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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variation in properties with composition also are given by Fornaseri, *Rend. soc. min. ital.*, **1,** 60 (1941), Otto, *Min. Mitt.*, **47,** 89 (1935), Ford, *Trans. Conn. Acad. Arts Sc.*, **22,** 211 (1917), Gaubert, *Bull. soc. min.*, **42,** 97 (1919), Niggli, *Zs. Kr.*, **56,** 231 (1921).

7. Veit, *Jb. Min., Beil.-Bd.*, **45,** 121 (1921).

8. Additional analyses are summarized by Hintze (**1** [3A], 3216, 1927) and Wayland (1942); also Dolar-Mantuani, *Zs. Kr.*, **98,** 181 (1937), Ham and Oakes, *Econ. Geol.*, **39,** 412 (1944).

9. Wherry and Larsen, *J. Washington Ac. Sc.*, **7,** 365 (1917).

10. Zsivny, *Zs. Kr.*, **65,** 728 (1927).

11. Barić and Tućan, *Ann. Geol. Pen. Balkan.*, Belgrade, **8,** 129 (1925).

12. Manchot and Lorenz, *Zs. anorg. Chem.*, **134,** 297 (1924).

13. Manasse, *Atti soc. tosc., Mem., Pisa*, **27,** 76 (1911).

14. Fahey anal. cited in Wayland (1942).

15. Yosimura, *J. Fac. Sc. Hokkaido Imp. Univ.*, **4,** 361 (1939).

16. Mayo and O'Leary, *Am. Min.*, **19,** 304 (1934).

17. Mellor (**12,** 432, 1932); Hintze (1927); Biltz, *Zs. anorg. Chem.*, **220,** 312 (1934).

18. Kreutz, *Min. Mag.*, **15,** 232 (1909).

19. Thermal analyses are described by Kulp, Wright, and Holmes, *Am. Min.*, **34,** 195 (1949).

14.1.1.5 **COBALTOCALCITE** [$CoCO_3$]. Sphäro-kobaltit *Weisbach* (*Berg.-Hütt. Jb.*, 53, 1877). Kobaltspath *Germ.* Sphérocobaltite *Fr.* Sphaerocobaltite.

Cryst.[1] Hexagonal—R; hexagonal-scalenohedral—$\bar{3}\,2/m$.

$a:c = 1:0.81$; $\alpha\ 103°21'$; $p_0:r_0 = 0.94:1$; $\lambda\ 72°32'$

Forms:[2]

c 0001	111	$m\cdot 40\bar{4}1$	$3\bar{3}\bar{1}$	w $07\bar{7}3$	10.10.11
m $10\bar{1}0$	$2\bar{1}\bar{1}$	$\delta\cdot 01\bar{1}2$	110	$\Xi\cdot 05\bar{5}1$	$22\bar{3}$
$p\cdot 10\bar{1}1$	100	$\phi\cdot 02\bar{2}1$	$11\bar{1}$	$\pi\cdot 08\bar{8}1$	$33\bar{5}$

Structure cell.[3] Space group $R\bar{3}c$. a_{rh} 5.72, α 48°14′; a_0 4.67 kX, c_0 15.13; $a_0:c_0 = 1:3.24$. Cell contents $Co_2(CO_3)_2$ in the rhombohedral unit.

Habit. Crystals rare. As small spherical masses, with a crystalline surface and concentric and radiated structure; as crusts.

Phys. Presumably cleavable on $\{10\bar{1}1\}$. H. 4. G. 4.13; 4.11 (calc.). Luster vitreous. Color rose-red, altering superficially to gray, brown or velvet-black. Streak peach-blossom-red. Translucent to subtranslucent.

Opt.[4]

	n (Boleo)	Dichroism	
O	1.855 ± 0.005	Violet-red	Uniaxial negative (−).
E	1.60 ± 0.01	Rose-red	

Chem. Cobalt carbonate, $CoCO_3$. Small amounts of Ni, Fe″, Ca, and Cu (?) occur in substitution for Co.

Anal.

	CoO	NiO	FeO	CaO	CuO	CO_2	Rem.	Total
1.	63.00					37.00		100.00
2.	58.86			1.80		34.65	4.63	99.94
3.	59.68		0.90	0.18	2.87	[36.12]	0.25	[100.00]
4.	55.72	1.21		3.12	1.95	35.87	1.57	99.44

1. $CoCO_3$. 2. Schneeberg.[5] Rem. is Fe_2O_3 3.41, H_2O 1.22. Oxidized ferroan material? 3. Libiola, Italy.[6] Rem. is H_2O. 4. Valle del Neva, Italy.[7] Rem. is Fe_2O_3 0.27, H_2O 1.30, MnO and MgO tr.

Tests. B.B. and in C.T. becomes black. Slowly soluble in cold HCl; rapidly soluble with effervescence in hot acids.

Occur. Originally found at Schneeberg, Saxony, with roselite, erythrite, and annabergite in the Co-Ni veins. From Libiola near Casarza and Valle del Neva, in Liguria, Italy. In dolomite at the Étoile du Congo mine and elsewhere in the Katanga district, Belgian Congo,[9] and in the Jervois Range in Central Australia. From Boleo, Lower California.

Alter. To stainierite.

Artif.[8] As microscopic rhombohedral crystals by heating $CoCl_2$ with carbonates at 150° in a closed tube. Several different hydrates of $CoCO_3$ are known.

Name. Sphaerocobaltite in allusion to the spheroidal shape and the composition. This name is unsatisfactory because of the suggested relation to cobaltite and the use of the mode of aggregation as a species rather than as a varietal designation and is here replaced by the name cobaltocalcite.

Ref.

1. Elements of the structure cell of Baccaredda, *Acc. Linc., Rend.*, **16,** 248 (1932), but with c quartered to conform to the morphological unit used for the calcite group.
2. Pelloux, *Ann. museo civico stor. nat. Genoa,* **52,** 269 (1927), who states that the angles are close to those of siderite.
3. Baccaredda (1932) [analysis 4]. Ferrari and Colla, *Acc. Linc., Rend.*, **10,** 594 (1929), obtained a cell with a_{rh} 5.91 kX, α 103°21′ on artificial material.
4. Larsen (135, 1921).
5. Weisbach (1877).
6. Ferro, *Atti soc. sc. Genoa,* **10,** 264 (1899).
7. Baccaredda (1932).
8. de Sénarmont, *Ann. Chem. Pharm.*, **80,** 216 (1851); *C.R.*, **32,** 409 (1851); and Mellor (**14,** 808, 1935).
9. Buttgenbach, *Les Min. de Belgique et du Congo belge*, Liége, 236 (1947).

REMINGTONITE. *Booth* (*Am. J. Sc.*, **14,** 48, 1852).

Supposedly a cobalt carbonate found as earthy, rose-colored incrustations on serpentine at a copper mine at Finksburg, Carroll County, Maryland. Apparently a serpentine-like mineral stained with cobalt and not a valid species.[1]

Ref.

1. Shannon, *Am. Min.*, **9,** 208, (1924).

14.1.1.6 **SMITHSONITE** [$ZnCO_3$]. Calamine pt. Galmei pt. Zincum acido aëro mineralisatum *Bergmann* (144, 1782; **2,** 209, 1780). Zinc carbonaté *Brongniart* (47, 1827). Zinkspath, Kohlengalmei *Germ.* Carbonate of Zinc. Smithsonite *Beudant* (**2,** 354, 1832). Zinkspath, Kapnit (or Capnit), Zinkischer Carbonspat *Breithaupt* (241, 236, 1841). Calamine *Miller* (589, 1852); *Dana* (211, 1837; 263, 1844). Smithsonite *Dana* (447, 1854). Zinkglas. Dry-bone *U. S. Miners term.* Bonamite (Sterrett, *U. S. Geol. Sur. Min. Res.*, **2,** 805, 1908). Orthorhombic Zinc Carbonate (?) *Griffiths* and *Dreyfus* (*Chem. News*, **54,** 67, 1886).

Monheimite *Kenngott* (23, 1853). Zinkeisenspath, Eisenzinkspath *Germ.* Cadmiumzinkspat *Blum* (1858). Herrerite *Del Rio* (*Am. J. Sc.*, **18,** 193, 1830).

Cryst.[1] Hexagonal—R; hexagonal-scalenohedral—$\bar{3}\,2/m$.

$a:c = 1:0.8063$; α 103°28′; $p_0:r_0 = 0.9311:1$; λ 72°20′