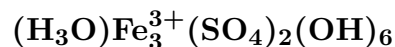


## Hydronium jarosite



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**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3} 2/m$ . As microscopic plates or rhombohedra; reniform, scaly, earthy.

**Physical Properties:** *Cleavage:* [On {0001}, distinct.] (by analogy to jarosite).  
*Fracture:* [Uneven to conchoidal.] *Tenacity:* [Brittle.] *Hardness* = 4–4.5 *D*(meas.) = 2.50–2.90  
*D*(calc.) = 3.01

**Optical Properties:** Translucent. *Color:* Bright yellow to pale yellow. *Luster:* Dull to resinous.

*Optical Class:* Uniaxial (–). *Pleochroism:* *O* = deep yellow; *E* = pale yellow.  $\omega = 1.816$   
 $\epsilon = 1.728$

**Cell Data:** *Space Group:*  $R\bar{3}m$ .  $a = 7.3559$   $c = 17.0097$   $Z = 3$

**X-ray Powder Pattern:** Synthetic. (ICDD 31-650).

5.10 (100), 3.13 (90), 3.09 (65), 1.839 (30), 1.990 (20), 5.67 (18), 5.97 (16)

### Chemistry:

	(1)	(2)
SO <sub>3</sub>	32.71	33.31
Fe <sub>2</sub> O <sub>3</sub>	48.90	49.83
Na <sub>2</sub> O	0.43	
K <sub>2</sub> O	0.52	
H <sub>2</sub> O	15.09	16.86
insol.	2.35	
Total	100.00	100.00

(1) Thorez mine, Poland; corresponds to  $[(\text{H}_3\text{O})_{0.88}\text{Na}_{0.07}\text{K}_{0.05}]_{\Sigma=1.00}\text{Fe}_3(\text{SO}_4)_2(\text{OH})_6$ .

(2)  $(\text{H}_3\text{O})\text{Fe}_3(\text{SO}_4)_2(\text{OH})_6$ .

**Mineral Group:** Alunite group.

**Occurrence:** In the oxidized zone of rapidly weathering sulfide-bearing rocks; may be of post-mining formation. A relatively uncommon member of the group because the ubiquitous abundance of alkali ions in surface waters normally precludes its stability.

**Association:** Melanterite, goethite.

**Distribution:** Material confirmed by modern techniques from: in Poland, at the Staszic mine, Holy Cross Mountain, near Kielce, and at Rudawka, Rymanowska, Carpathian Mountains; in the Thorez mine, Walbrzych, Lower Silesia. From Jáchymov (Joachimsthal), Czech Republic. At the Kamariza mine, Laurium, Greece. Found north of Ballybunion, Co. Kerry, Ireland. In the Malka mine, southeast of Pyatigorsk, Caucasus Mountains, Russia. At Paddy's River mine, Australian Capital Territory. In the USA, from the Black Brush deposit, Cherry Creek area, Pinal Co., Arizona; at the Bristol silver mine, Lincoln Co., New Mexico; in Nevada, from the Boss mine, Goodsprings district, Clark Co.; the Goldstrike mine, Lynn district, and the Gold Quarry mine, near Carlin, Maggie Creek district, Eureka Co.; and at Majuba Hill, Pershing Co.; from the Centennial Eureka mine, Tintic Co., Juab Co., Utah. More localities undoubtedly could be confirmed.

**Name:** As the  $\text{H}_3\text{O}^+$ , *hydronium*, analog of *jarosite*.

**Type Material:** Academy of Mining and Metallurgy, Krakow, Poland.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 566–567 [carphosiderite = hydronium jarosite, part]. (2) Kubisz, J. (1960) Hydronium jarosite –  $(\text{H}_3\text{O})\text{Fe}_3(\text{SO}_4)_2(\text{OH})_6$ . Bull. Acad. Polonaise Sci, Sér. géol. géogr., 8, 95–99. (3) (1961) Amer. Mineral., 46, 243 (abs. ref. 2). (4) Brophy, G.P. and M.F. Sheridan (1965) Sulfate studies IV: the jarosite-natrojarosite-hydronium jarosite solid solution series. Amer. Mineral., 50, 1595–1607. (5) Ripmeester, J.A., C.I. Ratcliffe, J.E. Dutrizac, and J.L. Jambor (1986) Hydronium ion in the alunite-jarosite group. Can. Mineral., 435–447.

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