The phosphate mineral (mean $n = 1{\cdot}63$) has been identified by X-ray powder photograph as a member of the plumbogummite group. Members of this group are very difficult to identify positively by X-ray, but since a qualitative spectrographic determination showed the presence of barium and lesser amounts of strontium, it may be nearest to gorceixite ($BaAl_3(OH)_7P_2O_7$), with some goyazite ($SrAl_3(OH)_7P_2O_7$) in solid solution. Gorceixite has been found in the weathered rocks surrounding the Mrima Hill carbonatite, Kenya, (Coetzee and Edwards, 1960), where it is considered to have formed from weathered baryte, apatite, and aluminous material. In the Tanzanian rock, however, it is apparently of metamorphic origin.

Little attempt is made to identify the origin of the rock, beyond suggesting that it may belong to a fairly high-grade greenschist facies, possibly derived from pelitic rocks rich in alkalis, BaO, SrO, and P_2O_5.

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Dielectric properties of hydroxyapatites

Cockbain and Smith (1967, p. 412) attribute the 'good dielectric properties' of hydroxyapatites to the separation and position of hydroxyl ions along the 6_3 axes, although the OH position they used (in the plane of the Ca triangle) was incorrect. Their arguments are actually strengthened by use of the correct position. The most salient point of the structure refinement by Kay, Young, and Posner (1964) was that the hydroxyl ion is *not* centred in the Ca triangle, but that the repulsion of the Ca ions for the H ion is enough to lift (or drag) the O ion out of the Ca triangle, either above or below it by about 0·3 Å.

'Good' dielectric properties presumably mean high dielectric constant or low dielectric loss or both. If low dielectric loss is the desirable feature, the frequency is also presumably low enough to allow permanent dipole (OH, in particular) interactions. The configuration in hydroxyapatite of the three coplanar Ca ions, the O ion, and the H ion suggests that the OH dipole is unable to 'follow' an alternating electric field with moderate amplitude. Wide separation of OH ions contributes to low dielectric loss by precluding hydrogen ion transfer. More extraordinary dielectric behaviour may also be possible. Because of the dipolar nature of the regions in the unit cell that contain one Ca triangle and one OH radical, and because these dipoles may be ordered or disordered in their vector sense, the polarization of hydroxyapatite crystals may exhibit hysteresis for large enough amplitudes of electric field. This possibility has been pointed out (although not definitely proven) by Elliott and Young (1967) for chlorapatites, which have 'Ca_3Cl groups' that are also dipolar (but of much larger dipole moment). Depending on the type of ordered dipolar response to a strong applied field, both chlor- and hydroxyapatites could exhibit ferroelectric or antiferroelectric behaviour, as discussed by Young and Elliott (1966, p. 705).

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