Formanite-(Y) $YTaO_4$

Crystal Data: Tetragonal or monoclinic; typically, metamict. *Point Group*: 4/*m* or 2/*m*. Prismatic or pyramidal crystals in parallel or fan-shaped groups, to 6 mm; in concretions, as grains, and massive.

Physical Properties: *Cleavage*: {111}, interrupted. *Fracture*: Subconchoidal. *Tenacity*: Brittle. Hardness = 5.5-6.5 D(meas.) = 6.17-6.24 D(calc.) = [6.46] (for $YTaO_4$). May be radioactive.

Optical Properties: Opaque, thin fragments may be transparent. *Color*: Brownish black or velvety black, pale green to colorless; gray, yellow, or brown with alteration; colorless to pale olive-brown in thin section. *Streak*: Pale yellow. *Luster*: Metallic, resinous to greasy; weathered surfaces are dull. *Optical Class*: Biaxial (+); metamict material is isotropic. $\alpha = 2.053$ $\beta = 2.075$ $\gamma = 2.104$ 2V(meas.) = 80° *Pleochroism*: Light to dark brown. *Orientation*: $X = b$; $Y \approx a$; $Z \wedge c \approx 6°$.

Cell Data: *Space Group*: *P* (ICDD 26-1478), with $a = 7.732$ $c = 11.49$ Z = 8; or *P*2/*a*, with $a = 5.23$ $b = 5.45$ $c = 5.13$ $\beta = 93.3°$ Z = [2]

X-ray Powder Pattern: "Siberia", Russia; after heating for one hour at 900° C.
3.13 (10), 2.933 (9), 1.900 (7), 1.641 (7b), 1.567 (7b), 2.723 (6), 1.216 (6)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
Nb_2O_5	2.15	9.50		RE_2O_3	0.94	33.20	
Ta_2O_5	55.51	47.46	66.18	FeO	trace	0.39	
UO_3	1.18			MnO	0.87	0.21	
TiO_2	2.20	0.38		MgO	0.12		
ThO_2	1.02	0.56		CaO	2.18	1.01	
UO_2		3.65		H_2O^+		2.68	
Y_2O_3	23.00		33.82	H_2O^-		0.17	
Er_2O_3	8.38			LOI	3.36		.
				Total	100.79	[99.33]	100.00

(1) Cooglegong, Western Australia. (2) "Siberia", Russia; RE = La 0.8%, Ce 1.3%, Pr 0.7%, Nd 2.4%, Sm 4.9%, Eu+Gd 8.9%, Tb+Y 63.0%, Dy 7.0%, Ho 1.5%, Er 3.6%, Tu 0.5%, Yb+Lu 5.3%; original total given as 99.17%; corresponds to $[(Y,RE)_{0.86}Ca_{0.06}U_{0.04}Fe_{0.02}Mg_{0.01}Th_{0.01}]_{\Sigma=1.00}(Ta_{0.74}Nb_{0.24}Ti_{0.02})_{\Sigma=1.00}O_{3.99}$. (3) $YTaO_4$. (4) Mt. Ploskaya, Russia; electron microprobe analyses yield $(Y_{0.60-0.81}Yb_{0.16-0.30}RE_{0.29-0.49})_{\Sigma=1.05-1.19}(Ta_{0.61-0.67}Nb_{0.23-0.30}Ti_{0.01-0.02})_{\Sigma=0.91-0.98}O_4$.

Polymorphism & Series: Dimorphous with yttrotantalite-(Y); forms a series with fergusonite-(Y).

Occurrence: In granites and albitized, RE-rich pegmatitic veins; a detrital mineral in placers.

Association: Cassiterite, monazite, euxenite, gadolinite (Cooglegong, Western Australia); plumbomicrolite, galena, native bismuth, löllingite (Mt. Ploskaya, Russia).

Distribution: Found at Cooglegong, Pilbara district, and in the Marble Bar district, Western Australia. At Mt. Ploskaya, Western Keivy area, Kola Peninsula, and an undisclosed location in Siberia, Russia. Occurs at an undisclosed locality in Jiangxi Province, China.

Name: Honors Francis Gloster Forman (1904-1980), government geologist of Western Australia.

Type Material: Western Australian Museum, Perth, Australia, S381.

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