

THE SYSTEM OF
MINERALOGY

*of James Dwight Dana and Edward Salisbury Dana
Yale University 1837-1892*

SEVENTH EDITION

Entirely Rewritten and Greatly Enlarged

By

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VOLUME II

*HALIDES, NITRATES, BORATES, CARBONATES,
SULFATES, PHOSPHATES, ARSENATES, TUNGSTATES,
MOLYBDATES, ETC.*

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Habit. Prismatic [0001] with basal plane and pyramid.

Phys. Observations on the cleavage and hardness are lacking. G. 2.714 (artif.).¹ Color pale rose (Vesuvius); white (artificial).

Opt. Basal sections of artificial crystals may show six anomalously birefringent sectors with the axial plane parallel to the prism faces and $X = c$.² Refractive indices:³

	$n(\text{Na})$	
<i>O</i>	1.3125	Uniaxial negative (-).
<i>E</i>	1.3089	

Chem. Supposedly sodium silicon fluoride, Na_2SiF_6 . Analyses of natural material are lacking, and the identification is based on the similarity in properties of admixed material re-crystallized from water solution with the artificial compound.⁴

Tests. Slightly soluble in cold water, and more so in hot.

Occur. Found as crusts on lava at Vesuvius, associated with sal-ammoniac, avogadrite, hieratite, and ferrucite.

Artif.⁵ Obtained by reaction of fluosilicic acid with NaOH , NaCl , or other sodium salts, and by reaction of a NaHF_2 solution on silica.

Name. After Alessandro Malladra, a director of the Vesuvius Observatory.

Ref.

1. Collins, *Chem. News*, **318**, 184 (1929); Stolba, *Zs. anal. Chem.*, **11**, 199 (1872) gives 2.7547.
2. Bertrand, *Bull. soc. min.*, **3**, 57 (1880).
3. Raiteri, *Acc. Linc., Rend.*, **31**, 115 (1922), on artificial crystals.
4. Cf. Zambonini and Carobbi (1926) and Carobbi, *Per. Min.*, **4**, 410 (1933).
5. Mellor (**6**, 947, 1925).

11.4.2.2 **BARARITE** $[(\text{NH}_4)_2\text{SiF}_6]$. Criptoalite, Cryptohalite pt. *Scacchi* (*Acc. Napoli, Att.*, **6**, no. 9, 1873). Cryptohalite pt. *Christie* (*Rec. Geol. Sur. India*, **59**, 233, 1926). β - $(\text{NH}_4)_2\text{SiF}_6$.

Cryst.¹ Hexagonal—*P*, scalenohedral— $\bar{3}2/m$.

$$a:c = 1:0.8281 \text{ (artif.)};^2 \quad p_0:r_0 = 0.9562:1$$

Forms:²

	ϕ	$\rho = C$	<i>M</i>	<i>A</i> ₂
<i>c</i> 0001	0°00'	90°00'	90°00'
<i>m</i> 10 $\bar{1}$ 0	30°00'	90 00	60 00	90 00
<i>p</i> 10 $\bar{1}$ 1	30 00	43 43	69 47	90 00
<i>x</i> 20 $\bar{2}$ 1	30 00	62 23½	63 42	90 00

Structure cell.³ Space group $C\bar{3}m$. a_0 5.76 *kX*, c_0 4.77; $a_0:c_0 = 1:0.828$. Cell contents $(\text{NH}_4)_2\text{SiF}_6$.

Habit. Tabular {0001}, sometimes distorted by elongation $\perp c$. Also in arborescent and mammillary forms.

Twinning. Twins of paddle-wheel or dart-like form have been observed (Barari),⁴ with the twin-plane inclined to {0001}.

Phys. Cleavage {0001} perfect. H. probably $2\frac{1}{2}$. G. 2.152,² 2.144 (calc.). Color white. Luster vitreous. Taste saline.

Opt. In transmitted light, colorless.

	$n(\text{Na})^4$		
<i>O</i>	1.406 ± 0.001		Uniaxial negative (-).
<i>E</i>	1.391 ± 0.003		

Chem. Ammonium silicon fluoride, $(\text{NH}_4)_2\text{SiF}_6$. Dimorphous with cryptohalite. Chemical analyses of natural material are lacking.

Tests. Easily soluble in water. Sublimes without residue.

Occur. Found originally at Vesuvius, Italy, associated with sal-ammoniac and cryptohalite as a sublimation product. Also found as sublimed crusts with sulfur and cryptohalite on the surface of the ground above a burning coal seam in the Bararee colliery, Barari, Jharia coal field, India.⁴

Artif.⁵ Formed in crystals from the water solution at temperatures below 5° C.; the isometric modification is formed at temperatures over 13°, and mixtures of the two phases may be obtained at intermediate temperatures.

Name. The name, here first given, refers to the Indian locality, Barari, from where the species was first fully described. The mineral was earlier recognized as a constituent of mixtures with cryptohalite but was not given an individual name.

Ref.

1. Gossner and Kraus, *Zs. Kr.*, **88**, 223 (1934), by x-ray and morphological study of artificial crystals.
2. Gossner, *Zs. Kr.*, **38**, 147 (1903), on artificial crystals.
3. Gossner and Kraus (1934).
4. Christie, *Rec. Geol. Sur. India*, **59**, 233 (1926).
5. See Mellor (**6**, 945, 1925) and Gossner (1903); the hexagonal modification was first prepared by Marignac, *Ann. chim.* [3], **60**, 301 (1860).

11.4.3 **RINNEITE** $[\text{NaK}_3\text{FeCl}_6]$. Boeke (*Cbl. Min.*, **72**, 1909; *Jb. Min.*, **II**, 38, 1909).

Crystal.¹ Hexagonal—*R*; hexagonal-scalenohedral— $\bar{3}2/m$.

$$a:c = 1:1.1532;^2 \quad \alpha 92^\circ 15'; \quad p_0:r_0 = 1.3316:1; \quad \lambda 57^\circ 22'$$

Forms:³

		ϕ	$\rho = C$	A_1	A_2
<i>c</i> 0001	111	0°00'	90°00'	90°00'
<i>a</i> 1120	101	0°00'	90 00	60 00	60 00
<i>r</i> 0112	110	-30 00	33 39½	90 00	61 19
<i>R</i> 1011	100	30 00	53 05½	46 10½	90 00

Structure cell.⁴ Space group $R\bar{3}c$. a_{rh} 8.25, $\alpha 91^\circ 54'$; a_0 11.86 *kX*, c_0 13.81; $a_0:c_0 = 1:1.164$. Cell contents $\text{Na}_2\text{K}_6\text{Fe}_2\text{Cl}_{12}$ in the rhombohedral unit.