

Geology, University of California, Santa Barbara, U.S.A., for helpful discussions and constructive suggestions in the field.

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Determination of mineral formulae and the relationship of ions to crystal structure of bentonites from Kutch (Gujarat)

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Seven samples of bentonite from Mandwi Taluka, Kutch district were chemically analysed. From the chemical analyses obtained, the mineral formulae were calculated by using the method prescribed by Ross and Hendricks (1945). The significance of this method is that it brings out the relationship of ions to crystal structure and provides a way by which some idea of the atomic structure can be visualised without using X-ray diffraction. From the mineral formulae, the b_0 length of the montmorillonite unit was calculated by the relation

$b_0 = 8.91 + 0.06r + 0.034s + 0.048t \text{ \AA}$ as given by MacEwan (1953), where,

r = number of Al ions in tetrahedral coordination

s = number of Mg ions in octahedral coordination

t = number of Fe ions in octahedral coordination

(per unit cell, in each case).

From this the a_0 length can be obtained by the relation $b_0 = a_0\sqrt{3}$.

The Table on the next page presents the calculated mineral formulae and axial lengths of seven samples from different localities

It is concluded from the results that the main mineral constituent of the bentonites is beidellite.

Chemical analyses, Mineral formulae, relation of ions to crystal structure and unit lengths of bentonites from Kutch (Gujarat)

Locality	% loss on ignition	SiO ₂ %	Insoluble in acid %	Al ₂ O ₃ %	Fe ₂ O ₃ %	MgO %	CaO %	Na ₂ O %	K ₂ O %	SO ₃ %	Total	Tetrahedral co-ordination			Octahedral co-ordination			Unit lengths Å	
												Si	Al	Al ⁺	Al ⁺	Fe ⁺	Mg ⁺	E	a ₀
Kutch Minerals Sherdi	7.57	56.30	1.24	17.80	11.20	0.43	2.24	1.67	Nil	1.80	100.25	3.946	.054	1.4	.59	.045	2.04	5.16	8.94
Ambica Minerals Wandh	6.85	54.13	2.24	17.30	13.80	0.49	1.96	1.80	0.24	1.62	100.43	3.747	.253	1.156	.716	.05	1.92	5.17	8.96
Wandh	7.02	52.43	4.71	15.10	10.60	3.31	2.24	2.34	0.27	1.85	99.87	3.773	.227	1.05	.572	.357	1.97	5.17	8.96
Ambica Minerals Sherdi	7.23	49.55	4.24	19.70	10.80	0.18	2.80	2.24	1.05	2.16	99.95	3.34	.66	1.47	.474	.014	1.96	5.18	8.97
Kisan Minerals Sherdi	9.74	48.74	7.48	18.50	8.00	1.37	2.80	2.07	0.24	1.18	100.12	3.687	.319	1.70	.451	.153	1.91	5.17	8.46
Ambica Minerals Hamla	7.01	55.46	5.50	14.05	12.60	0.18	1.96	2.41	Nil	1.01	100.18	3.938	.062	1.11	.67	.19	1.97	5.16	8.94
Ambica Minerals Hamla	9.15	53.58	1.85	19.50	9.00	1.15	2.80	1.74	Nil	1.32	100.09	3.729	.271	1.32	.469	.119	1.91	5.17	8.96

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