

44 NaNH₄SO₄ · 2H₂O (lecontite) family

44A Pure compounds

No. 44A-1 NaNH₄SO₄ · 2H₂O, Sodium ammonium sulfate dihydrate (lecontite) (*M* = 173.12; [D: 181.17])

1a	Ferroelectric activity in NaNH ₄ SO ₄ · 2H ₂ O was discovered by Pepinsky et al. in 1959.	59Pep															
b	<table> <tr> <th>phase</th><th>II</th><th>I</th></tr> <tr> <td>state</td><td>F</td><td>P</td></tr> <tr> <td>crystal system</td><td></td><td>orthorhombic</td></tr> <tr> <td>space group</td><td></td><td>P2₁2₁2₁–D₂⁴</td></tr> <tr> <td>Θ[K]</td><td colspan="2">101</td></tr> </table>	phase	II	I	state	F	P	crystal system		orthorhombic	space group		P2 ₁ 2 ₁ 2 ₁ –D ₂ ⁴	Θ [K]	101		65Mak
phase	II	I															
state	F	P															
crystal system		orthorhombic															
space group		P2 ₁ 2 ₁ 2 ₁ –D ₂ ⁴															
Θ [K]	101																
	<i>P</i> _s [001].																
	Dehydration point is 338 K.	67Mak															
	$\rho = 1.745 \cdot 10^3 \text{ kg m}^{-3}$.	67Cor															
	Transparent, colorless.	67Cor															
	Efflorescent.	67Cor															
2a	Crystal growth: evaporation or cooling method from an aqueous solution of the constituents with equi-molar ratio of Na ₂ SO ₄ and (NH ₄) ₂ SO ₄ or with excess (NH ₄) ₂ SO ₄ .	65Mak															
3a	Unit cell parameters: <i>a</i> = 8.228(1) Å, <i>b</i> = 12.856(1) Å, <i>c</i> = 6.253 Å at 295(2) K. See also	94Arz 67Cor															
b	<i>Z</i> = 4 in phase I. Crystal structure: Table 44A-1-001, Table 44A-1-002, Table 44A-1-103; Fig. 44A-1-001, Fig. 44A-1-002.	65Mak															
4	Lattice distortions: Fig. 44A-1-003, Fig. 44A-1-004.																
5a	Dielectric constants: Fig. 44A-1-005, Fig. 44A-1-006, Fig. 44A-1-007, Fig. 44A-1-008. <i>C</i> = 300 K. $d\Theta/dE = 2.9 \cdot 10^{-1} \text{ K m V}^{-1}$. A dielectric anomaly was reported to occur at 92 K below the ferroelectric transition temperature.	65Mak 78Osa 65Mak															
c	Spontaneous polarization: Fig. 44A-1-009.																
6a	Heat capacity: Fig. 44A-1-010. Transition heat and transition entropy: $\Delta Q_m = 326 \text{ J mol}^{-1}$, $\Delta S_m = 3.30 \text{ J K}^{-1}$.	78Osa															
9a	Refractive indices: Fig. 44A-1-011. <i>n_a</i> = 1.4534, <i>n_b</i> = 1.4554, <i>n_c</i> = 1.4386 for $\lambda = 632.8 \text{ nm}$, <i>T</i> = 296 K.	75Ani															
b	Electrooptic constants: <i>r</i> ₄₁ = $0.37 \cdot 10^{-12} \text{ m V}^{-1}$, <i>r</i> ₅₂ = $0.11 \cdot 10^{-12} \text{ m V}^{-1}$, <i>r</i> ₆₃ = $1.3 \cdot 10^{-12} \text{ m V}^{-1}$ for $\lambda = 632.8 \text{ nm}$, <i>T</i> = 296 K.	75Ani															
10a	Raman scattering: Fig. 44A-1-012.																
13a	NMR: Table 44A-1-004; Fig. 44A-1-013, Fig. 44A-1-014; see also	66Eas															
15a	Domain structure: striped domains parallel to the (100) or (010) plane were observed by polarized light in phase II.																