LAS LINEAS ULTIMAS Y SUS POTENCIALES DE EXCITACION (1)

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ABSTRACT

The ultimate lines and their exciting potentials. — 1. *Classification and Exciting Potentials.* — The ultimate lines are classified as primary, secondary, or tertiary as suggested by Russell, modifying the nomenclature in the form proposed by Catalan and by us.

The following table gives the number of ultimate lines for the different classes and the minimum and maximum values of their exciting potentials. Those computational data are based on the table of the author published in Twyman and Smith's book.

Classification	Number of Lines	Exciting Potentials
Arc lines Primary	277	0,0 to 1,32
» Secondary	206	0,28 to 5,45
» Tertiary	53	0,92 to 9,15
Spark lines Primary	170	0,0 to 0,56
Secondary	109	0,14 to 11,90
Tertiary	60	0,32 to 17,94
Not classified	204	?
Total number	1079	

Fifty per cent of the ultimate arc lines correspond to the primary lines class, and the same proportion is maintained in the spark lines. According to Meggers, Kiess, and Walters, jr., all the ultimate lines of the spark, with no exception whatsoever, are originated in the fundamental levels; this conclusion is also main-

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tained by Catalan. Our computations do not support that assertion, which is only found true regarding very few elements of the iron group.

2. *Absorption.* — Supplementing our observations regarding the ultimate lines we have established, as the extreme limit for the appearance of the ultimate lines in absorption, the value $N_1/N = 1/14{,}500$, that — according to the equation $N_1/N = e^{-\frac{E}{RT}}$, where N_1 is the number of the excited atoms and N the total number of atoms—corresponds to a value of E = 1.03 volts for T = 1250° and to a value of E = 2.06 for T = 2500°.

The value $N_1/N = 1/14{,}500$, adopted by us, corresponds to an extreme limit because, according to our experimental data, faint absorption lines only are observed for $N_1/N \geq 1/1600$ and lines of medium intensity for $N_1/N \geq 1/210$; for the value adopted, only lines of absorption of a very faint intensity and few in number are observed. In accordance with the preceding considerations, and not taking into account other factors in the obtaining of the absorption spectra — the most important of which is the vapour tensión of the element considered — it is possible to observe, in an absorption at a temperature of 1250°, those lines the original levels of which are the fundamental ones that are separated from it by not more than 1,03 volts; that is to say, 330 lines out of 536, and, at a temperature of 2500°, 414 lines out of 536. The quantities given are maxima, because if we consider the possible number of lines of absorption of medium intensity, the value N_1/N should be 1/210, corresponding to a value of 1.13 volts at 2500°, which shows that — excluding the lines originated at the fundamental levels — only a small number of those corresponding to other levels may be observed in absorption.

3. *Multiplets.* — In the case of multiplets, the ultimate lines fulfil the conditions $\Delta l = -1$ for $\Delta j = -1$ and 0, and $\Delta l = 0$ for $\Delta j = -1$ and 0. The only exceptions to this rule are the multiplets SP (Mn, Cr, etc.). This conclusion is identical with the one we established regarding the lines that appear in absorption and that fulfil the same conditions in the variation of the quantum numbers.

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