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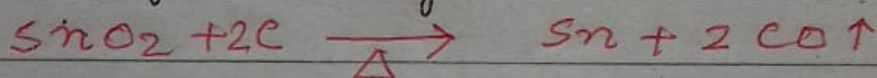
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For Deg I Chemistry Hons Paper-I & Metallurgy Deg I sub Course

Tin metal (Sn) Atomic no = 50

The chief ore of tin is Cassiterite or Tin stone (SnO₂)

Extraction:— The ore is powdered and concentrated by gravity separation process. The concentrated ore is roasted when As and S are removed as As₂O₃ and SO₂ gas. The roasted ore is then reduced by heating with carbon.

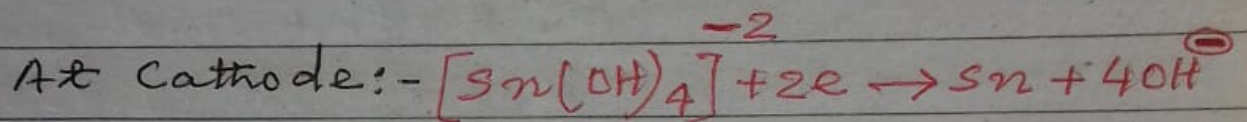
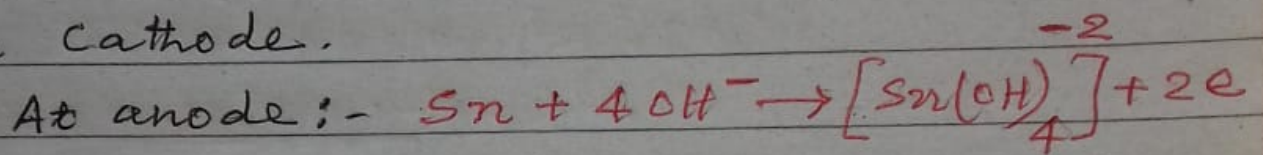


Sn obtained by carbon-reduction is purified by liquation. The metal is melted and allowed to flow in a slanted position. As a result of which Sn metal flows and impurities are left behind on the floor of slanting plane.

Isolation of Sn from scrap tin:— Steel covered with a thin film of tin is called scrap tin. Scrap tin is compressed into bundles and is used as anode and a sheet of pure tin is

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used as cathode in a bath (trough) of dilute alkali. Sn from scrap tin passes into solution at anode and from the solution Sn is deposited at the cathode.

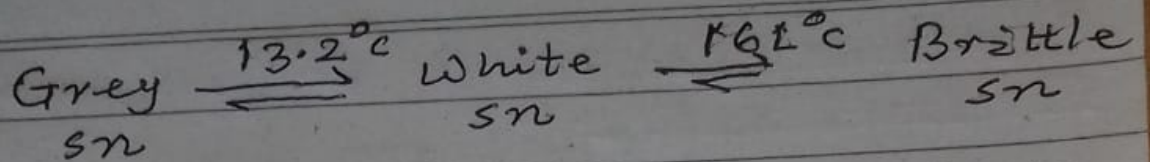


Note: - Though Sn is above H, in the electrochemical series yet it is deposited as Sn from its solution due to hydrogen over voltage effect.

Physical properties

Tin is a silver white lustrous metal which is very soft and so it can be rolled into very thin sheets called tin-foil.

Sn exists in two allotropic forms - (1) white tin (2) Grey tin. White tin is metallic and has ionic lattice whereas Grey tin is non-metallic and has diamond like structure.



Below 13.2°C , tin is grey and above 13.2°C it is white tin. If it is heated above 161°C , it is brittle.

$$\text{M.P.} = \underline{231.8^\circ\text{C}}$$

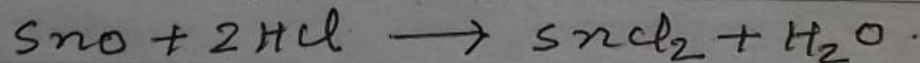
Deadening of tin :-

When tin is cooled below 13.2°C it is converted to grey tin and crumble into powder which is called deadening of tin.

Sn(II) compound :-

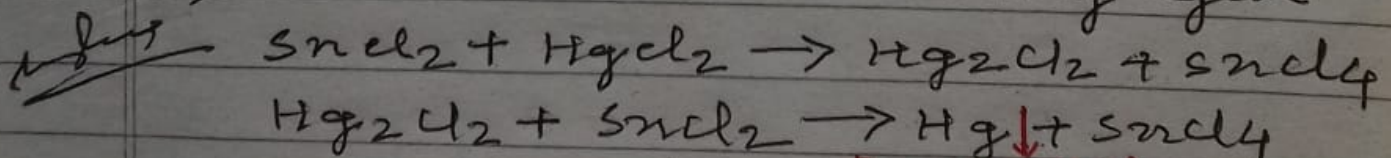
SnCl_2 (stannous chloride)

- 1) When SnCl_4 is heated with Sn, SnCl_2 is formed. $\text{SnCl}_4 + \text{Sn} \xrightarrow{\Delta} 2\text{SnCl}_2$
- 2) It may also be obtained by the reaction of SnO with HCl.



Properties :-

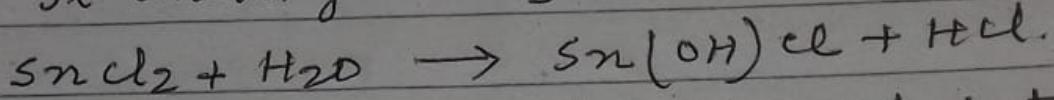
- (1) SnCl_2 is solid and soluble in water
- (2) It acts as a reducing agent



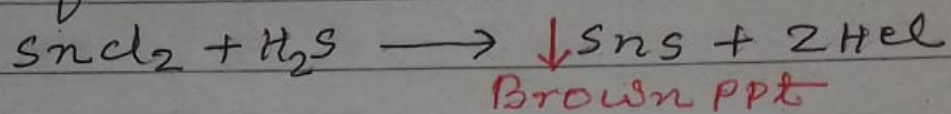
Brown ppt

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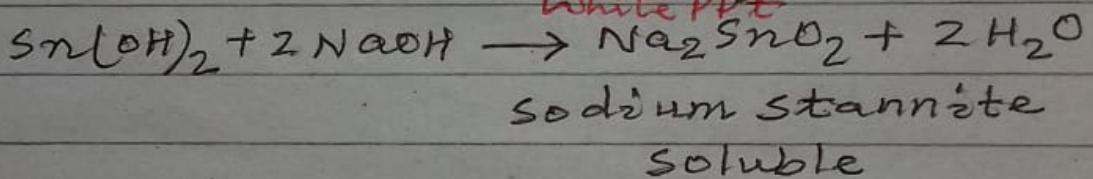
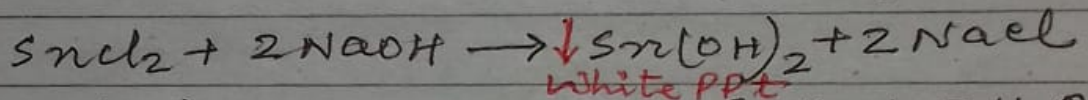
(3) It undergoes hydrolysis in water



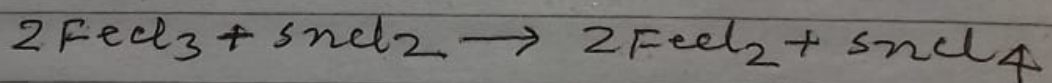
(4) When H_2S gas is passed into acidic solution of SnCl_2 , brown ppt of SnS is formed.



(5) When NaOH is added to SnCl_2 white ppt of Sn(OH)_2 is obtained which dissolves in excess of NaOH .



(6) It reduces ferric chloride solution to ferrous chloride solution



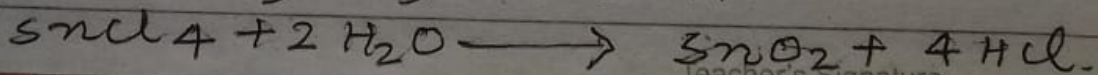
Stannic chloride (SnCl_4)

When Sn is heated with Cl_2 , SnCl_4 is formed. $\text{Sn} + 2\text{Cl}_2 \xrightarrow{\Delta} \text{SnCl}_4$

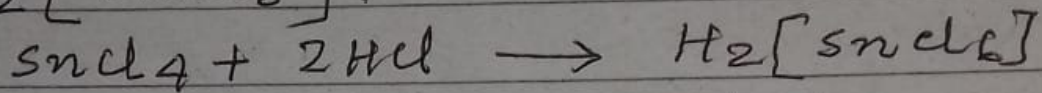
Properties: —

(1) It is solid

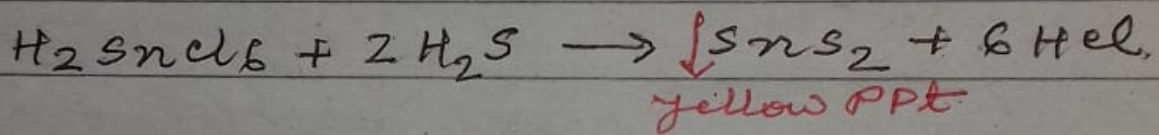
(2) It is hydrolysed with water



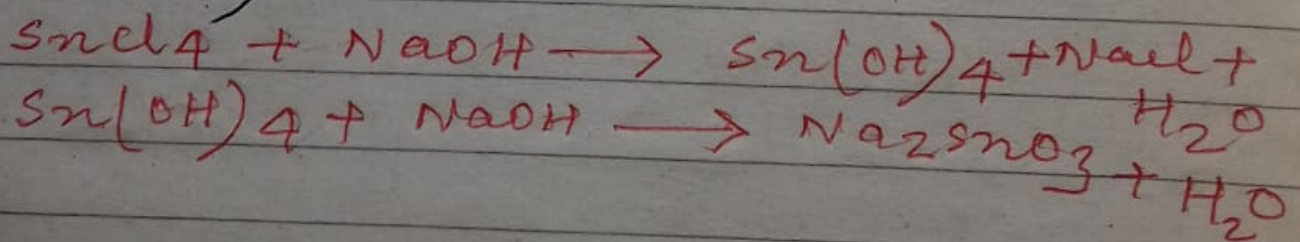
(3) With excess of conc HCl, it forms $H_2[SnCl_6]$.



(4) When H_2S is passed into acidic solution of $SnCl_4$ is H_2SnCl_6 solution which gives yellow ppt of SnS_2 .



(5) When NaOH solution is added to $SnCl_4$ white ppt of $Sn(OH)_4$ is formed which dissolves in excess of NaOH to form Na_2SnO_3 (sodium stannite)



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