XXXI. Application to particular instances of the general formula for eliminating the weights of mixed bases

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mentioned. At this point, where the glacier has swept to the westward, and has expanded, its surface seems in a short space to have declined much: for on a hill lying about a quarter of a mile N.W. of the shoulder, and forming a lower part of the same range (it stands S.S.E. of the Victoria Inn, and has a reddish summit), the marks of the passage of the glacier are at a considerably lower level. At the very summit, however, of this hill, several large blocks of rock have been moved from their places, as if the ice had occasionally passed over the summit, but not for periods long enough to have worn it smooth.

I cannot imagine a more instructive and interesting lesson for any one who wishes (as I did) to learn the effects produced by the passage of glaciers, than to ascend a mountain like one of those south of the upper lake of Llanberis, constituted of the same kind of rock and similarly stratified, from top to bottom. The lower portions consist entirely of convex domes or bosses of naked rock, generally smoothed, but with their steep faces often deeply scored in nearly horizontal lines, and with their summits occasionally crowned by perched boulders of foreign rock. The upper portions, on the other hand, are less naked, and the jagged ends of the slaty rocks project through the turf in irregular hummocks; no smooth bosses, no scored surfaces, no boulders are to be seen, and this change is effected by an ascent of only a few yards! So great is the contrast, that any one viewing these mountains from a distance, would in many cases naturally conclude that their bases and their summits were composed of quite different formations.

XXXI. *Application to particular instances of the general Formula for eliminating the Weights of Mixed Bases.* By JOSIAH REES, JUN., F.G.S., of Her Majesty's Ordnance Geological Survey*.

THE general formula for eliminating the weights of any two bases, where the whole weight of any particular acid with which they are combined has been previously ascertained, is not easily available to those who are unaccustomed to mathematical inquiry.

If, however, we apply the general rule to particular instances, we are enabled to obtain a very simple place for each, by the application of which the weight of the bases may be ascertained.

I have thought it would not be altogether useless to draw up a few such rules for the use of chemists.

* Communicated by the Author.

The following combinations have been chosen as the most likely to come under the notice of the practical chemist:—

Potash and soda combined with sulphuric acid; sodium and magnesium with chlorine; sodium and calcium with chlorine; lime and magnesia with carbonic acid.

The equivalents adopted by Brande have been used in the calculation.

Carbonic acid	22	Magnesium	12
Chlorine	36	Potash	48
Sulphuric acid	40	Soda	32
Calcium	20	Potassium	40
Lime	28	Sodium	24

1. When potash and soda exist in combination with sulphuric acid, the weight of mixed sulphates being known, and also the weight of acid with which they are combined, to ascertain the weight of each base present.

Rule.—Multiply the whole weight of material experimented on by 15; from the product subtract 27 times the weight of the acid in combination, and divide the remainder by 5, the quotient will be the weight of potash: b being the weight of material experimented on, and a the known weight of acid, the rule stands thus:—

$$\frac{15b - 27a}{5} = \text{the weight of potash.}$$

The whole weight of acid and the weight of potash being ascertained, the weight of soda is of course at once known by subtracting the weight of acid and potash from that of the whole material experimented on.

2. When magnesium and sodium exist in combination with chlorine, the whole weight of the chlorine in combination being known, to ascertain the weight of each base.

Rule.—Multiply the whole weight of material experimented on by 6, from the product subtract 8 times the weight of the chlorine, and divide the remainder by 3, the quotient will be the weight of the sodium:—

$$\frac{6b - 8a}{3} = \text{weight of the sodium.}$$

3. When sodium and calcium exist in combination with chlorine, the weight of chlorine being known, to ascertain that of each base.

Rule.—Multiply the whole weight of material experimented on by 18; from the product subtract 28 times the weight of chlorine, and divide the remainder by 3; the quotient will be the weight of the sodium:—

$$\frac{18b - 28a}{3} = \text{weight of sodium.}$$

4. When lime and magnesia exist in combination with carbonic acid, the whole weight of the acid in combination being previously known, to ascertain the weight of each base.

Rule.—Multiply the whole weight of material experimented on by 77; from the product subtract 147 times the weight of acid, divide the remainder by 22, and the quotient will be the weight of lime:—

$$\frac{77b - 147a}{22} = \text{weight of the lime.}$$

Crickhowel, July 2, 1842.

XXXII. *On the Employment of Polar Coordinates in expressing the Equation of the Straight Line, and its application to the proof of a property of the Parabola.* By T. S. DAVIES, Esq., F.R.S., F.S.A., &c., Royal Military Academy, Woolwich*.

ABOUT ten years ago I gave in a note to my paper on Spherical Coordinates (in the Trans. Roy. Soc. Edinb., vol. xii.) the general equation of a straight line in reference to polar coordinates. The idea, which is very simple, was suggested by the method which I had employed in the discussion of spherical loci; the equation of the line in plano corresponding to that of the great circle on the surface of the sphere: and it was made apparent that the treatment of the straight line by such means was quite as simple and elementary in all its details as that by means of rectilinear coordinates.

Beyond the occasional employment of the expression $\frac{dr_1}{r_1 d\theta_1}$ to express the angle of the tangent and radius vector, or the relation between the perpendicular on the tangent and the corresponding radius vector, the method of polar coordinates has been generally disregarded by mathematicians in treating of the tangents and normals to curve lines: and I do not recollect a single instance where the general polar form of the equation of a line subject to its adequate number of defining conditions has even been noticed, much less used, by any author, prior to the appearance of my paper. However, that it is a very efficient method of investigating the properties of rectilineal figures, any reader may readily convince himself by a few experiments upon such theorems as express those properties; and I wish here to illustrate its utility in reference to tangencies by the investigation of a theorem which has ex-

* Communicated by the Author.