## XVII. *Some additional Observations on the Red Oxalate of Chromium and Potash.* *By* Robert Warington, *Esq.*

Read May 17, 1842.

HAVING in the year 1832 obtained this salt by the same method as that described by Mr. Croft, namely, in the endeavour to prepare the dark blue oxalate of chromium and potash by the process originally given by its discoverer Dr. Wilton Turner, and having in my possession some crystals of a much larger size than those usually obtained, I was induced to avail myself of the kind offer of Professor Miller of Cambridge, "to determine the form of any crystalline products that the members of the Society might obtain in their researches," and have great pleasure in laying before the Society the following letter and measurements:—

"St. John's College, Cambridge, April 25, 1842

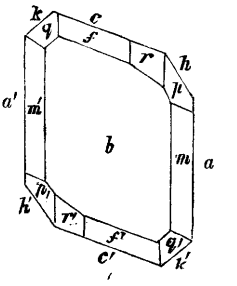
"Dear Sir.—The crystals of the oxalate of chromium and potash are represented in the accompanying figure. The numbers expressing the angles between normals to the faces must be considered as rough approximations only, for although I measured all the measurable crystals you sent me, the variations of the angles between corresponding faces showed that the crystals were by no means so perfect as could be wished.

"The angles given are however abundantly accurate for the purpose of identifying the substance. One of the crystals was a twin, the face (*a*) being the twin face or the face with respect to which the two individuals were symmetrically situated.

"*Oxalate of Chromium and Potash-system—Oblique prismatic.*

"*Angles between normals to the faces of the crystal.*

| | | | |
|---|---|---|---|
| *a c* | 70° 45′ | *c p* | 50° 40′ |
| *a h* | 33 2 | *c m* | 77 32 |
| *c h* | 37 43 | *a r* | 61 0 |
| *b p* | 53 13 | *a f* | 78 30 |
| *c k* | 59 16 | *a′q* | 63 50 |
| *a p* | 47 49 | *b f* | 37 40 |
| *a m* | 49 5 | | |



"The faces *a p r f q* are all in one zone; *h p b* are in one zone; *k q b* are in one zone; *a h c k* are in one zone. The other zones are sufficiently well indicated by the parallelisms of the edges.

"The symbols of the faces are,—*a* (100), *b* (010), *c* (001), *h* (101), *p* (111), *q* (111), *f* (011), *m* (110), *k* (101), *r* (112).

"I remain yours faithfully,

"W. H. Miller."

These crystals, submitted to measurement by Professor Miller, were obtained by slow spontaneous evaporation: the difficulty of procuring this salt in crystals of any size has been fully pointed out by Mr. Croft.

I have only one observation which does not coincide with Mr. Croft's statements, but which, however, confirms in a great measure the results of his analysis; I allude to the statement that these double salts of chromium cannot be formed by the direct combination of their ingredients. The process which I have followed has been to digest the hydrated oxide of chromium in a mixed solution of oxalic acid and oxalate of potash in the proportions indicated by analysis, and when it ceases to dissolve the oxide, to decant the clear solution and allow it to crystallize. By the same means the analogous salts of soda and ammonia have been obtained, but not in crystals sufficiently large for measurement, as also other double salts of chromium. To prepare the hydrated oxide of chromium, the best and most œconomical process that I have found, is to take 150 grs. of the bichromate of potash and 200 grs. of liquid sulphuric acid, oil of vitriol, these proportions being nearly in the ratio of their atomic weights, so that the chrome alum, sulphate of the green oxide of chromium and potash, may be formed; the deoxidation of the chromic acid is easily effected by the addition of a little sugar and boiling the solution. When the deoxidation is complete, the green oxide may be precipitated by ammonia or by a carbonated alkali, and only requires to be well washed to remove all trace of alkali or saline matter.