리튬용융염계에서 오스테나이트 스테인레스강 용접부의 부식특성
Corrosion Characteristics of Austenitic Stainless Steel Weld in the Lithium Molten Salts

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요약

용융염취급장치의 구조재료를 위한 평가의 일환으로 고온리튬용융염계에서 오스테나이트 스테인레스강, Type 304, Type 304L과 Type 316LN의 용접부 부식거동을 분위기온도; 650℃, 부식시간; 25~75시간, Li_2O농도; 8wt%, Li_3N농도; 1wt%에서 조사하였다. 용융염 LiCl-8%Li_2O- 1%Li_3N 분위기에서의 부식속도가 용융염 LiCl-8%Li_2O보다 2배 정도 크게 나타났다. 부식층은 용융염 LiCl-8%Li_2O에서 Type 304는 $LiCrO_2$이고, 316LN은 $LiCrO_2$, Li_4MoO_5, 용융염 LiCl-8% Li_2O-1%Li_3N에서 Type 304는 CrN, $LiCrO_2$, Type 316LN은 CrN, Mo_2N, Li_4MoO_5를 형성하였다.

A Study on the Changes of Primary Coolant Chemistry and CRUD generation at PWR for Long Term Fuel Cycle

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Abstract

Nuclear power plant operation practice shifts to long-term fuel cycle such as from 12month operating cycle to 18~24 month operating one. It is important to emphasize that the current trend to longer fuel cycle has complicated the dilemma of finding optimum pH range for the primary coolant chemistry. And long term fuel cycle has a possibility to occur AOA(axial offset anomaly). Although CRUD is not a high level waste, it is very important products because CRUD is the major source of ORE (occupational radiation exposure) and its transport mechanism is not specified exactly yet. To analyze the generation mechanism of CRUD at the long-term fuel cycle, the COTRANcode used, which simulate the behavior of the CRUD based on double layer concept model and solubility difference. It turned out that the activities of CRUD decreases as the pH of the coolant increases, and for the same period of different fuel cycle, the generation of the CRUD increases as the operating fuel cycle duration increased. In this paper, enriched boric acid(40% enriched B10 concentration) for the reactivity control is adopted for the simulation as the required chemical shim rather than natural boric acid.