Analysis of Oxides Nb, Ta, Th and U in Acidic Leached from Ethiopian Tantalite Ore

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Abstract

Columbo-tantalite mineral is the major source Nb and Ta metals. Today, the demand of these economic metals may not meet in the future due to very low available world resources. Ethiopian is blessed in Nb and Ta in the Southern belt of Kenticha pegmatite field. The successive beneficiation of this pegmatite ore and both XRD and EDXRF results gave highest 58 weight % of Ta_2O_5 with 6 wt% of Nb_2O_5 including U, Th, Ti and Si with recommended. The 6N HF:2N H_2SO_4 acidic leached and extracted and precipitated using MIBK and ammonium solution, respectively. Precipitated oxides of Nb and Ta were affected by leaching temperatures and the presence of radioactive oxides of U and Th. The elemental and compositional analyses and SEM/EDS the surface composition shows highest %composition of oxides of Nb and Ta at 100 to 200 ^{0}C leaching temperatures. Comparatively compositions of the U and Th are higher 150 and 200 ^{0}C leaching temperature and almost very low at higher leaching temperature and at leaching temperatures of at 350 and 400 ^{0}C shows absence of U and Th with almost nil composition of Nb and Ta economic metals. The stability of the tantalite ore and precipitated samples were analyzed using TGA-DTA and they are thermally stable, and contain no significant moisture or gaseous decomposition products of each separated and extracted at the treatment temperature.

Key words: Columbo-tantalite, niobium, pegmatite, tantalum and radioactive oxides.