**High temperature reaction of Yttria with UF6 and UF4 gases (T > 900 oC)**

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 The work focuses on the characterization of reaction layers formed when yttria (Y2O3) is subjected to UF6 gas firstly at 900 oC, and secondly to UF4 gas at 1377 oC and 1477oC. Experiments were conducted under inert atmosphere (Ar) with resistive and inductive heating respectively. Two and three consecutive layers were observed and characterized using SEM-EDS, XRD, EMP respectively. The chemical reactions of yttria with UF(n=4,6) vapours alongside the phase boundaries were described. Static weight change analyses was also performed. The velocities of moving boundaries were calculated using layer thicknesses observed under optical microscopy. The inner layer was composed of YOF whereas outer layer was a mixture of YF3 and UO2 following the reaction of yttria with UF6. In UF4 case, inner layer was again YOF, but an intermediate compact layer of UO2 formed additionally. The outer layer was a mixture of a eutectic matrix (YUF7 - YU10F3) in which UO2 dendrites were dispersed throughout. Center layer controlled inward diffusion of Uranium and Fluorine and back diffusion of oxygen and yttrium. The reaction of yttria with liquid UF4 was much more intensive and all sample was consumed in a very short time when dipped in liquid UF4. It was concluded that although a stable oxide thermodynamically, yttria was not a proper material for space power applications; however Molybdenum metal was resistant to uranium gases under space conditions even at temperatures exceeding 2000 oC.