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A NATURAL OCCURRENCE OF NICKEL HYDROXIDE

K. L. WILLIAMS, *Mineragraphic Investigations, Commonwealth Scientific and Industrial Research Organization, University of Melbourne, Parkville, Victoria.*

During the examination of zaratite-bearing specimens from the Lord Brassey mine at Heazlewood, Tasmania (Williams, 1958), a minute amount of a pale greenish blue mineral was observed occurring in a finely banded intergrowth with zaratite on a shear plane in a specimen of serpentinite. This mineral was at first believed to be fine-grained zaratite or hellyerite (which occurs elsewhere in the same specimen), but microscopic and *x*-ray examinations proved it to consist of pure nickel hydroxide, a compound which does not appear to have been found previously in nature.

A complete examination of the mineral could not be made because of the paucity of material; the largest observed area of nickel hydroxide measured $3\times2\times0.7$ mm., and this contained inclusions of zaratite.

The mineral has a dull, earthy lustre and, by contrast with the glassy zaratite, it appears cloudy and rather opaque. It is soft, with an estimated scratch hardness of approximately 2, and it has a white streak.

Microscopically it was found to be transparent but very fine grained, with the aggregates varying from isotropic to weakly anisotropic. The fine grainsize prevented the determination of complete optical data, but the apparent refractive index was found, by immersion methods, to vary between 1.64 and 1.69; the best values were close to 1.68.

An *x*-ray powder diffraction photograph was found to match closely a diffraction photograph of synthetic (chemical reagent) nickel hydroxide, the only significant differences being that some of the lines in the pattern of the synthetic material were relatively diffuse (Table 1). This effect may be due to small crystallite size or poor crystallinity, or both.

Both diffraction patterns match that listed for nickel hydroxide in the American Society for Testing Materials' Index of *x*-ray Diffraction Data. They are both much sharper than the pattern of "anodic nickel hydroxide" figured by Klug and Alexander (1954, p. 385) and they show no evidence of a two-dimensional lattice.

The refractive index of the synthetic material was found to be slightly higher than that of the natural nickel hydroxide; it varied from 1.68 to 1.71, with the best values around 1.69. This difference may also stem from differences in grainsize or degree of crystallinity.

TABLE 1. NICKEL HYDROXIDE $Ni(OH)_2$-*X*-RAY POWDER PATTERN

1		2		3	
d (Å)	$I_{est.}$	d (Å)	$I_{est.}$	d (Å)	I/I_0
4.63	10	4.67b	10	4.60b	0.67
3.67	0.2				
2.71	6	2.72	6	2.70	1.00
2.34	10	2.34b	8	2.33b	0.67
1.757	8	1.75b	2	1.75	0.07
1.562	4	1.56b	4	1.56	0.53
1.480	3	1.48b	3	1.48	0.33
1.352	0.2	1.354	1	1.348	0.07
1.338	3				
1.299	2	1.300	2	1.295	0.07
1.167	1.5	1.17b	1		
1.097	0.5	1.09b	0.5		
1.061	0.2	1.06b	0.2		
1.017	0.5	1.018	0.5		
0.999	1	0.999	1		
0.937	1.5	0.936b	2		
0.929	0.5				
0.903	0.7	0.904b	1		
0.886	0.5	0.887b	1		
0.853	1				
0.796b	0.2				

1. Natural nickel hydroxide, Lord Brassey mine, Heazlewood, Tasmania, $CuK\alpha_1$ radiation, $\lambda = 1.5404$ Å
2. Synthetic nickel hydroxide, supplied to the Chemistry Department of the University of Melbourne by Hopkin and Williams Ltd.
   $CuK\alpha_1$ radiation, $\lambda = 1.5404$ Å
3. Nickel hydroxide pattern from the A.S.T.M. Index of *X*-Ray Diffraction Data. $MoK\alpha$ radiation, $\lambda = 0.708$ Å

The author recognizes that, in the absence of further chemical and physical data, this constitutes a most inadequate description of a new mineral, and accordingly suggests that naming of the mineral be deferred until such time as quantities sufficient for a complete description be obtained, either from Heazlewood or from other localities. On the other hand, the *x*-ray data already obtained leave no doubt as to the identity of the Heazlewood mineral, and its occurrence thus seems worthy of record.

REFERENCES

KLUG, H. P., AND ALEXANDER, L. E. (1954): *X*-ray Diffraction Procedures for Polycrystalline and Amorphous Materials. New York, Wiley and Sons.

WILLIAMS, K. L. (1958): Nickel mineralization in western Tasmania, *Proc. Aus. Inst. Min. Met.*, **Stillwell Anniversary Volume,** 263–302.