Natrosulfatourea $Na_2(SO_4)[CO(NH_2)_2]$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As prisms, elongate along [100], more or less flattened on {010}, to 0.3 mm, that exhibit {010}, {110}, {021}, {041}, and {131}.

Physical Properties: *Cleavage*: Perfect on {100}. *Tenacity*: Brittle. *Fracture*: Irregular. Hardness = 1.5 D(meas.) = 1.92(2) D(calc.) = 1.963 Soluble in H_2O.

Optical Properties: Transparent. *Color*: Colorless. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (+). α = 1.456(2) β = 1.464(5) γ = 1.524(2) 2V(meas.) = 42(1)° 2V(calc.) = 41.4° *Dispersion*: None. Non-pleochroic. *Orientation*: $X = a$, $Y = c$, $Z = b$.

Cell Data: *Space Group: Pbcn*. a = 5.5918(4) b = 18.1811(18) c = 6.7179(5) Z = 4

X-Ray Diffraction Pattern: Rowley mine, Maricopa Co., Arizona, USA.
9.08 (100), 4.179 (77), 3.047 (61), 5.34 (36), 3.765 (34), 2.599 (33), 2.835 (29)

Chemistry:

	(1)	(2)
Na	24.82	22.75
N	12.16	13.86
C	[5.94]	5.94
S	[16.78]	15.86
O	[39.62]	39.58
H	[2.00]	1.99
Total	100.00	100.00

(1) Rowley mine, Maricopa Co., Arizona, USA; electron microprobe analysis supplemented by Raman spectroscopy, $CO(NH_2)_2$ confirmed, C N H and O calculated from structure; corresponds to $Na_{2.02}(S_{0.98}O_4)[CO(NH_2)_2]$. (2) $Na_2(SO_4)[CO(NH_2)_2]$.

Occurrence: On rock surfaces as the result of evaporation under the conditions prevailing underground (Rowley mine).

Association: Natrosulfatourea, aphthitalite, urea (Rowley mine).

Distribution: From the 125-foot level of the Rowley mine, Maricopa Co., Arizona, USA.

Name: Reflects its composition: sodium (*natro*), sulfate (*sulfato*), urea (*urea*).

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (74491 and 74492).

References: (1) Kampf, A.R., A.J. Celestian, B.P. Nash, and J. Marty (2021) Allantoin and natrosulfatourea, two new bat-guano minerals from the Rowley mine, Maricopa County, Arizona, USA. Can. Mineral., 59(3), 603-616.