

Cobalt-zippeite

$\text{Co}_2(\text{UO}_2)_6(\text{SO}_4)_3(\text{OH})_{10} \cdot 16\text{H}_2\text{O}$

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Crystal Data: Orthorhombic (?). *Point Group:* n.d. As minute tabular {010} grains and petallike aggregates. *Twinning:* Simple and polysynthetic twins common in synthetic material.

Physical Properties: *Cleavage:* On {010}, perfect (synthetic). Hardness = ~2 (synthetic). D(meas.) = > 3.3 D(calc.) = n.d. Radioactive.

Optical Properties: Semitransparent. *Color:* Tan to brownish yellow, yellow-orange. *Optical Class:* Biaxial (−) (synthetic). *Pleochroism:* X = colorless; Y = pale yellow; Z = yellow. *Orientation:* Z = c. $\alpha = 1.747$ $\beta = 1.779$ $\gamma = 1.84$ 2V(meas.) = Large.

Cell Data: *Space Group:* n.d. Z = n.d.

X-ray Powder Pattern: Synthetic, nearly identical to nickel-zippeite. 7.21 (100), 3.59 (46), 3.12 (28), 3.47 (22), 1.963 (12), 2.491 (11), 2.653 (10)

Chemistry:

	(1)	(2)
SO ₃	10.55	9.67
UO ₃	67.2	69.07
FeO	0.57	
MnO	0.27	
MgO	0.56	
NiO	1.87	
CoO	1.98	6.03
H ₂ O	17.0	15.23
Total	[100.00]	100.00

(1) Happy Jack mine, Utah, USA; recalculated to 100% after deduction of SiO₂ 0.80%, (TiO₂ + Al₂O₃ + Ce₂O₃) 0.98%, sodium-zippeite 8.0%, johannite 1.6%; corresponds to (Co_{0.68}Ni_{0.64}Mg_{0.36}Fe_{0.22}Mn_{0.10})_{Σ=2.00}(UO₂)₆(SO₄)₃(OH)₁₀ • 16H₂O. (2) Co₂(UO₂)₆(SO₄)₃(OH)₁₀ • 16H₂O.

Occurrence: Rarely as efflorescences on the mine walls in oxidized portions of a uraninite deposit containing gersdorffite.

Association: Sodium-zippeite, uranopilite, johannite, zeunerite, chalcantite, antlerite, siderotil, bieberite, erythrite, epsomite, gypsum.

Distribution: From the Happy Jack mine, White Canyon, San Juan Co., Utah, USA.

Name: For its dominant content of *cobalt* and relation to other *zippeite* group species.

Type Material: The Natural History Museum, London, England, 1981,537 and 1981,538.

References: (1) Frondel, C., J. Ito, R.M. Honea, and A.M. Weeks (1976) Mineralogy of the zippeite group. Can. Mineral., 14, 429–436. (2) Haacke, D.F. and P.A. Williams (1979) The aqueous chemistry of uranium minerals. Part I. Divalent cation zippëite. Mineral. Mag., 43, 539–541.