ANAUXITE, A MINERAL SPECIES, BASED ON MATERIAL FROM BILIN, CZECHOSLOVAKIA[1]

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Anauxite was first described from Bilin, Czechoslovakia (Bohemia), by Breithaupt[2] in 1838, and was restudied by Dittler and Hibsch[3] in 1923. Dana[4] classed anauxite as a variety of cimolite but the work of Dittler and Hibsch indicates that it is a distinct mineral species. The examination of a large number of clay specimens by the writers and their comparison with type material from Bilin has shown that anauxite is one of the most widely occurring clay minerals and is especially abundant in many so-called kaolins. This wide occurrence has shown the necessity of a definite knowledge of the chemical and physical properties of anauxite.

The National Museum recently received an ample supply of the altered basalt from Bilin that contains the anauxite. The basalt has been acted upon by thermal, carbonated waters which have produced a porous, light-colored rock. This is now composed of anauxite, cimolite, which appears to be an impure clay aggregate, and various other alteration products. Large phenocrysts that were originally augite and slightly smaller ones of biotite have been altered to anauxite. The best of the altered augite masses were selected and the outer shells of mixed anauxite and "cimolite" were removed under a binocular microscope and then carefully tested for purity in immersion oils under the petrographic microscope. Altered biotite crystals free from residual biotite were selected in the same way. Material of both types were analyzed with the results given below:

The Na_2O, MgO and CaO are present in very minor amounts and are lowest in the most carefully prepared material. It is therefore evident that they are not an essential part of the anauxite molecule, and anauxite is evidently a hydrous, aluminum silicate.

[1] Published by permission of the Director of the U. S. Geological Survey and the Secretary of the Smithsonian Institution.

[2] Breithaupt, A.; *Jour. pr. Chemie*, vol. **15**, p. 325, 1838.

[3] Dittler, E., and Hibsch, J. E.; *Tsch. Min. Petr. Mitt.*, vol. **36**, p. 85, 1923.

[4] Dana, James D.; The system of mineralogy, 6th Ed., p. 689, **1909.**

ANALYSES OF ANAUXITE FROM BILIN, CZECHOSLOVAKIA (BOHEMIA).

	PER CENT		RATIOS	
Derived from altered augite.[1]				
SiO_2	54.32	901	901	100×3
Al_2O_3	29.96	293	305	102×1
Fe_2O_3	2.00	12		
MgO	0.14			
CaO	0.32			
Na_2O	0.37			
H_2O-	0.84			
H_2O+	11.80	655	655	109×2
	99.75			
Derived from altered biotite.[2]				
SiO_2	53.80	892	892	100×3
Al_2O_3	32.48	318	325	109×1
Fe_2O_3	1.12	7		
MgO	0.26			
CaO	0.34			
H_2O-	0.94			
H_2O+	10.98	609	609	102×2
	99.92			

[1] Analysis by W. F. Foshag.
[2] Analysis by F. A. Gonyer.

The anauxite derived from augite gives ratios that are sharply 2:1:3 and this is confirmed by the material secondary to biotite although its ratios are not quite so sharp. It is therefore evident that the correct formula for Bilin anauxite is $2H_2O \cdot Al_2O_3 \cdot 3SiO_2$.

Dittler and Hibsch[5] give the following as the result of two closely agreeing analyses:

ANALYSIS OF BILIN ANAUXITE.

SiO_2	56.56
Al_2O_3	26.09
Fe_2O_3	2.69
MgO	0.11
CaO	0.40
TiO_2	0.38
H_2O	13.58
	99.87

and assign the formula $3Al_2O_3 \cdot 10SiO_2 \cdot 8H_2O$.

[5] *Op. cit.*

Anauxite has been described as having parallel extinction but careful measurements show that it has a small but distinct angle of extinction.

The physical and optical properties are as follows: Crystal system monoclinic; habit vermicular crystals with perfect basal cleavage; cross section nearly hexagonal in outline. Color white. $\alpha=1.559$, $\beta=1.564$, $\gamma=1.565$, $\gamma-\alpha=.006$. Extinction parallel in one position, slightly inclined in the other, maximum about 1°30′. Orientation as in muscovite $a=Y$, $b=Z$, $c=X$, $2V$ varies from 30° to 42°, mean about 36°. Dispersion $\rho>v$. Cleavage perfect on (001). Luster pearly on (001), subvitrous on prism faces. Dittler and Hibsch give the following physical and optical properties:

Platy grains, silver-white to bluish-white; luster pearly; $\alpha=1.54$, $\gamma=1.55$, $\alpha=c$, $\beta=b$, $\gamma=a$; $2V$ medium large; plane of the optic axis parallel to (010). Acute bisectrix normal to plates (001) H $2\frac{1}{2}$, Sp. Gr. 2.524.