## Pirssonite $Na_2Ca(CO_3)_2 \cdot 2H_2O$



**Crystal Data:** Orthorhombic. *Point Group:* $mm2$. Hemimorphic crystals, to 2 cm, showing {010}, {110}, {111}, {131}, {311}, large $\{\bar{1}11\}$; granular, massive, may be as efflorescences.

**Physical Properties:** *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 3–3.5
D(meas.) = 2.352–2.382 D(calc.) = 2.367 Pyroelectric; soluble in $H_2O$, leaving $CaCO_3$.

**Optical Properties:** Transparent. *Color:* Colorless to white, may be pale yellow or gray if included; colorless in transmitted light. *Luster:* Vitreous.
*Optical Class:* Biaxial (+). *Orientation:* $X = a$; $Y = c$; $Z = b$. *Dispersion:* $r < v$, slight.
$\alpha = 1.504$ $\beta = 1.509$–$1.510$ $\gamma = 1.573$–$1.575$ 2V(meas.) = 31°26′ 2V(calc.) = 27°

**Cell Data:** *Space Group:* $Fdd2$. $a = 11.32(2)$ $b = 20.06(2)$ $c = 6.00(2)$ Z = 8

**X-ray Powder Pattern:** John Hay, Jr. Well No. 1, Wyoming, USA.
2.506 (100), 2.654 (90), 2.565 (80), 5.133 (71), 2.020 (71), 4.928 (60), 3.153 (50)

**Chemistry:**

| | (1) | (2) |
|---|---|---|
| $SiO_2$ | 0.29 | |
| $CO_2$ | 36.07 | 36.35 |
| $Al_2O_3$ | 0.13 | |
| CaO | 23.38 | 23.16 |
| $Na_2O$ | 25.70 | 25.61 |
| $K_2O$ | 0.15 | |
| $H_2O$ | 14.73 | 14.88 |
| Total | 100.45 | 100.00 |

(1) Searles Lake, California, USA; average of two analyses. (2) $Na_2Ca(CO_3)_2 \cdot 2H_2O$.

**Occurrence:** A rare component of saline lake-bed sediments; in a differentiated alkalic massif.

**Association:** Northupite, trona, gaylussite (Borax Lake, California, USA); shortite, bradleyite, northupite, gaylussite, trona (John Hay, Jr. Well No. 1, Wyoming, USA).

**Distribution:** In the USA, in California, from Searles Lake, San Bernardino Co., at Borax Lake, Lake Co., in Deep Spring Lake, Inyo Co., and at Owens Lake, Mono Co.; in the John Hay, Jr. Well No. 1, about 30 km west of Green River, Sweetwater Co., Wyoming. On the Arizaro, Pastos Grandes, and Pozuelos playas, Salta Province, Argentina. From the Jequetepeque River Valley, northwest Peru. On the Otjiwalundo Salt Pan, about 400 km west-northwest of Otavi, Namibia. In the Beypazari Basin, Ankara, Turkey. On Mt. Kukisvumchorr, Khibiny massif, and Mt. Alluaiv, Lovozero massif, Kola Peninsula, Russia.

**Name:** To honor Professor Louis Valentine Pirsson (1860–1919), American petrographer and mineralogist, Yale University, New Haven, Connecticut, USA.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 232–233. (2) Fahey, J.J. and M.E. Mrose (1962) Saline minerals of the Green River Formation. U.S. Geol. Sur. Prof. Paper 405, 24, 35–36, 48–49. (3) Corazza, E. and C. Sabelli (1967) The crystal structure of pirssonite, $CaNa_2(CO_3)_2 \cdot 2H_2O$. Acta Cryst., 23, 763–766.