## Zirsilite-(Ce) $(Na, \square)_{12}(Ce, Na)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\cdot H_2O$

**Crystal Data:** Hexagonal. *Point Group:* 3*m*. Displays {10$\bar{1}$ 1}, {10$\bar{1}$ 2}, {01$\bar{1}$ 0}, and {0001} in rhombohedral crystals zoned with carbokentbrooksite, to 2 cm.

**Physical Properties:** *Cleavage:* None. *Fracture*: Conchoidal. *Tenacity*: Brittle.
Hardness = 5 VHN = n.d. D(meas.) = 3.15(2) D(calc.) = 3.10

**Optical Properties:** Transparent. *Color:* Creamy white. *Streak:* White. *Luster:* Vitreous.
*Optical Class:* Uniaxial (-). $\omega$ = 1.648(2) $\varepsilon$ = 1.637(2)

**Cell Data**: *Space Group*: *R*3*m*. *a* = 14.29(1) *c* = 30.02(4) Z = 3

**X-ray Powder Pattern**: Dara-i-Pioz massif, northern Tajikistan.
3.220 (100), 2.979 (95), 2.857 (66), 3.166 (56), 4.32 (51), 3.975 (37), 2.597 (34)

**Chemistry**:

| | (1) | | (1) |
|---|---|---|---|
| $Na_2O$ | 9.54 | $Y_2O_3$ | 0.47 |
| $K_2O$ | 0.45 | $SiO_2$ | 45.63 |
| CaO | 10.52 | $TiO_2$ | 0.45 |
| SrO | 1.35 | $ZrO_2$ | 10.48 |
| FeO | 1.89 | $Nb_2O_5$ | 3.76 |
| MnO | 5.67 | Cl | 0.32 |
| $La_2O_3$ | 2.31 | $H_2O$ | 1.52 |
| $Ce_2O_3$ | 3.78 | $CO_2$ | 0.58 |
| $Pr_2O_3$ | 0.28 | - O = Cl | 0.07 |
| $Nd_2O_3$ | 0.82 | Total | 99.75 |

(1) Dara-i-Pioz massif, northern Tajikistan; electron microprobe analysis, $H_2O$ by Penfield method; corresponds to $(Na_{9.04}Ca_{0.94}K_{0.32})_{\Sigma=10.78}(Na_{1.12}Ce_{0.76}La_{0.47}Sr_{0.43}Nd_{0.16}Pr_{0.06})_{\Sigma=3.00}(Ca_{5.25}Mn_{0.61}Y_{0.14})_{\Sigma=6.00}(Mn_{2.03}Fe_{0.87})_{\Sigma=2.90}(Zr_{2.81}Ti_{0.19})_{\Sigma=3.00}Nb_{0.93}Si_{25.07}O_{74.27}[(OH)_{2.70}Cl_{0.30}]_{\Sigma=3.00}(CO_3)_{0.43}\cdot 1.44H_2O$.

**Mineral Group**: Eudialyte group.

**Occurrence**: In the quartz core of a zoned pegmatite in the Dara-i-Pioz alkaline massif.

**Association**: Carbokentbrooksite, quartz, microcline, aegirine, stillwellite-(Ce), ekanite, pyrochlore, polylithionite, fluorite, calcite, galena.

**Distribution**: From the Dara-i-Pioz alkaline massif, northern Tajikistan.

**Name**: For the essential composition, *zir*conium *sil*icate and the suffix indicates *ce*sium as the dominant rare earth element.

**Type Material**: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia.

**References:** (1) Kohmyakov, A.P., V.D. Dusmatov, G. Ferraris, A. Gula, G. Ivaldi, and G.N. Nechelyustov (2003) Zirsilite-(Ce), $(Na,\square)_{12}(Ce,Na)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\cdot H_2O$, and carbokentbrooksite $(Na,\square)_{12}(Na,Ce)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\cdot H_2O$ - two new eudialyte-group minerals from the Dara-i-Pioz alkaline massif, Tajikistan. Zapiski Vseross. Mineral. Obshch., 132(5), 40-51 (in Russian, English abs.). (2) (2004) Amer. Mineral., 89, 1826 (abs. ref. 1).