Kosmochlor $NaCr^{3+}Si_2O_6$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Short prismatic crystals, to 2 mm; in fibrous and polycrystalline aggregates. *Twinning:* Simple, lamellar on {100}, {001}.

Physical Properties: *Cleavage:* Good on {110}, (110) ∧ $(1\bar{1}0)$ ∼87°; parting on {001}. Hardness = ∼6 D(meas.) = 3.51–3.60 D(calc.) = 3.60

Optical Properties: Semitransparent. *Color:* Emerald-green; green or yellow in thin section. *Optical Class:* Biaxial (–). *Pleochroism:* Strong; X = yellowish green; Y = blue-green, grass-green; Z = emerald-green. *Orientation:* $Y = b$; $Z \wedge a = 8°$–$22°$. *Dispersion:* $r > v$, moderate to strong. $\alpha = 1.740$–1.766 $\beta = 1.756$–1.778 $\gamma = 1.745$–1.781 2V(meas.) = 6°–70°

Cell Data: *Space Group:* $C2/c$. $a = 9.550$ $b = 8.712$ $c = 5.273$ $\beta = 107.44°$ Z = 4

X-ray Powder Pattern: Synthetic.
2.956 (100), 2.867 (100), 2.5166 (90), 2.4476 (70), 2.0985 (70), 1.5957 (70), 1.3802 (60)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2	55.5	54.81	MgO	0.8	0.49
TiO_2		0.03	CaO	1.7	0.54
Al_2O_3		4.02	Na_2O	11.6	12.94
Fe_2O_3	0.2	3.61	K_2O		0.02
Cr_2O_3	30.6	23.67	P_2O_5		0.09
MnO		0.02	Total	100.4	[100.24]

(1) Coahuila meteorite; by electron microprobe, corresponds to $(Na_{0.83}Ca_{0.07})_{\Sigma=0.90}(Cr_{0.90}Mg_{0.04})_{\Sigma=0.94}Si_{2.06}O_6$. (2) Myanmar; by electron microprobe, average of seven analyses, average sum originally given as 100.19%; corresponds to $(Na_{0.93}Ca_{0.02})_{\Sigma=0.95}(Cr_{0.69}Al_{0.17}Fe_{0.10}Mg_{0.03})_{\Sigma=0.99}Si_{2.02}O_6$.

Mineral Group: Pyroxene group.

Occurrence: A major constituent of some jadeitites; an accessory constituent of some iron meteorites.

Association: "Cliftonite" [graphite], chromian diopside, troilite (Toluca); daubréelite (Coahuila); krinovite, roedderite, high albite, richterite, chromite (Canyon Diablo); jadeite, chromite, chlorite (Myanmar).

Distribution: In the Toluca, Coahuila, Hex River Mountains, and Canyon Diablo meteorites. Around Tawmaw and other towns, Myitkyina-Mogaung district, Kachin State, Myanmar (Burma). At Mocchie, Susa, Piedmont, Italy. From Williams Creek, Mendocino Co., California, USA.

Name: From the German *kosmisch*, for *cosmic*, in allusion to its meteoritic occurrence, and the Greek *chlor*, for *green*.

Type Material: National Museum of Natural History, Washington, D.C., USA, 81869, 81870; The Natural History Museum, London, England, 81869–81870.

References: (1) Dana, E.S. (1899) Dana's system of mineralogy, (6th edition), app. I, 20. (2) Deer, W.A., R.A. Howie, and J. Zussman (1978) Rock-forming minerals, (2nd edition), v. 2A, single-chain silicates, 520–525. (3) Frondel, C. and C. Klein, Jr. (1965) Ureyite [kosmochlor], $NaCr_2Si_2O_6$, a new meteoritic pyroxene. Science, 149, 742–744. (4) (1965) Amer. Mineral., 50, 2096 (abs. ref. 3). (5) Clark, J.R., D.E. Appleman, and J.J. Papike (1969) Crystal-chemical characterization of clinopyroxenes based on eight new structure refinements. MSA Spec. Paper 2, 31–50. (6) Yang, C.M.O. (1984) A terrestrial source of ureyite [kosmochlor]. Amer. Mineral., 69, 1180–1183. (7) Harlow, G.E. and E.P. Olds (1987) Observations on terrestrial ureyite [kosmochlor] and ureyitic pyroxene. Amer. Mineral., 72, 126–136.