoid contraction ? What are the consequences of lanthanoid contraction ?



**75.** What are the characteristics of the 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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76. In what way is the electronic configuration of the transition elements

different from that of the non transition elements?

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77. What are different oxidation states exhibit by lanthanoids?

**78.** Explain giving reasons: (i) Transition metals and many of their compounds show paramagnetic behaviour. (ii) The enthalpies of atomisation of the transition metals are high. (iii) The transition metals generally form coloured compounds. (iv) Transition metals and their many compounds act as good catalyst.

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**79.** What are interstitial compounds? Why are such compounds well known for transition metals?



80. How is the variability in oxidation states of transition metals different

from that of the non transition metals?

Illustrate with examples.



**81.** Describe the preparation of potassium dichromate from iron chromite ore.What is the effect of increasing pH on a solution of potassium dichromate?

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**82.** Descibe the oxidising actions of potassium dichromate and write the

ionic equations for its reaction with (i) iodide (ii) iron II solution (iii) $H_2S$ 

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83. Describe the preparation of potassium permagnatite. How does the

acidified permanganate solution react with oxalic acid ?

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

follows.

$$egin{aligned} rac{Cr^{2+}}{Cr} &- 0.9V, rac{Cr^{3+}}{Cr^{2+}} - 0.4V \ rac{Mn^{2+}}{Mn} &- 1.2V, rac{Mn^{3+}}{Mn^{2+}} + 1.5V \ rac{Fe^{2+}}{Fe} &- 0.4, rac{Fe^{3+}}{Fe^{2+}} + 0.8V \end{aligned}$$

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

 $Ti^{3+}, V^{3+}, Cu^+, Sc^{3+}, Mn^{2+}, Fe^{3+}$  and  $Co^{2+}$ . Give reasons for each.

86. Compare the stability of +2 oxidation state for the elements of the

first transition series.



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

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**88.** How would you account for the following :

(i) Out 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 oxidized.

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

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

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

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**91.** 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?

**92.** Give examples and suggest reasons for the following features of the transition metal chemistry:

(i) The lowest oxide of transition metal is basic, the highest is amphoteric/acidic.

(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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93. Indicate the steps in the preparation of:

- (i).  $K_2 C r_2 O_7$  from chromite ore.
- (ii).  $KMnO_4$  from pyrolusite ore



94. What are alloys? Name an important alloy which contains some of the

lanthanoid metals. Mention its uses.

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

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**96.** The chemistry of the actinoid elements is not so smooth as that of theb lanthanoids. Justify this statement by giving some examples from the oxidation state of these elements.

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**97.** Which is the last element in the series of the actinoids? Write the electronic configuration of this element. Comment on the possible oxidation state of this element.

**98.** Use Hund's rule to derive the electronic configuration of  $Ce^{3+}$  ion, and calculate its magnetic moment on the basis of 'spin-only' formula.

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**99.** Name the members of the lanthanoid series which exhibit +4 oxidation states and those which exhibit +2 oxidation states. Try to correlate this type of behaviour with the electronic configurations of these elements.

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100. Compare the chemistry of actinoids with that of the lanthanoids with

special reference to:

**101.** Write the electronic configurations of the elements with the atomic

numbers 61, 91, 101, and 109.



**102.** 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 bais of Atomic size.

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**103.** Write down the number of 3d electrons in each of the following ions:  $Ti^{2+}, V^{2+}, Cr^{3+}, Mn^{2+}, Fe^{2+}, Fe^{3+}, Co^{2+}, Ni^{2+}$  and  $Cu^{2+}$ . Indicate how would you expect the five 3d orbitals to be occupied for these hydrated ions (octahedral). **104.** 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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106. Which of the following postulates of kinetic theory of gases is not

correct ?

**107.**  $FeSO_4$  solution mixed with  $(NH_4)_2SO_4$  solution in 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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**108.** Explain with two examples each of the following: coordination entity, ligand, coordination number, coordination polyhedron, homoleptic and heteroleptic

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**109.** What is meant by unidentate, didentate and ambidentate ligands?

Give two examples for each.



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

- (i)  $\left[Co(H_2O)(CN)(en)_2\right]^{2+}$
- (ii)  $\left[CoBr_2(en)_2
  ight]^+$
- (iii)  $\left[ PtCl_4 
  ight]^{2\,-}$
- (iv)  $K_3 ig[Fe(CN)_6ig]$
- (v)  $\left[ Cr(NH_3)_3 Cl_3 
  ight]$

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111. Using IUPAC norms write the formulas for the following

- (i) Tetrahydroxidozincate (II)
- (ii) Potassium tetra chlorido palladate
- (iii) Diamminedi chlorido platinum (II)
- (iv) Potassium tetracyanidonikelate (II)
- (v) Pentaammine nitrito -O cabolt (III)
- (vi) Hexaamminecobalt (III) sulphate
- (vii) Potassium tri(oxalato) chromate (III)
- (viii) Hexaamine platinum (IV)



(iii).  $\left[Ti(H_2O)_6
ight]^{3\,+}$ 

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113. List various types of isomerism possible for coordinatior compounds,

giving an example of each.



**114.** How many geometrical isomers are possible in the following coordination entities ?

- (i)  $\left[ Cr(C_2O_4)_3 \right]^{3-}$
- (ii)  $\left[Co(NH_3)_3Cl_3\right]$

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**115.** Draw the structures of optical isomers of:

- $\left[Cr(C_2O_4)_3
  ight]^{3-}$
- (ii)  $\left[ PtCl_2(en)_2 \right]^{2+}$
- (iii)  $\left[ Cr(NH_3)_2 Cl_2(en) 
  ight]^+$

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**116.** Draw the structures of optical isomers of:

$$ig[Cr(C_2O_4)_3ig]^{3-}$$

(ii) 
$$\left[ PtCl_2(en)_2 
ight]^{2+}$$

(iii)  $\left[ Cr(NH_3)_2 Cl_2(en) \right]^+$ 

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

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



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

- (i)  $\left[Fe(CN)_6\right]^{4-}$
- (ii)  $\left[FeF_6
  ight]^{3-}$
- (iii)  $\left[ Co(C_2O_4)_3 \right]^{3-}$
- (iv)  $\left[ CoF_{6}
  ight] ^{3\,-}$

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121. The magnitude of CFSE (Crystal Field Splitting Energy ,  $\Delta_0)$  can be

related to the configuration of d-orbitals in a coordination entity as

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122. Write 1st 5 order and define What is spectrochemical series?



123. The magnitude of CFSE (Crystal Field Splitting Energy ,  $\Delta_0)$  can be

related to the configuration of d-orbitals in a coordination entity as



126.  $\left[Fe(H_2O)_6
ight]^{3+}$  is strongly paramagnetic whereas  $\left[Fe(CN)_6
ight]^{3-}$  is

weakly paramagnetic Explain.



127. Give the IUPAC name of the following compounds



**128.** Give the oxidation state, d orbital occupation and coordination number of the central metal ion in the following complexes:

```
(i) K_3 [Co(C_2O_4)_3]
```

```
(ii) cis- \left[ CrCl_{2}(en)_{2} \right] Cl
```

```
(iii) (NH_4)_2 [CoF_4]
```

(iv)  $\left[Mn(H_2O)_6
ight]SO_4$ 



**133.** How many ions are produced from the complex Co(NH3)4Cl2 in solution ?

(i) 6 (ii) 4 (iii) 3 (iv) 2

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

- (i)  $\left[ Cr(H_2O)_6 
  ight]^{3\,+}$
- (ii)  $\left[Fe(H_2O)_6
  ight]^{2+}$
- (iii)  $\left[Zn(H_2O)_6
  ight]^{2\,+}$

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135. The oxidation number of hyrogen is

(i) 0

(ii) +1

(iii) -1

(iv) +1 only.

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136. Amongst the following, the most stable complex is

- (i)  $\left[Fe(H_2O)_6
  ight]^{3\,+}$
- (ii)  $\left[Fe(NH_3)_6
  ight]^{3\,+}$
- (iii)  $\left[Fe(C_2O_4)_3
  ight]^{3-}$
- (iv)  $\left[FeCl_6
  ight]^{3-}$

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137. 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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<b>2.</b> What type of ores are roasted?	
<b>Watch Video Solution</b>	

3. Give the names of the four most abundant elements in the earth's

crust? Arrange them in decreasing abundance.



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

<b>5.</b> Why do some metals occur in the native state?
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<b>6.</b> Name the method used for refining of :
(a). Zirconium.
(b). Nickel.
<b>Vatch Video Solution</b>
7. Can iron be purified by amalgamation?
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<b>8.</b> Both iron and aluminium combine slowly with oxygen at room temperature. Why is this reaction a problem for iron but not for

aluminium?



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

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.



**16.** The value of  $\Delta_f G^{\Theta}$  for formation of  $Cr_2O_3$  is  $-540kJmol^{-1}$  and that of  $Al_2O_3$  is  $-827kJmol^{-1}$ . Is the reduction of  $Cr_2O_3$  possible with Al?

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?

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



24. Why phosphorus is more reactive than nitrogen?





**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?



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.



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

## **35.** Which is most stable among above hydrides?

<b>Watch Video Solution</b>
36. What are the neutral oxides of nitrogen?           Watch Video Solution
37. What are the paramagnetic oxides of nitrogen?           Watch Video Solution
38. Name the halides formed by nitrogen.          Watch Video Solution

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



**44.** What is the number of unpaired electrons present in the valency shell

of group elements?



48. What is the relation between oxidation number of the central atom

and covalent nature of the compound?

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<b>49.</b> 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?

Watch Video Solution

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


**Watch Video Solution** 

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.

# 56. Maximum covalency of oxygen is 4. Why?

<b>Watch Video Solution</b>
<b>57.</b> Name the radioactive chalcogen.
<b>Vatch Video Solution</b>
<b>58.</b> What type of bonds do chalcogens form in $+4$ and $+6$ oxidation
states?
<b>O</b> Watch Video Solution
<b>59.</b> Hypo is used in photography to
Watch Video Solution

#### 60. Which allotropic form of oxygen is unstable?



atomic?

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

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

strength.



**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?



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

reaction?



**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.



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?

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

strength.



**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?

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

gases?



87. Why are electron affinities of noble gases zero? Arrange halogens in

increasing order of electron affinity.









100. The correct order of the thermal stability of hydrogen halides (H-X) is .



## **104.** Why fluorine ghas only one oxidation state?

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<b>105.</b> Arrange oxides of chlorine in decreasing order of reactivity.
<b>O</b> Watch Video Solution
<b>106.</b> Name two elements resisting oxidation by chlorine.
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<b>107.</b> Which halogen has the largest atomic size?
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108. Which oxide of chlorine is paramagnetic?



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

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

**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?

A.  $Cl_2O$ 

 $\mathsf{B.}\,ClO_2$ 

 $\mathsf{C.}\,Cl_2O_6$ 

D.  $Cl_2O_7$ 

#### Answer:







**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.



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



**133.** Give the name of noble gas which is commonly used in crygenic

## studies?

**O** Watch Video Solution

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 ?



136. Name the elements which are not really transition elements but are

discussed with them. Why is is so?



**137.** Account for the following : (a) (i) Copper(I) compounds are white whereas Copper(II) compounds are coloured. (ii) Chromates change their colour when kept in an acidic solution. (iii) Zn,Cd, Hg are considered as d-block elements but not as transition elements. (b) Calculate the spin only moment of  $Co^{2+}$  (Z=27) by writing the electronic configuration of Co and  $Co^{2+}$ 

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

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139. Which is the most common oxidation state of lanthanoids?

**140.** In the transition element series starting from lanthanun  $({}_{57}La)$ , the next element hafnium  $({}_{72}2Hf)$  has an atom number, 72. Why do we observe this jump in atom number?

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141. Why does vanadium pentoxide acts as a catalyst?

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

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**143.** Give the general electronic configuration of actinoids





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

**152.** Write the electronic configuration of the element with atomic number 102.

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**153.** Explain why transition elements have many irregularities in their electronic configuration.

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**154.** Explain the following :

The paramagnetic character in 3d-transition series elements increases

upto Mn and then decreases.

155. Scandium forms no coloured ions, yet it is regarded as a transition

elements. Explain why?



**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 are good reducing agents , but and aqueous solution of  $Ce^{4+}$  is good oxidsing (Z=64) and Lutetium (Z= 7) are especially, stable . Why ?





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?

(i).  $\left[Cr(NH_3)_5Br
ight]SO_4$  and (ii).  $Cr(NH_3)_5(SO_4)
ight]Br$ 



**166.** What is spectrochemical series? Explain the difference between a weak field ligand and a strong field ligand.

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167. The magnitude of CFSE (Crystal Field Splitting Energy ,  $\Delta_0$ ) can be

related to the configuration of d-orbitals in a coordination entity as

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**168.** What are  $t_{2q}$  and  $e_q$  orbitals?

**O** Watch Video Solution

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







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



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

ferric salt solution?