

CHEMISTRY STUDY MATERIALS FOR CLASS 12

(NOTES BASED ON NCERT)

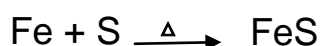
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DATE:- 18/07/2020

The d & f - Block Elements

Sulphides of transition metals.

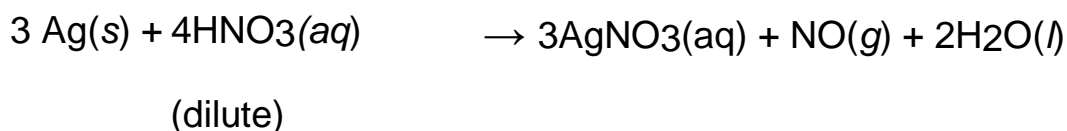
- (i) Sulphides of transition metals can be obtained direct union of sulphur with the transition metals



- (ii) In sulphides, the oxidation state of the metal is generally low because sulphur is a weak oxidizing agent.
- (iii) The sulphides of transition metals are usually coloured or black. For example CuS, NiS, CoS are black, MnS is light pink, CdS is yellow etc. They are insoluble in water.

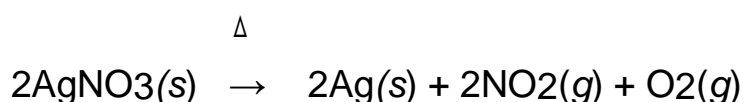
Silver Nitrate or Lunar Caustic, AgNO₃:

Silver nitrate can be prepared by heating silver with dilute nitric acid.

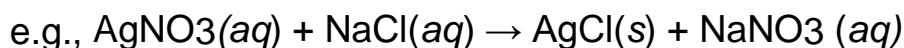


Properties:

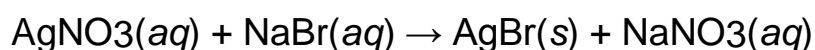
- (i) It is a colourless, crystalline compound, soluble in water and alcohol. It melts at 484 K.
- (ii) In contact with organic substances (skin, clothes, paper etc.) it blackens due to decomposition into metallic silver and thus leaves black stains when comes in contact with skin and clothes.
- (iii) It decomposes on exposure to light and hence is stored in brown coloured bottles. On heating strongly, at red hot it decomposes to metallic silver.



- (iv) With potassium chromate it gives a red ppt. of silver chromate.
- (v) Aqueous solutions of halides, phosphates, sulphides, chromates, thiocyanates, give a precipitate of the corresponding silver salt with silver nitrate solution



(white)



(pale Yellow)

- (vi) It forms precipitate of silver oxide with $\text{NaOH}(\text{aq})$. Originally, the ppt., has a brown colour but turns black when dried.



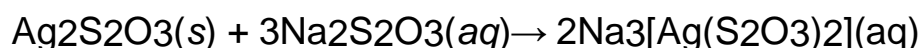
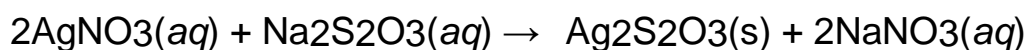
- (vii) Solid AgNO_3 absorbs ammonia gas with the formation of an addition compound, $\text{AgNO}_3 \cdot 2\text{NH}_3$.

- (viii) With potassium chromate it gives a red ppt. of silver chromate.



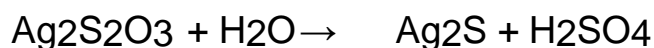
Red PPT

- (ix) It gives white precipitate with hypo (sodium thiosulphate) which however dissolves in excess of hypo due to complex formation.



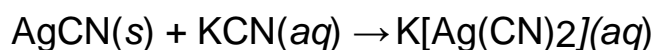
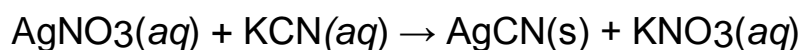
Sodium argentothiosulphate

However if hypo is not excess, the white ppt. changes to black Ag_2S , slowly.



Black ppt.

- (x) It gives white precipitate of AgCN with KCN which dissolves in excess of KCN due to complex formation.



- (xi) **Tollen's reagent:** It gives brown precipitate with NH_4OH which however dissolves in excess of NH_4OH due to complex formation.



Brown ppt.

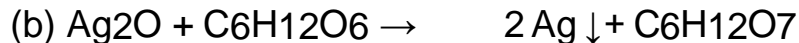


Diamminesilver(I)nitrate

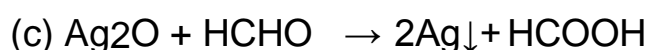
The Ammonical solution of AgNO_3 is known as Tollens reagent and gives following reactions.



Silver Acetylide



Silver mirror



Silver mirror

Uses.

- (i) It is used as a laboratory reagent for the identification of various acidic radicals especially for halides. Tollen's reagent is used in organic chemistry for testing aldehydes, reducing sugars, etc.
- (ii) It is used for making silver halides which are used in photography.
- (iii) It is used in the preparation of inks and hair dyes.
- (iv) A very dilute solution of silver nitrate is used in cauterization of eyes and as dental antiseptic.
- (v) **Silvering of mirror** or for the preparation of silvered mirrors.

(vi) AgNO_3 is popularly used both the quantitative and qualitative analysis. Presence of chloride (Cl^-) bromide (Br^-) and iodide (I^-) ions can be detected with the help of silver nitrate. However, Fluoride ion (F^-) cannot be detected by this method as silver fluoride so formed on treatment with AgNO_3 solution is soluble in water.
