No. 39A-9 K_2ZnCl_4, Potassium tetrachlorozincate

(M = 285.40)

1a Ferroelectric activity in K_2ZnCl_4 was discovered by Gesi in 1978. 78Ges

b

phase	IV [a] [b]	III **	II *	I
state		F		P
crystal system	monoclinic	orthorhombic		orthorhombic
space group	$C1c1-C_s^4$ [d]	$P2_1cn-C_{2v}^9$ [c]		$Pmcn-D_{2h}^{16}$
Θ [K]	145	403	553	

[a]) 82Qui
[b]) 83Mil
[c]) 79Mik
[d]) 93Mas

*) Incommensurately modulated phase. 79Mik
**) Anomalies in some quantities have been reported around 148 K. 92Ges, 95Hed

P_s || [100]. 78Ges
$\rho = 2.29 \cdot 10^3$ kg m^{-3}, $\rho_X = 2.36 \cdot 10^3$ kg m^{-3}. 79Mik
Cleavage plane {010}. 78Ges

2a Crystal growth: evaporation method from aqueous solution. 78Ges

3a Unit cell parameters:
a = 7.256(2) Å, b = 12.402(2) Å, c = 26.778(6) Å at RT (phase III). 79Mik
a = 14.394(7) Å, b = 24.544(8) Å, c = 26.616(5) Å, β = 89.98(3)° at 140 K (phase IV). 93Mas

b Z = 12 in phase III. 45Klu
Z = 48 in phase IV. 93Mas
Crystal structure: Table 39A-9-001, Table 39A-9-002, Table 39A-9-003, Table 39A-9-004, Table 39A-9-005; Fig. 39A-9-001, Fig. 39A-9-002.
Crystal structure of phase II based on superspace group: see 90Qui1

4 Thermal expansion: Fig. 39A-9-003, Fig. 39A-9-004.

5a Dielectric constant: Fig. 39A-9-005, Fig. 39A-9-006, Fig. 39A-9-007, Fig. 39A-9-008.
Dielectric relaxation time: Fig. 39A-9-009.
See also 92Pan
κ'' in the infrared region: Fig. 39A-9-010.
Effect of p: Fig. 39A-9-011.
Phase diagram in regard to p: Fig. 39A-9-012.
$[d\Theta_{II-I}/dp]_{p=0}$ = 110 K GPa^{-1}, $[d\Theta_{III-II}/dp]_{p=0}$ = –86.9 K GPa^{-1}. 85Ges
See also Fig. 39A-2-015 in No. 39A-002, Fig. 39A-6-005 in No. 39A-6.
Time evolution of κ around Θ_{III-II}: Fig. 39A-9-013, Fig. 39A-9-014.

c Spontaneous polarization: Fig. 39A-9-015, Fig. 39A-9-016.

6a Heat capacity: Fig. 39A-9-017; Fig. 39A-6-008 in No. 39A-6;
see also 93Hag
Transition entropy: ΔS_{IV-III} = 0.34 J mol^{-1} K^{-1}. 92Fle
Influence of γ irradiation on c_p. 93Tek

7a Piezoelectric coefficients. 89Tyl

8a Elastic compliance and stiffness: Table 39A-9-006; Fig. 39A-9-018, Fig. 39A-9-019, Fig. 39A-9-020.
Sound velocity: Fig. 39A-9-021, Fig. 39A-9-022, Fig. 39A-9-023, Fig. 39A-9-024, Fig. 39A-9-025, Fig. 39A-9-026.

	See also	90Maa, 89Tyl
9a	Refractive index: $n_a = 1.561$, $n_b = 1.555$, $n_c = 1.564$ at $\lambda = 514.5$ nm. Dispersion of refractive index: Table 39A-9-007. Refractive index and birefringence: Fig. 39A-9-027, Fig. 39A-9-028.	90Qui2
	See also	82Qui, 86Vlo1, 87Vlo, 90Rom
	Infrared reflection spectra.	85Ech
b	Electrooptic effect: Fig. 39A-9-029, Fig. 39A-9-030.	
c	Piezooptic effect: Fig. 39A-9-031; see also $n_0^3(\Pi_{33} - \Pi_{13}) = 3 \cdot 10^{-12}\ m^2\ N^{-1}$, $n_0^3(\Pi_{31} - \Pi_{11}) = 5 \cdot 10^{-12}\ m^2\ N^{-1}$ for $\lambda = 632.8$ nm at RT.	86Vlo2 85Vlo
d	Optical rotatory power: Fig. 39A-9-032.	
e	Second harmonic generation: see	87Esa
10a	Raman scattering: Fig. 39A-9-033; see also	82Qui, 82Kat, 86Sek, 95Noi
11	Luminescence: Fig. 39A-9-034; see also	86Des
13a	NMR of ^{39}K: $e^2qQ/h = 0.437$ MHz, $\eta = 0.13$. NQR of ^{35}Cl: Fig. 39A-9-035.	91Top
14a	Bragg reflections due to structural modulations: Fig. 39A-9-036, Fig. 39A-9-037. Slow time variations of the satellite reflections at III–II phase transition: see	87Mas
b	X-ray diffuse scattering: Fig. 39A-9-038; see also Neutron inelastic scattering: Fig. 39A-9-039, Fig. 39A-9-040, Fig. 39A-9-041.	95Hed
15a	Domain structure: striped domains parallel to the *b* axis were observed; on the *a* face by means of etching method, powder pattern method, replica method, nematic liquid crystal method and transmission electron microscope. Domain dimension was obtained by second harmonic light.	88Tsu, 89Sak, 90Sak, 92Sak 91Moi
b	Polarization reversal: domain wall motion was observed by means of nematic liquid crystal method.	92Sak