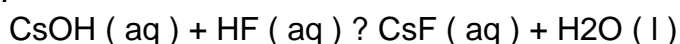


= Caesium fluoride =

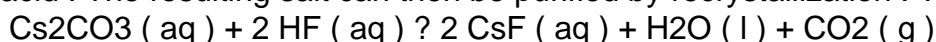
Caesium fluoride or cesium fluoride is an inorganic compound usually encountered as a hygroscopic white solid . It is used in organic synthesis as a source of the fluoride anion . Caesium has the highest electropositivity of all non @-@ radioactive elements and fluorine has the highest electronegativity of all elements .

= Synthesis and properties =

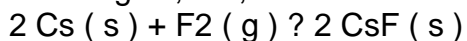
Caesium fluoride can be prepared by the reaction of caesium hydroxide (CsOH) with hydrofluoric acid (HF) . The resulting salt can then be purified by recrystallization . The reaction is shown below :



Another way to make caesium fluoride is to react caesium carbonate (Cs₂CO₃) with hydrofluoric acid . The resulting salt can then be purified by recrystallization . The reaction is shown below :



In addition , elemental fluorine and caesium can be used to form caesium fluoride as well , but doing so is very impractical because of the expense . While this is not a normal route of preparation , caesium metal reacts vigorously with all the halogens to form caesium halides . Thus , it burns with fluorine gas , F₂ , to form caesium fluoride , CsF according to the following reaction :



CsF is more soluble than sodium fluoride or potassium fluoride . It is available in anhydrous form , and if water has been absorbed it is easy to dry by heating at 100 ° C for two hours in vacuo . CsF reaches a vapor pressure of 1 kilopascal at 825 ° C , 10 kPa at 999 ° C , and 100 kPa at 1249 ° C.

CsF chains with a thickness as small as one or two atoms can be grown inside carbon nanotubes .

= Structure =

Caesium fluoride has the halite structure , which means that the Cs + and F - pack in a cubic closest packed array as do Na + and Cl - in sodium chloride .

= Applications in organic synthesis =

Being highly dissociated it is a more reactive source of fluoride than related salts . CsF is less hygroscopic alternative to tetra @-@ n @-@ butylammonium fluoride (TBAF) and TAS @-@ fluoride (TASF) when anhydrous " naked " fluoride ion is needed .

= As a base =

As with other soluble fluorides , CsF is moderately basic , because HF is a weak acid . The low nucleophilicity of fluoride means it can be a useful base in organic chemistry . CsF gives higher yields in Knoevenagel condensation reactions than KF or NaF .

= Formation of C @-@ F bonds =

Caesium fluoride is also a popular source of fluoride in organofluorine chemistry . For example , CsF reacts with hexafluoroacetone to form a caesium perfluoroalkoxide salt , which is stable up to 60 ° C , unlike the corresponding sodium or potassium salt . It will convert electron @-@ deficient aryl chlorides to aryl fluorides (halex reaction) .

= Deprotection agent =

Due to the strength of the Si - F bond , fluoride ion is useful for desilylation reactions (removal of Si

groups) in organic chemistry ; caesium fluoride is an excellent source of anhydrous fluoride for such reactions . Removal of silicon groups (desilylation) is a major application for CsF in the laboratory , as its anhydrous nature allows clean formation of water @-@ sensitive intermediates . Solutions of caesium fluoride in THF or DMF attack a wide variety of organosilicon compounds to produce an organosilicon fluoride and a carbanion , which can then react with electrophiles , for example :
Desilylation is also useful for the removal of silyl protecting groups .

= = = Other uses = = =

Single crystals of the salt are transparent into the deep infrared . For this reason it is sometimes used as the windows of cells used for infrared spectroscopy .

= = = Precautions = = =

Like other soluble fluorides , CsF is moderately toxic . Contact with acid should be avoided , as this forms highly toxic / corrosive hydrofluoric acid . The caesium ion (Cs +) and caesium chloride are generally not considered toxic .