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Impact of γ -irradiation on the Palladium behaviour in the PUREX process

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Abstract

The PUREX process uses 30% vol tri-*n*-butylphosphate (TBP) diluted in TetraPropylen Hydrogen (TPH, an hydrocarbon diluent) to selectively extract uranium and plutonium towards fission products such as ruthenium, molybdene, cesium, palladium, etc. In this process, chemical degradation of the extraction solvent and cruds formation occur due to radiolysis. The main consequence of these phenomena is an alteration of the extraction properties of the solvent, especially in terms of efficiency and selectivity. Many papers report detailed qualitative and quantitative investigations of TBP-TPH degradation due to radiolysis (¹). However, very few data report the influence of the radiolysis on the palladium behaviour (²⁻³) and show that some degraded products could interact with palladium to form either complexes or precipitates (⁴).

In this paper, the impact of the radiolytic degradation of TBP-TPH on the palladium behaviour and the formation of precipitates will be thoroughly discussed. For that purpose, a fine characterization of the precipitates formed after γ -irradiation of the biphasic system TBP-TPH/Pd-HNO₃ will be detailed.

Keywords: Radiolysis, Palladium, TBP-TPH, degradation products, PUREX process

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