31 $LiH_3(SeO_3)_2$ family

31A Pure compounds

No. 31A-1 $LiH_3(SeO_3)_2$, Lithium trihydrogen selenite

(M = 263.88; [D: 266.90])

1a Ferroelectric activity in $LiH_3(SeO_3)_2$ was discovered by Pepinsky et al. in 1959. 59Pep

b

state	F
crystal system	monoclinic
space group	$Pn–C_s^2$
Θ*)	

60Ved

P_s has a major component along the direction perpendicular to (001) plane.
T_{melt} = 110 °C.
$\rho = 3.391 \cdot 10^3$ kg m^{-3}. 72Tel
Transparent.
*) Ferroelectric transition temperature does not exist under the atmospheric pressure below the melting point, but has been observed under high pressures. See subsection 5a.

2a Crystal growth: slow cooling or evaporation of aqueous solution of lithium hydroxide or lithium carbonate and selenious acid in stoichiometric proportions.

b Crystal form: Fig. 31A-1-001.

3a Unit cell parameters: a = 6.2554(3) Å, b = 7.8823(5) Å, c = 5.4339(5) Å, β = 105.325(5)°. 72Tel

b Z = 2. 59Pep
Rectangular coordinates X_c, Y_c, Z_c are defined as $\boldsymbol{X}_c \parallel \boldsymbol{a}$, $\boldsymbol{Y}_c \parallel \boldsymbol{b}$, $\boldsymbol{Z}_c \parallel (\boldsymbol{X}_c \times \boldsymbol{Y}_c)$.
Crystal structure: Table 31A-1-001, Table 31A-1-002, Table 31A-1-003, Table 31A-1-004; Fig. 31A-1-002, Fig. 31A-1-003, Fig. 31A-1-004, Fig. 31A-1-005.
The unit cell parameters given in 3a were used in determination of the crystal structure.
See also 60Ved, 69Sod, 79Cho

4 Volume change with hydrostatic pressure: Fig. 31A-1-006.

5a Dielectric constants: Fig. 31A-1-007, Fig. 31A-1-008, Fig. 31A-1-009, Fig. 31A-1-010, Fig. 31A-1-011, Fig. 31A-1-012, Fig. 31A-1-013.
Curie-Weiss constant: Fig. 31A-1-014;
For $LiH_3(SeO_3)_2$, $C = 4.1 \cdot 10^4$ K, $(d\Theta_f/dp)_{p=0} = -6.0 \cdot 10^{-8}$ K Pa^{-1}. 68Sam
For $LiD_3(SeO_3)_2$, $C = 2.9 \cdot 10^4$ K, $(d\Theta_f/dp)_{p=0} = -5.9 \cdot 10^{-8}$ K Pa^{-1}. 68Sam

b ξ, ζ: non-linear coefficients. $E = \chi_p^{-1} P + \xi P^3 + \zeta P^5$ 68Sam
$\xi = 9.88 \cdot 10^9$ V m^{5}C^{-3}, $\zeta = 2.17 \cdot 10^{11}$ V m^9 C^{-5}.

c Spontaneous polarization: $P_s = 15 \cdot 10^{-2}$ C m^{-2} at RT. 68Sam
Spontaneous polarization and coercive field: Fig. 31A-1-015.

7a Piezoelectricity: Table 31A-1-005.

8a	Elastic compliances: Table 31A-1-006.	
9a	Refractive indices: Fig. 31A-1-016, Fig. 31A-1-017. Optical indicatrix: Fig. 31A-1-018, Fig. 31A-1-019. See also Fig. 31A-3-023 in No. 31A-3.	
d	Optical activity: Fig. 31A-1-020.	
10a	Raman scattering: Fig. 31A-1-021.	
11	Electrical conduction: Fig. 31A-1-022.	
13a	NMR: Table 31A-1-007, Table 31A-1-008, Table 31A-1-009, Table 31A-1-010; Fig. 31A-1-023; see also Fig. 31A-2-032 in No. 31A-2.	
	Dipolar spin-lattice relaxation time, see	71Bli
b	ESR in γ-ray irradiated crystals: see	76Edl, 65Iwa
	for VO^{2+}: see	79Jai
	ESR and ENDOR: see	82Hef
15a	Domain structure: layered domains were observed by means of nematic liquid crystal and scanning electron microscope.	84Ani