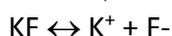


Answer on Question #75702 – Chemistry – Inorganic Chemistry

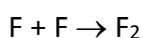
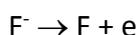
Describe Moissan's reaction for the isolation of fluorine. Give the modifications done in the origin.

Solution:

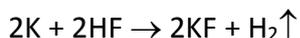
Henri Moissan found a way to produce fluorine by passing an electric current through a liquid mixture of potassium fluoride and hydrogen fluoride. He electrolysed a cooled solution of KF in anhydrous liquid HF at 250 K using platinum-iridium electrodes sealed with fluorspar caps in a platinum U-tube. In this reaction, the actual electrolyte is KF while HF acts as an ionising solvent, F₂ is evolved at the anode and H₂ at the cathode as indicated below:



At the anode:



At the cathode:



Potassium fluoride thus formed again undergoes electrolysis. As the hydrogen fluoride is used up, more is added to prevent the melting point of the mixture from rising. The outgoing gases, F₂ and H₂, are not allowed to mix up in the electrolytic cell. The fluorine gas is collected in plastic receivers.

Moissan's original method has been modified. In place of the expensive Pr/Ir alloy, cells made of copper, steel or Monel metal, which is a nickel-copper alloy, have been used. These get covered by a thin protective film of the fluoride just as aluminium is protected by the thin film of oxide. Anode is a carbon rod impregnated with copper to render it inert and cathode is made of steel or copper. A mixture of KF and HF in the molar ratio of 1 : 1 or 1 : 2 is used as electrolyte giving a working temperature of 515 K or 345 K, respectively.

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