Zirkelite 
\((\text{Ca, Th, Ce})\text{Zr(Zr, Ti)}_2\text{O}_7\)

Crystal Data: Cubic; commonly metamict. Point Group: 4/m 3 2/m. Crystals are flattened octahedra, to 3 cm. Twinning: On \{111\}, very common, as complex fourlings and polysynthetic.

D(meas.) = 4.74

Optical Class: Isotropic. \(n = 2.19(1)\)

Cell Data: Space Group: Fm3m. \(a = 5.02-5.06\) \(Z = 2\)

X-ray Powder Pattern: Arbarastkh massif, Russia; after heating at 700–800 °C.
2.98 (100), 1.82 (50), 2.53 (30), 1.75 (30), 2.84 (20), 2.30 (10), 1.51 (10)

Chemistry:
\[
\begin{array}{lcccc}
\text{TiO}_2 & 14.95 \\
\text{ZrO}_2 & 52.89 \\
\text{ThO}_2 & 7.31 \\
\text{UO}_2 & 1.40 \\
\text{Y}_2\text{O}_3 & 0.21 \\
\text{CeO}_2 & 2.64 \\
\text{FeO} & 7.72 \\
\text{MgO} & 0.22 \\
\text{CaO} & 10.79 \\
\text{LOI} & 1.02 \\
\text{Total} & 99.15
\end{array}
\]

\((1)\) Jacupiranga, Brazil; corresponds to \([[(\text{Ca, Na})_{0.82}\text{Th}_{0.12}\text{RE}_{0.07}\text{U}_{0.02}]_{\Sigma=1.03}}
\]
\([\text{Zr}_{1.84}\text{Ti}_{0.80}(\text{Fe, Mn, Mg, Al})_{0.48}]_{\Sigma=3.12}\text{O}_7\).

Polymorphism & Series: Dimorphous with calcioberafite.

Occurrence: In a magnetite-pyroxenite carbonatite (Jacupiranga, Brazil); a late-stage differentiate in a layered intrusion (Rhum, Scotland).

Association: Perovskite, baddeleyite.

Distribution: From the Jacupiranga carbonatite, São Paulo, Brazil. On St. Kilda, Outer Hebrides, and Rhum, Inner Hebrides, Scotland. In Russia, in the Vouriyarvi and Kovdor massifs, and in the Sevlyavr carbonatite complex, Kola Peninsula; from the Arbarastkh massif, Aldan Shield, Sakha. At Phalaborwa, Transvaal, South Africa. From Walawada, Sri Lanka. In some soils and breccia derived from granophyre on the Moon.

Name: Honors Ferdinand Zirkel (1838–1912), German petrographer, Professor of Mineralogy, University of Leipzig, Leipzig, Germany.


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