Quantitative Spectrum Analysis. Part VIII. Determination of each salt in a mixture of two salts with the same anion or a two-oxide mixture of different elements contained in a sample by the spectrographical determination of the ratio of the concentrations of the two elements in question.

By

Arata Iwamura

(Received September 27, 1932)

The determination of the concentration ratio of two elements contained in a sample was reported in the previous paper (Part VII).

If the concentration ratio of two elements contained in a sample is thus found and both elements are weighed in the form of a chloride, sulphate or oxide mixture, then the amounts of the respective elements may be calculated in the manner described below.

For example, sodium and potassium are weighed as a mixture of their chlorides or sulphates and then the molar concentration ratio of Na to K is found spectrographically, then

$NaCl+KCl=A$, say 1.0000 gm., a known weight.

Let the weight of $Na=x$,

" " $K=y$,

" " Cl combining with $Na=mx$,

" " " " " $K=ny$,

where m and n are numerical values, representing $\frac{35.45}{22.99}$ and $\frac{35.45}{39.10}$ respectively.

$$x+mx+y+ny=A \quad \text{.....(1)}$$

Put $\dfrac{\frac{x}{22.99}}{\frac{y}{39.10}}=r$, where r is a ratio, which can be experimentally determined as mentioned above.

$$\frac{39.10\,x}{22.99\,y}=r \qquad \cdots\cdots(2)$$

$$x=\frac{22.99}{39.10}ry \qquad \cdots\cdots(3)$$

Substitute the value of x denoted in equation (3) in equation (1), then we have

$$(1+m)\frac{22.99}{39.10}ry+y+ny=A$$

$$\left\{\frac{22.99}{39.10}(1+m)r+1+n\right\}y=A$$

$$y=\frac{A}{\frac{22.99}{39.10}(1+m)r+1+n} \qquad \cdots\cdots(4)$$

$$x=\frac{22.99}{39.10}ry=\frac{\frac{22.99}{39.10}ry}{\frac{22.99}{39.10}(1+m)r+1+n} \qquad \cdots\cdots(5)$$

Where A is a known weight, m and n are constants.

Hence, if the value of r is experimentally found, then the values of x and y can be calculated out from equations (4) and (5).

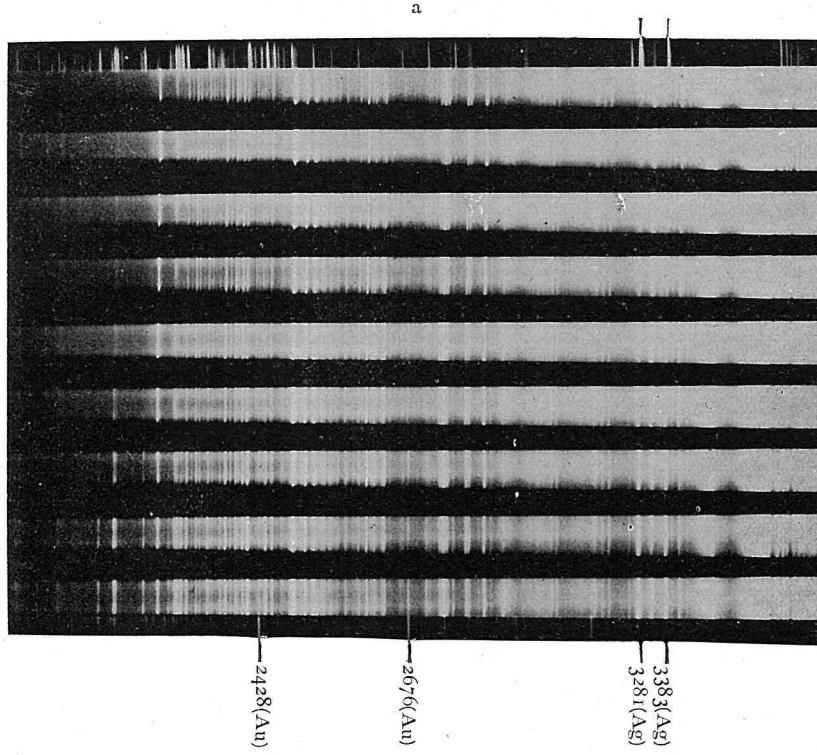
If the values of x and y are thus obtained, then the amounts of salts $x+mx$ and $n+ny$ can be calculated.

The experimental proof will be reported later.

In conclusion the present writer wishes to express his sincere thanks to Prof. M. Matsui of the Chem. Institute and Prof. M. Kimura of the Physical Institute for their kind advice and encouragement during the experiments.

Plate I

a



b

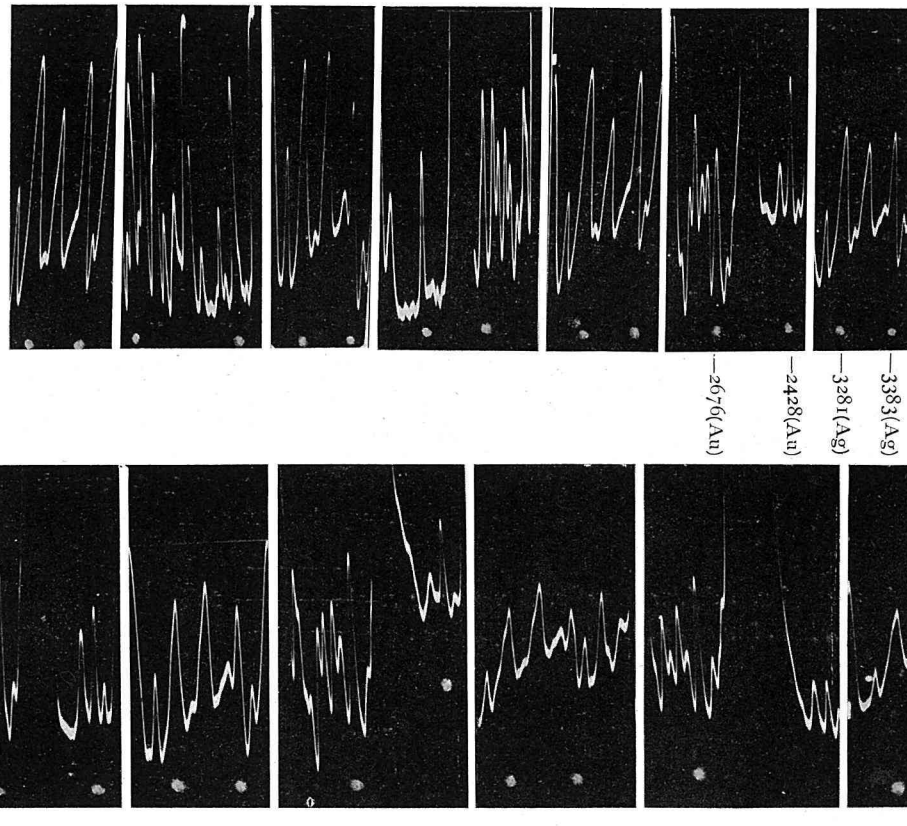
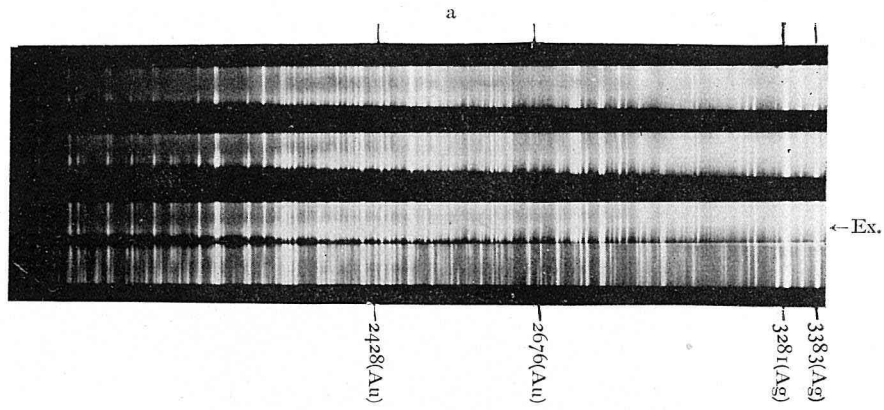
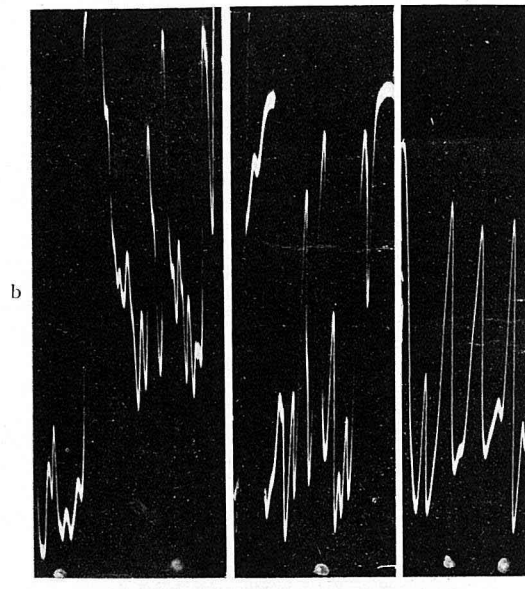


Plate II



Ex. 1



Ex. 2