## DEVELOPMENT OF NEW METHODS FOR THE REDUCTION OF $UF_6$

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Methods for the preparation of $UF_5$ are discussed with respect to the formation of ß-$UF_5$. The reduction of $UF_6$ by HBr in liquid HF /1/ can be used to synthesize pure ß-$UF_5$ even if greater amounts are required.

Details of the direct photolysis of $UF_6$ without scavenger /2/ are presented In an advanced version a simplified photo-reactor is used which consists of a stainless steel vessel with a diameter of 100 mm and a volume of about 3 liters. UV-light of a 1000 W super high pressure mercury lamp is used to photolyze about 50 g of high purity $UF_6$ within 12 h, giving pure ß-$UF_5$ in about 90 % yield without intermediately removing the $F_2$ formed.

Two simple new methods have been developed to synthesize ß-$UF_5$. $UF_6$ is reduced by $H_2$ in liquid anhydrous HF at room temperature. This reaction which

In addition, it was found that anhydrous HCl catalyzes the reaction, too. 200 mbar of HCl were added, together with 4 bar $H_2$, to $UF_6$ in liquid HF, and the reaction mixture was magnetically stirred for 66 hours. ß-$UF_5$ could be obtained in 91 % yield as a very pure product. This latter method is recommended for large scale production of ß-$UF_5$.

Reactions of $UF_6$ with other reducing agents like HCl, $SO_2$, and CO in liquid HF were studied. These reactions give poor yields or impure products.

$UF_6$ yields with CO and Au in the presence of HF a carbonyl compound of Au with the very high $\nu_{CO}$ at 2205 $cm^{-1}$. Analytical and spectroscopic data suggest the formula $Au(CO)_2U_2F_{11}$.

1 E. Jacob, Z. Anorg. Allg. Chem. 400 (1973) 45.

2 F.S. Becker, E. Jacob, Angew. Chem. Int. Ed. Engl. 19 (1980) 227