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ZIRCON AS A REFRACTORY

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(1) Mineral Properties

The mineral zircon ($ZrSiO_4$) is the orthosilicate of the metal zirconium and occurs as a fairly uniform sand of average grain size about 0.1 mm. in Florida, India, Australia and Brazil. It is also found as an accessory mineral in granite and other acid rocks, forming tetragonal crystals with square prisms and pyramidal terminations. There is evidence that it is one of the first minerals which crystallises out from the cooling rock magma.¹ On disintegration of the igneous rocks, crystals of zircon together with other stable minerals such as tourmaline and rutile are released and ultimately find their way into arenaceous and argillaceous deposits. Fluvial sorting arranges the minerals according to their specific gravity and because of its very high density of 4.7, zircon may become almost completely separated.

Further concentration and separation can be effected as follows:² (1) the quartz is removed on a Wilfley-type wet concentrating table; (2) ilmenite ($FeTiO_3$) and garnet are removed by a low-intensity magnetic separator; (3) monazite is separated on a high-intensity cross-belt Wetherill separator; (4) rutile is separated from zircon by electrostatic means or by flotation.

In the U.S.A. the consumption of zircon amounted to 21 000 short tons³ in 1946, of which a little over half was imported from Australia and the remainder was produced by the T.A.M.Co. near Jacksonville, Fla., where there are large reserves. Of the 1946 consumption, 28% was used for refractories, 25% for vitreous enamels, 19% for electrical and chemical porcelains, 16% for metals and alloys, 10% for pottery glazes and 2% for miscellaneous purposes.

Zircon, when pure, is a compound of zirconia and silica in the proportions of 67.2:32.8 and is white in colour. The commercial product usually contains alumina, titania, phosphorus, iron and hafnium as impurities and is therefore usually brown or