Duftite $PbCu(AsO_4)(OH)$

Crystal Data: Orthorhombic. *Point Group:* 222. Crystals may be pseudo-octahedral, or elongated along [001], commonly curved and rough, to 5 mm; usually in crusts and aggregates.

Physical Properties: *Fracture:* Conchoidal. Hardness = 4.5 D(meas.) = 6.40 D(calc.) = 6.602

Optical Properties: Subtranslucent. *Color:* Bright olive-green to gray-green; pale apple-green in transmitted light, generally zoned due to compositional variations. *Streak:* Pale green to white. *Luster:* Dull to vitreous on fractures.
Optical Class: Biaxial (–). *Dispersion:* $r > v$, perceptible. α = 2.03–2.04 β = 2.06–2.08 γ = 2.08–2.10 2V(meas.) = Large.

Cell Data: *Space Group:* $P2_12_12_1$ (synthetic). $a = 7.768(1)$ $b = 9.211(1)$ $c = 5.999(1)$ Z = 4

X-ray Powder Pattern: Tsumeb, Namibia.
3.26 (10), 2.85 (8), 2.65 (8), 2.57 (6), 4.21 (5), 2.28 (5), 1.87 (5)

Chemistry:	(1)	(2)	(3)
SiO_2	0.44		
As_2O_5	26.01	26.1	26.93
$(Fe,Al)_2O_3$		0.6	
CuO	19.32	18.6	18.65
ZnO	0.46	0.7	
PbO	50.10	50.6	52.31

	(1)	(2)	(3)
CaO	0.75	0.9	
H_2O^+	2.65		
H_2O^-	0.08		
H_2O		2.3	2.11
Total	99.81	99.8	100.00

(1–2) Tsumeb, Namibia. (3) $PbCu(AsO_4)(OH)$.

Mineral Group: Adelite group.

Occurrence: An uncommon mineral in the oxidized zone of some hydrothermal base-metal deposits.

Association: Olivenite, mottramite, azurite, malachite, wulfenite, calcite (Tsumeb, Namibia); bayldonite, beudantite, mimetite, cerussite (Cap Garonne mine, France).

Distribution: Many minor localities. Abundant at Tsumeb, Namibia, rarely in large crystals. From Fitula and Mufulira, Zambia. At the Touissit mine, near Oujda, Morocco. From the Cap Garonne mine, near le Pradet, Var, France. In the Virneberg mine, near Rheinbreitbach, Rhineland-Palatinate, Germany. From Beresovsk, near Yekaterinburg (Sverdlovsk), Middle Ural Mountains, Russia. In England, at Brandy Gill, Caldbeck Fells, Cumbria, and in the Penberthy Croft mine, St. Hilary, Cornwall. From the Ojuela mine, Mapimí, Durango, Mexico. In the USA, from the Mohawk mine, Clark Mountains, San Bernardino Co., and at the Belmont mine, Cerro Gordo, Inyo Co., California; in the Black Pine mine, Philipsburg, Granite Co., Montana; at Granite Gap, Hidalgo Co., New Mexico. In Australia, large crystals in the Mt. Bonnie mine, Grove Hill, Prices Station, Northern Territory; from Broken Hill, New South Wales; and in the Puttapa zinc mine, near Beltana, and the Mt. Malvern mine, near Clarendon, South Australia.

Name: In honor of G. Duft, General Manager of the mine at Tsumeb, Namibia.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 810–811. (2) Claringbull, G.F. (1951) New occurrences of duftite. Mineral. Mag., 29, 609–614. (3) Guillemin, C. (1956) Contribution a la minéralogie des arséniates, phosphates et vanadates de cuivre. I. Arséniates de cuivre. Bull. Soc. fr. Minéral., 79, 7–95, esp. 70–80 (in French). (4) Jambor, J.L., D.R. Owens, and J.E. Dutrizac (1980) Solid solution in the adelite group of arsenates. Can. Mineral., 18, 191–195. (5) Kharisun, M.R. Taylor, D.J.M. Bevan, and A. Pring (1998) The crystal chemistry of duftite, $PbCuAsO_4(OH)$ and the β-duftite problem. Mineral. Mag., 62, 121–130.