

THE PRESENT STATUS AND THE PROJECTED PROGRAMME
ON NIOBIUM-TANTALUM METALLURGY IN INDIA(*)

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A significant stockpile of columbite-tantalite ores has been built up in this country mainly as a by-product of mica mining operations, and more intensified prospecting for these ores has been suggested in view of the foreseeable demand for niobium and tantalum metals and their alloys.

The use of niobium in the form of ferro-niobium in the production of stabilised stainless steels - accounts for the major portion of niobium metal consumption in industry. With the projected growth of the alloy steel industry in the country, a definite demand for ferro-niobium can be expected. In nuclear engineering, a requirement of pure niobium is foreseen for possible alloying with zirconium. Zirconium containing 2.5% niobium is a potential competitor to zircaloy for structural core components in water-cooled nuclear power systems.

As regard tantalum, the current major requirement in the country is for electrolytic tantalum capacitors. The Electronics Committee report of the Government of India has estimated the demand for tantalum capacitors at 5 tons/year by 1975.

The paper surveys the development programme carried out at the Bhabha Atomic Research Centre on the chemical treatment of Indian columbite-tantalite ores for the extraction of niobium and tantalum values,

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separation of pure niobium and tantalum compounds by solvent extraction, preparation of the consolidated metals by metallo-thermic reduction of the pure oxides, and preparation of ferro-niobium by aluminothermic reduction of niobium concentrates. Purification of the as-reduced metals by electron beam refining and fabrication of sheet and wire products has also been examined.

In order to meet the immediate requirement of tantalum capacitors, conditions have been optimised on the preparation of high purity tantalum powder by sodium reduction of K_2TaF_7 and the high vacuum, high temperature sintering of tantalum compacts. Proposals have been finalised for the setting up of a production capacity of 5,00,000 tantalum anodes (= 1 ton of tantalum) per year, as part of a Special Materials Project at Hyderabad. The possibility of converting the by-product niobium fraction partly into ferro-niobium and partly to pure niobium metal powder is under consideration.

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