

62.(B)  $\text{Mn}^{2+}$  (in  $\text{MnSO}_4 \cdot 2\text{H}_2\text{O}$ ) has the configuration  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$ , i.e., it has 5 unpaired electrons in 3d-orbitals. Similarly the number of unpaired electrons in other species are  $\text{Cu}^{2+}$  (in  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ):  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$ , i.e., one unpaired electron.

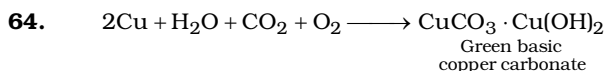
$\text{Fe}^{2+}$  (in  $\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$ ):  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$ , i.e., four unpaired electrons.

$\text{Ni}^{2+}$  (in  $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ ):  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$ , i.e., two unpaired electrons.

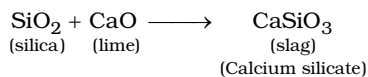
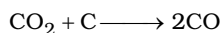
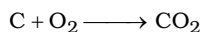
So, we find minimum number of unpaired electrons (i.e. 1) in  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  so it has the lowest degree of paramagnetism.

63.(AC) The addition of Mn makes steel harder and increases its elasticity and tensile strength.

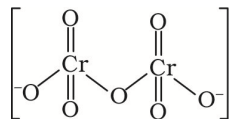
Mn also acts as a deoxidiser. MnO reacts with S present in cast iron to form  $\text{SO}_2$  and thus it can remove oxygen and sulphur.



65. Following reactions occur when haematite is burnt with carbon (coke) and lime at  $2000^\circ\text{C}$ .

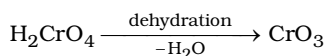


66.(B) The structure of  $\text{Cr}_2\text{O}_7^{2-}$  is :



In it all the six normal Cr – O bonds are equivalent and two bridged Cr – O bonds are equivalent. The normal Cr – O bonds (161 pm) are different from bridged Cr – O bonds (180 pm).

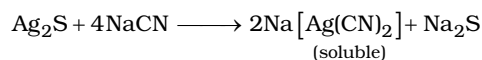
67.  $\text{CrO}_3$  is acid anhydride of  $\text{H}_2\text{CrO}_4$  (chromic acid)



68.(C) Reduction of haematite ore ( $\text{Fe}_2\text{O}_3$ ) to Fe by the process of reduction is followed by oxidation when impure iron is oxidised for removing C as  $\text{CO}_2$ .

69. (i) Argentite ( $\text{Ag}_2\text{S}$ ) ore is concentrated by froth floatation process.

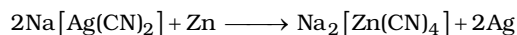
The concentration ore is finely divided and dissolved in dilute solution of sodium cyanide ( $\text{NaCN}$ ).



It is called leaching.

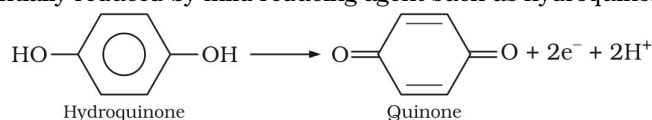
$\text{Na}_2\text{S}$  is oxidised by air to  $\text{Na}_2\text{SO}_4$  and it prevents the backward reaction to occur.

Metallic silver ( $\text{Ag}$ ) is then precipitated out from the solution by adding  $\text{Zn}$  (an electropositive metal).

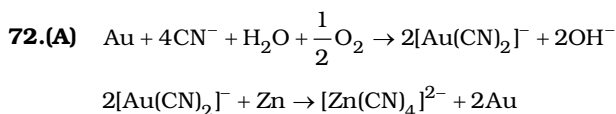
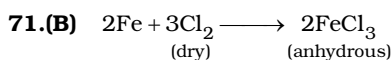
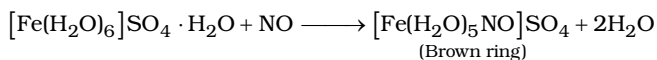
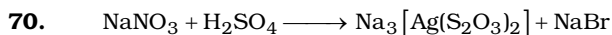
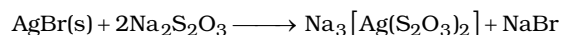


Note : Zinc is more electropositive than  $\text{Ag}$ .

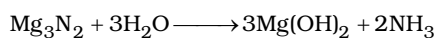
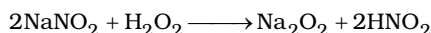
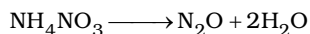
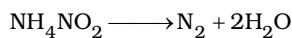
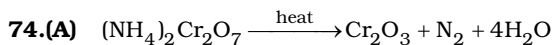
- (ii) During the process of development of the photographic film, the activated  $\text{AgBr}$  grains are preferentially reduced by mild reducing agent such as hydroquinone.



The photographic film is then permanently fixed by immediately washing any non-activated  $\text{AgBr}$  grains in hypo (This is the process of fixing).



- 73.(A) In alkaline medium the stable oxidation state of  $\text{Mn}$  is +6. Hence,  $\text{MnO}_2$  is oxidised to  $\text{K}_2\text{MnO}_4$  (purple green) by atmospheric oxygen in  $\text{KOH}$  medium.



$\text{N}_2$  gas is liberated by heating  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$  and the same gas ( $\text{N}_2$ ) is liberated by heating  $\text{NH}_4\text{NO}_2$ . In all other cases,  $\text{N}_2$  is not a product.

**75.(A)** In alkaline medium, the stable oxidation state of Mn is +6. Thus,  $\text{MnO}_4^-$  and  $\text{I}^-$  is oxidised to  $\text{IO}_3^-$ .

