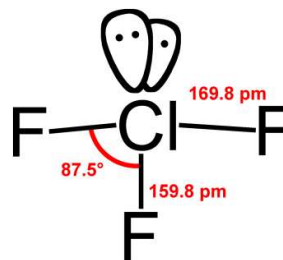


3. This question is about halogen fluorides

Chlorine trifluoride, ClF_3 , is one of the most reactive substances known: it causes sand and asbestos to explode and it reacts with xenon. It has been investigated as a rocket fuel; its reactions with every known fuel are so fast that no ignition delay has ever been measured.



- (a) ClF_3 is used to turn uranium into uranium hexafluoride, UF_6 , which is used to separate the isotopes of uranium. Chlorine monofluoride, ClF , is a side-product in this reaction. Write a balanced equation for the reaction between uranium and chlorine trifluoride.
- (b) ClF_3 is a powerful oxidising agent. In the answer booklet circle each atom / ion on the left hand side of the equation that is oxidised in the reaction between chlorine trifluoride and silver chloride.



Iodine forms the fluorides IF , IF_3 , IF_5 and IF_7 . Their standard enthalpy changes of formation are shown in the table.

	IF	IF_3	IF_5	IF_7
$\Delta_f H^\ominus / \text{kJ mol}^{-1}$	-95.4	-486	-843	-962.5

When the oxidation number of iodine is between 0 and +7 there is a possibility that it will disproportionate to the compound with iodine in its next highest oxidation number, and elemental iodine. For example, IF_3 might disproportionate to give IF_5 and I_2 .

- (c) i) Give the equations for the theoretical disproportionation reactions of IF , IF_3 and IF_5 .
- ii) Calculate the standard enthalpy change for each of these reactions.
- iii) Only one of IF , IF_3 and IF_5 , does not disproportionate – suggest which one.