

THE EFFECT OF TRACES OF FLUORINE; CHLORINE; AND BROMINE-CONTAINING ADDITIVES ON THE FORMATION OF DECOMPOSITION PRODUCTS IN THE COURSE OF URANIUM ENRICHMENT ACCORDING TO THE SEPARATION NOZZLE METHOD

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In separation nozzle systems a gaseous mixture consisting of CBrF_3 and F_2 is used in order to remove solid UF_6 decomposition products. Investigations have been made whether traces of these substances or the appearing intermediate and final products may catalyse the decomposition reaction between UF_6 and H_2 which are used as components of the feed gas in the separation nozzle process.

In order to be able to record even small amounts of decomposition products produced, the investigations are performed in a test loop with an extremely small ratio of the UF_6 massflow through the separation element slit to the UF_6 inventory. The separation nozzle element itself is used as a very sensitive detector to prove generation of UF_6 decomposition products.

By this method it could be shown that trace amounts of a number of bromine and fluorine containing compounds (CBrF_3 , F_2 , BrF_5 , BrF_3 , Br_2 , HBr) do not cause any formation of decomposition products by a catalytic reaction. Each substance is added in pure condition to a H_2/UF_6 mixture and for reference measurements to a He/UF_6 mixture as well.

In additional investigations it is proved that gaseous HCl reduces UF_6 in a He/UF_6 mixture and is able to catalyse the reaction between UF_6 and H_2 in the gas phase which causes an unlimited formation of UF_6 decomposition products.