**Highlights**

* 6:2 FTCA Transformation to 6:2 FTUA in NaOH containing wastes affects defluorination
* 100% defluorination of 6:2 FTUA in NaOH containing regeneration wastes using UV/S
* UV/PS outperforms UV/S for treating 6:2 FTCA in IEX regeneration wastes
* Substantial defluorination of PFAS triggered by interplay of and