ARTICLE 15
Excited electron: Relation of Silva de Peral and Alameda II: jump from $n_s s$ to ns

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ABSTRACT

Relation of Silva de Peral y Alameda (SPA) is introduced in [5] and refers to excited states and provides linearity between specific energy relationship and LAN of Serelles Secondary Line [2,4] that allows creation of said secondary line obtained from Torrebotana Central Line [1]. SPA in jump $1s^2 \rightarrow 1sns$ with Term=^3S and J=1 (isoelectronics with He) is treated in [5] and is now pursued with different jump and with higher non-excited or start n: $n_s s \rightarrow ns$ (with n_s(start n)>1)
Relation of Silva de Peral y Alameda refers to one single excited state and to all atoms. Silpovgar relation is theory that searchs jump globalization [5] and is applied to $n_s s \rightarrow ns$ with enlargement dedicated to different isoelectronic series that present same jump.

KEYWORDS

Relation of Silva de Peral y Alameda, SPA relation, Silpovgar Theory, Silpovgar III, FEC, Tete-Vic equation, Torrebotana Central Line, Serelles Secondary Line, LAN arrow rain.

INTRODUCTION

Relation of Silva de Peral y Alameda is interatomic relation and valid for specific jump (with concrete non-excited and excited states) and isoelectronic series. LAN acts on n principal quantum number and originates Serelles Secondary Line from Torrebotana Central Line [1,4]. Abbreviations Table is at end article.

P55 Fundamental Relation of Silva de Peral y Alameda [5] (SPA relation) provides Fundamental Energetic Correlation (FEC) as quotient between ionization energy of excited electron (IE) in absolute value and jump energy with reference data (E_k) (1). IE is in absolute value for FEC quotient to be positive. IE [6] and E_k [7] are from references to check SPA relation function on data.

$$(1)\text{FEC} = \frac{/\text{IE}/}{E_k} = \frac{-\text{IE}}{E_k}$$

This article together with following two make up one unit that has has been sectioned due to its extension. Three articles are [5] extension and main axes explained are:

* SPA application to several jumps.
* Silpovgar confirmation and extension with Silpovgar III and IV.
* Relativistic effects on SPA relation and LAN. This last point is also nexus with later article where relativistic effects are treated on Relation of Riquelme de Gozy (RG Relation).

Scheme, formulas and figures numbering is unique for three articles giving greater unity sense. Scheme is as follows:

* Relation of Silva de Peral & Alameda II: jump from n_ss to ns.
    Introduction
    1) Relation of Silva de Peral y Alameda in n_ss→ns
    Jump from 4s and 5s: isoelectronic lines and previous jump in transition metals
    2) Silpovgar III: parallel arrows of different isoelectronic series.

* SPA III: Mc Flui transform for Silpovgar III and Silpovgar IV.
    3) Mc Flui transform for Silpovgar III
    4) Silpovgar I: SPA convergence (Indian tents under Silva dominion) Part two.
    5) Other electronic jumps
        A) n_ss→np (Term=$^2P^0$ and J=3/2)
            A.1.) n_ss→np (Term=$^2P^0$ and J=3/2) with n>n_s
            Introduction to A.2. is P65 Fundamental Relation of Silva de Peral y Alameda type II
            A.2.) n_ss→np (Term=$^2P^0$ and J=3/2) with n=n_s
        Silpovgar IV, confluence arrows of different isoelectronic series with FEC adapted, is introduction to B) and C).
        B) n_s(p or s)→ns (Term=^{2}S and J=1/2) with FEC adapted.
        In general, this point is applied to any $n_s(p^y \text{ or } s^x) \rightarrow n_s(p^{y-1} \text{ or } s^{x-1})$ns
            P57 FEC adapted or AFEC

* SPA IV: Silpovgar IV with Piepflui. Excess Relativistic: influence in LAN and SPA
        C) n_s(p or s)→np (Term=$^2P^0$ and J=3/2 (or 1/2)) with FEC adapted
        In general, this point is applied to any $n_s(p^y \text{ or } s^x) \rightarrow n_s(p^{y-1} \text{ or } s^{x-1})$np
    P58 $n_s(p^y \text{ or } s^x) \rightarrow n_s(p^{y-1} \text{ or } s^{x-1})$np jump location in Silpovgar IV
    P59 Piepflui: Constant spacing for Silpovgar IV
        D) $1s^2$→1sns (Term=^{1}S and J=0)
            P60 Primitive energetic correlation of Silva de Peral y Alameda (SPA PEC)
    6) Relativistic effects: First application made on D) $1s^2$→1sns (Term=^{1}S and J=0)
        P61 IE Excess Relativistic in SPA PEC
        P62 Feliz Theory of E_o vision from electron as moves away.
        P63 ER_o interatomic behaviour
        P64 Feliz representation of E_o vision from electron as moves away.

1) Relation of Silva de Peral y Alameda in n_ss→ns

n_ss→ns (with n_s(start n)>1) study is performed on jumps that present data [7] for sufficient atoms to be able to check SPA relation linearity goodness (**Table 1**). Therefore, selected jumps are those that meet: Term=^{2}S and J=1/2.

There are only two data (Rb and Sr) for 5s→9s of isoelectronics with Rb and consequently SPA linearity can not be demonstrated since at least three points are required. In constrast, there are four isoelectronic atoms (RbI, SrII, ZrIV and MoVI) with E_k for previous jumps (from 5s to 6s, 7s and 8s) and SPA relation can be proven. Series studied are isoelectronic with alkaline, while is later deepened in non-isoelectronic with alkaline.

Table 1 - Relation of Silva de Peral y Alameda in isoelectronic series with alkalines: Non-excited or Start n (n_s) and excited or destiny n for $n_s s \rightarrow ns$					
Series	$n_s s$ (start n)	ns (excited state destiny n)			
Li	2	3	4	5	6
Na	3	4	5	6	7
K	4	5	6	7	8
Rb	5	6	7	8	

Reference destiny energy (E_{dR}) is sum of reference jump energy (E_k) [7] and Ionization Energy (IE) [6]. z_s and z_o charges follow P46 [1] and n is princial quantum number. Accordingly, LAN is calculated (2 and 2.B.) as has been checked in [2,4].

LAN calculation is given by (2):

$$(2)\text{ - LAN} \approx -\text{LAN}_R = \left(\frac{z_s^{\,2} E_o}{z_o^{\,2} E_{dR}}\right)^{1/2} - n = \left(\frac{z_s^{\,2} E_o}{z_o^{\,2}\left(E_K + IE\right)}\right)^{1/2} - n$$

(2) can be simplified in (2.B.):

$$(2.B.)\text{ - LAN} \approx -\text{LAN}_R = \frac{\left(-E_o\right)^{1/2} z_s}{\left(-E_{dR}\right)^{1/2} z_o} - n$$

LAN and FEC are calculated for all jumps indicated in Table 1. Eight first isoelectronic atoms are selected when n_s=[2,3], i.e. from Li to Ne if n_s=2 and from Na to Ar if n_s=3. Instead, six and four electronic atoms has been chosen if n_s=4 and n_s=5 respectively because there are no more isoselectronic atoms in reference [7]. Jump from Li isoelectronics (n_s=2) to ns with n=[3,6] are in **Table 2**. **Table 3, Table 4** and **Table 5** are obtained by progressively increasing n_s to 3, 4 and 5 and therefore to isoelectronics of Na, K and Rb respectively.

Transition metals make previous jump from nd→(n+1)s that already been considered for LAN [3]. This first energetic jump must be included in FEC and is treated in more detail at later point.

Table 2 - Relation of Silva de Peral y Alameda: FEC and LAN for $n_s s \rightarrow ns$ with n_s=2 and n=[3-6]		
	2s→3s	2s→4s

Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Li	1,59843124	0,403775	1,242061	0,401583
Be	1,66473612	0,26411972	1,27210469	0,26197293
B	1,69771092	0,19692722	1,28705512	0,19498661
C	1,71760595	0,15708089	1,29607008	0,15529757
N	1,73096056	0,13069281	1,3021171	0,12904789
O	1,74052313	0,11187141	1,30644963	0,11033029
F	1,74771304	0,09778905	1,30970788	0,0963355
Ne	1,75331499	0,08683571	1,31221091	0,08527649
	2s→5s		2s→6s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Li	1,13544852	0,400623	1,08751396	0,4000885
Be	1,15351407	0,26100359	1,09978116	0,26044931
B	1,16252861	0,19407288	1,10591917	0,19349667
C	1,16796608	0,15437194	1,10962666	0,1537673
N	1,17161792	0,12817007	1,11211942	0,12759863
O	1,17425078	0,10966062	1,113916	0,10912504
F	1,17619845	0,09543323	1,11524251	0,09473097
Ne	1,17770585	0,08423786	1,11627111	0,08339958

Table 3 - Relation of Silva de Peral y Alameda: FEC and LAN for $n_s s \rightarrow ns$ with $n_s=3$ and n=[4-7]

	3s→4s		3s→5s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Na	1,61031382	1,35506888	1,24845288	1,34994198
Mg	1,73723672	1,07691059	1,30689778	1,07047537
Al	1,81863043	0,90445219	1,34463986	0,89768063
Si	1,87697367	0,7834334	1,37177335	0,77663334
P	1,9213959	0,6926395	1,39245836	0,68589652
S	1,95652159	0,62147349	1,40883154	0,6147967
Cl	1,98501278	0,56379075	1,42208446	0,55694291
Ar	2,00897077	0,51649407	1,4332642	0,50990259
	3s→6s		3s→7s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Na	1,13957913	1,34737865	1,09043013	1,34571046
Mg	1,17511176	1,067148886	1,11475357	1,06497689
Al	1,19824895	0,894041193	1,13071146	0,89158846
Si	1,21495252	0,772848147	1,14227922	0,77022816

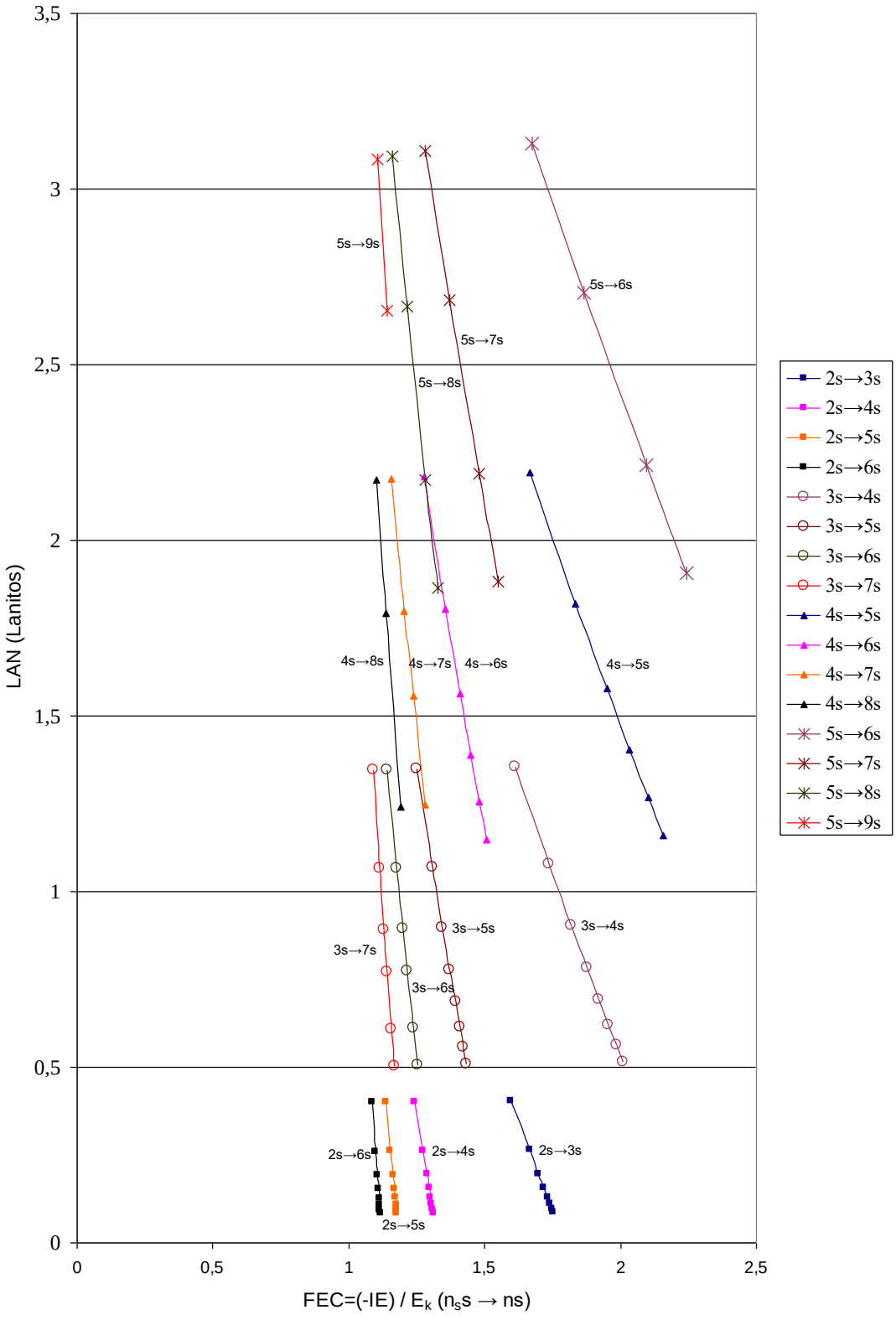
S	1,23783975	0,610823675	1,15818126	0,60790598
Ar	1,25297172	0,505809898	1,16868453	0,50199481

Table 4 - Relation of Silva de Peral y Alameda: FEC and LAN for $n_s s \rightarrow ns$ with $n_s=4$ and n=[5-8]				
	4s→5s		4s→6s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
K	1,66502746	2,19223328	1,27536897	2,18116816
Ca	1,83549002	1,81846414	1,35476944	1,80539535
Sc	1,94951249	1,57799832	1,40824891	1,56447796
Ti	2,03444594	1,40331531	1,44821804	1,38995143
V	2,10129594	1,26806253	1,47974678	1,25506318
Cr	2,15583762	1,15909887	1,50554309	1,14665656
	4s→7s		4s→8s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
K	1,15642124	2,17518929	1,1021366	2,17095873
Ca	1,20521026	1,79808424	1,13583477	1,79297422
Sc	1,23836778	1,5566207		
V	1,28297192	1,24719474	1,19019176	1,24142115

Table 5 - Relation of Silva de Peral y Alameda: FEC and LAN for $n_s s \rightarrow ns$ with $n_s=5$ and n=[6-9]				
	5s→6s		5s→7s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Rb	1,67345302	3,129253694	1,28046255	3,10876279
Sr	1,8636709	2,705781008	1,36945135	2,68245697
Zr	2,09483361	2,213475199	1,47866399	2,18873287
Mo	2,24341578	1,906069205	1,54928497	1,88128917
	5s→8s		5s→9s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Rb	1,1598796	3,09485749	1,1046518	3,08327951
Sr	1,214756	2,66648067	1,14266552	2,65338663
Zr	1,28296899	2,17120531		
Mo	1,32743517	1,863259		

Figure 1 shows the so-called LAN arrow rain. Figure 1 corroborates that all atoms and all $n_s s \rightarrow ns$ jumps fulfill. This fact implies the success of Relation of Silva de Peral y Alameda.

Figure 1 - SPA Relation: LAN arrow rain in $n_s s \rightarrow ns$ (Term=^{2}S J=1/2) for ns>1



Jump from 4s and 5s: isoelectronic lines and previous jump in transition metals

Transition metals are included in Table 4 and 5. K(I) and Ca(II) are isoelectronics with 19 electrons and their electron configuration is: [Ar]4s. Ga(III) is also 4s, but has 29 electrons and is isoelectronic with Cu(I) because 10 d electrons are intercalated. Ga(III), Ge(IV) or As(V) are isoelectronics with Cu(I) and constitute Cu(I) isoelectronic series. Transition metal can be part of K(I) isoelectronic series and has [Ar]4s but need to make previous step (from nd to (n+1)s) as also happens with Relation of Riquelme de Gozy [3]:

Transition metal $3p^6 3d^x 4s^y \rightarrow$ electron loss $\rightarrow 3p^6 3d \rightarrow$
outermost electron excitation (3d) $\rightarrow 3p^6 4s$ (Term=^{2}S and J=1/2)

For example, Sc needs E_k^0 = 3.166472 eV for previous step from 3d to 4s where E_k^0 is reference jump reference of previous step. E_k^0 is added to initial IE and reduced in absolute value IE_2 is obtained (3). E_{k2} also reduces its value because energetic jump is lower due to previous step (4):

E_k is energy from $3p^6 3d \rightarrow 3p^6 ns$
E_k^0 is energy from $3p^6 3d \rightarrow 3p^6 4s$
E_{k2} is energy from $3p^6 4s \rightarrow 3p^6 ns$,

$$(3) IE_2 = IE + E_k^0$$

$$(4) E_{k2} = E_k - E_k^0$$

Consequently, E_{dR} is not modified because (5) and (6) imply that: $E_{dR}=E_k+IE= E_{k2}+IE_2$ and LAN is the same because all other factors have not been varied (2) and (2.B.).

$$(5) E_{dR} = E_k + IE$$

$$(6) E_{dR} = E_{k2} + E_k^0 + IE_2 - E_k^0 = E_{k2} + IE_2$$

In contrast, FEC is altered (FEC_2) (7) and therefore previous $3p^6 3d \rightarrow 3p^6 4s$ jump must be considered in Relation of Silva de Peral y Alameda.

$$(7) FEC_2 = \frac{/IE_2/}{E_{k2}} = \frac{/IE + E_k^0/}{E_k - E_k^0} = \frac{-\left(IE + E_k^0\right)}{E_k - E_k^0}$$

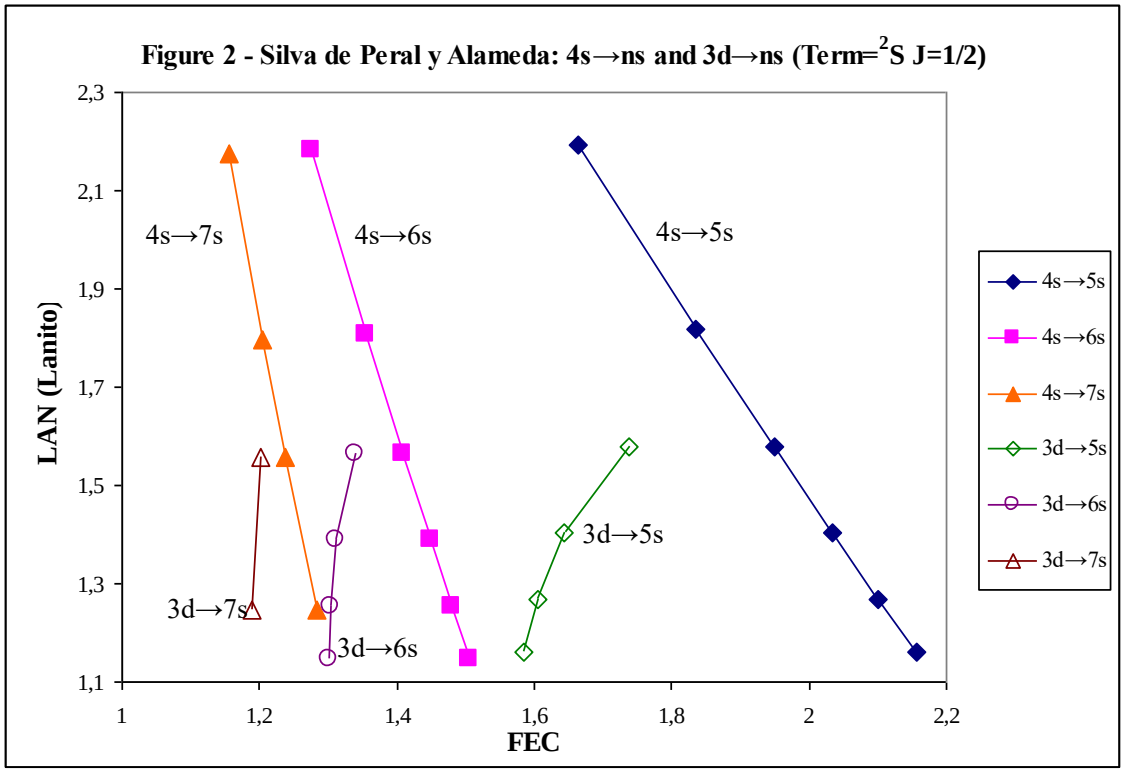
FEC_2 for transition metal is indicated as simply FEC in Table 4 and 5 because is indicated that are for $n_s s \rightarrow ns$ jump. **Table 6** has information for calculating LAN, $3p^6 3d \rightarrow 3p^6 ns$ FEC and $3p^6 4s \rightarrow 3p^6 ns$ FEC. $3p^6 4s \rightarrow 3p^6 ns$ FEC has already been included in Table 4 and $3p^6 3d \rightarrow 3p^6 ns$ FEC is in **Table 7**.

LAN vs. FEC for $3p^6 4s \rightarrow 3p^6 ns$ is in Figure 1 and is represented together with $3p^6 3d \rightarrow 3p^6 ns$ in **Figure 2**:

* Best linearity is achieved when non-excited or start state is $3p^6 4s$.

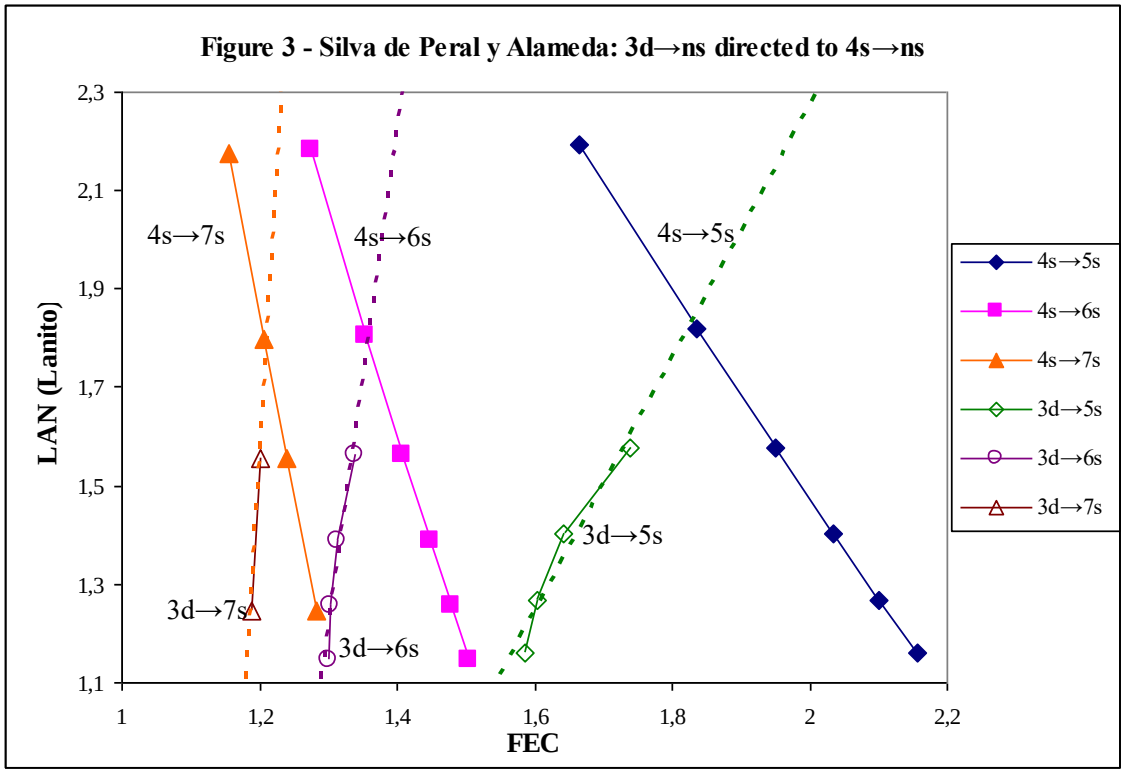
Table 6 - Data for Sc, Ti, V y Cr isoelectronics with K (I). Previous Ek^o for $3p^6 3d \rightarrow 3p^6 4s$						
S	IE (eV)	E_k^0 (eV)	IE_2 (eV)	E_o (eV)	z_o	z_s
Sc	-24,75666	3,166472	-21,590188	-6033,754	21	3
Ti	-43,26717	9,966956	-33,300214	-6625,807	22	4
V	-65,28165	18,367434	-46,914216	-7246,1223	23	5
Cr	-90,6349	28,25078	-62,38412	-7894,7989	24	6

Table 7 - FEC (-IE/ E_k) for Sc, Ti, V y Cr isoelectronics with K (I) with start from minium energy (IE) $3p^6 3d$ (Term = $^2P^0$ y J=3/2) → $3p^6 ns$				
Destiny	FEC for $3p^6 3d$ (Term = $^2P^0$ y J=3/2) → $3p^6 ns$			
	Sc	Ti	V	Cr
$3p^6 5s$	2,62215911	2,63224083	2,64498296	2,656471998
$3p^6 6s$	1,58282519	1,6062808	1,62528007	1,640790821
$3p^6 7s$	1,32360581		1,35451179	



* LAN vs FEC is not random when jump is $3p^6 3d \rightarrow 3p^6 ns$: LAN increases with FEC, that is to say inversely to $3p^6 4s \rightarrow 3p^6 ns$, with rather linear tendency direct precisely to its corresponding $3p^6 3d \rightarrow 3p^6 ns$ and specifically to last atom that has $3p^6 4s$

configuration without previous step: Ca(II). This directionality towards Ca(II) is shown in dashed line in **Figure 3**.



2) Silpovgar III: parallel arrows of different isoelectronic series.

P56 Silpovgar Theory is introduced in [5] with its first two relations and is now continued with the third.

Silpovgar I: SPA convergence (Indian tents under Silva dominion)
Silpovgar II: Leap to jump globality. Relation between SPA equation and n

Silpovgar III: parallel arrows of different isoelectronic series.

No-isoelectronic series with alkaline metal are included in study of $n_sS \rightarrow ns$ (Term=^2S and J=1/2). Isoelectronic series added to study are Cu(I) and Ag(I). **Table 8** contains LAN and FEC for Cu(I) isoelectronic series and Xe, Cs and Ba presence with its high Start charge (z_s) is remarkable. This fact makes it possible to check if Relation of Silva de Peral y Alameda (SPA relation) is maintained for high z_s.

Table 8 - Relation of Silva de Peral y Alameda for Cu(I) isoelectronic series: FEC and LAN for $n_sS \rightarrow ns$ with n_s=4 and n=[5-8]

Symbol	4s→5s		4s→6s	
	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Cu	1,444633	2,595007	1,179166	2,577090
Ga	1,760752	1,943875	1,321239	1,926011

Kr	2,070378	1,309676	1,465181	1,290847
Rb	2,107412	1,234805	1,482692	1,216369
Sr	2,136107	1,161864	1,495311	1,136541
Xe	2,396730	0,621671		
Cs	2,406152	0,604821		
Ba	2,413623	0,586742		
	4s→7s		4s→8s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Cu	1,099628	2,567312	1,064002	2,559879
Ga	1,184903	1,914752		
Kr	1,273922	1,277761	1,183745	1,265125
Rb	1,284827	1,203062		
Sr	1,292036	1,112414		

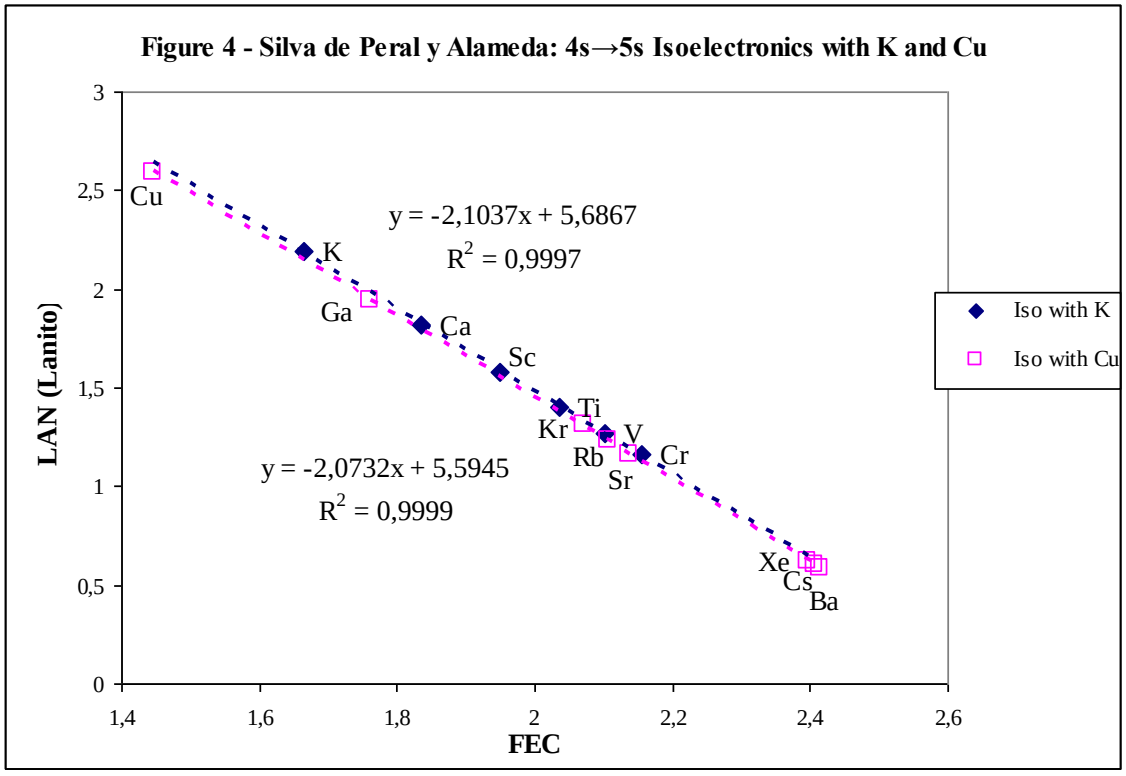


Figure 4, 4.B. and 4.C. (latter two located in annex) represent:

A) Relation of Silva de Peral y Alameda is fulfilled for jumps from 4s to 5s, 6s and 7s respectively, both being isoelectronics with Cu(I) that, as seen in Figure 2, being isoelectronics with K(I).
B) Both SPA relations run close but not overlapping and approximately parallel as corroborating their slopes. Higher Atomic Number line (in this case, isoelectronic with Cu(I)) has lower LAN values.

C) **Figure 5, 5.B. and 5.C.** (latter two located in annex) show identical behavior, but in this case for jumps from 5s to 6s, 7s and 8s respectively. Consequently, two isoelectronic series with Rb(I) and Ag(I) are represented. Data for these figures are obtained either with Table 5 (Rb(I) isoelectronics) or with **Table 9** (Ag(I) isoelectronics).

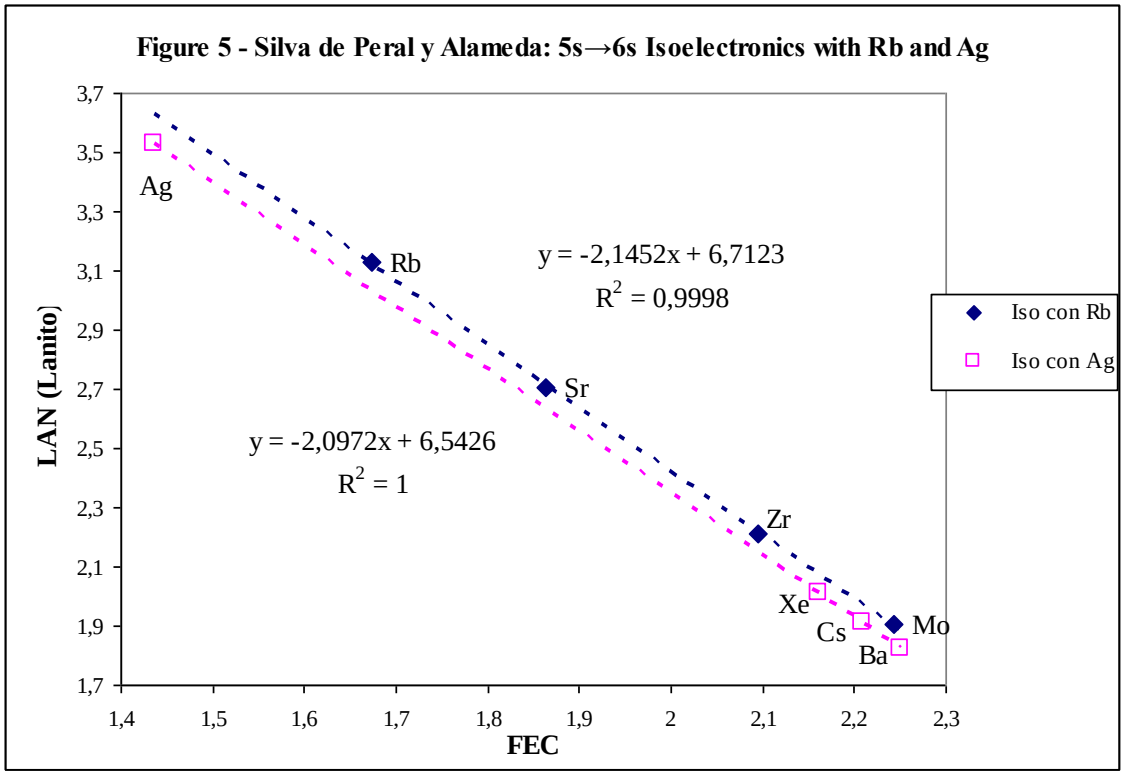


Table 9 - Relation of Silva de Peral y Alameda for Ag(I) isoelectronic series: FEC and LAN for $n_s s \rightarrow ns$ with n_s=5 and n=[6-9]				
	5s→6s		5s→7s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Ag	1,435901	3,531211	1,177684	3,498080
Xe	2,161250	2,010193	1,512072	1,974456
Cs	2,208577	1,911338	1,534282	1,874581
Ba	2,250514	1,822275	1,554054	1,784449
	5s→8s		5s→9s	
Symbol	FEC (1)	LAN_R (2.B.)	FEC (1)	LAN_R (2.B.)
Ag	1,099407	3,476388	1,064107	3,458151
Xe				
Cs	1,318490	1,846076	1,214773	1,806843
Ba				

Silpovgar III: parallel arrows of different isoelectronic series can be extended to other possibilities that allow same $n_s s \rightarrow ns$ (Term=^{2}S and J=1/2) jump. **Figure 6** is 4s→5s

(Term=^{2}S and J=1/2) and are two previous isoelectronic series represented in Figure 4 (Cu(I) and K(I)) along with three other isoelectronic series: Li(I), Na(I) and Al(I). These three isoelectronic series, as before with transition metals of K(I) isoelectronic series, need first excitation to reach required 4s start state. Figure 6 can be performed once FEC has been recalculated with first excitation considered and corresponding LAN is selected. Three new isoelectronic series are also adapted to Silpovgar III behavior. This fact can also be viewed with slope and Y-intercept similarity in **Table 10**.

Figure 6 - SPA relation: 4s→5s Isoelectronic series: Li, Na, K, Cu and Al

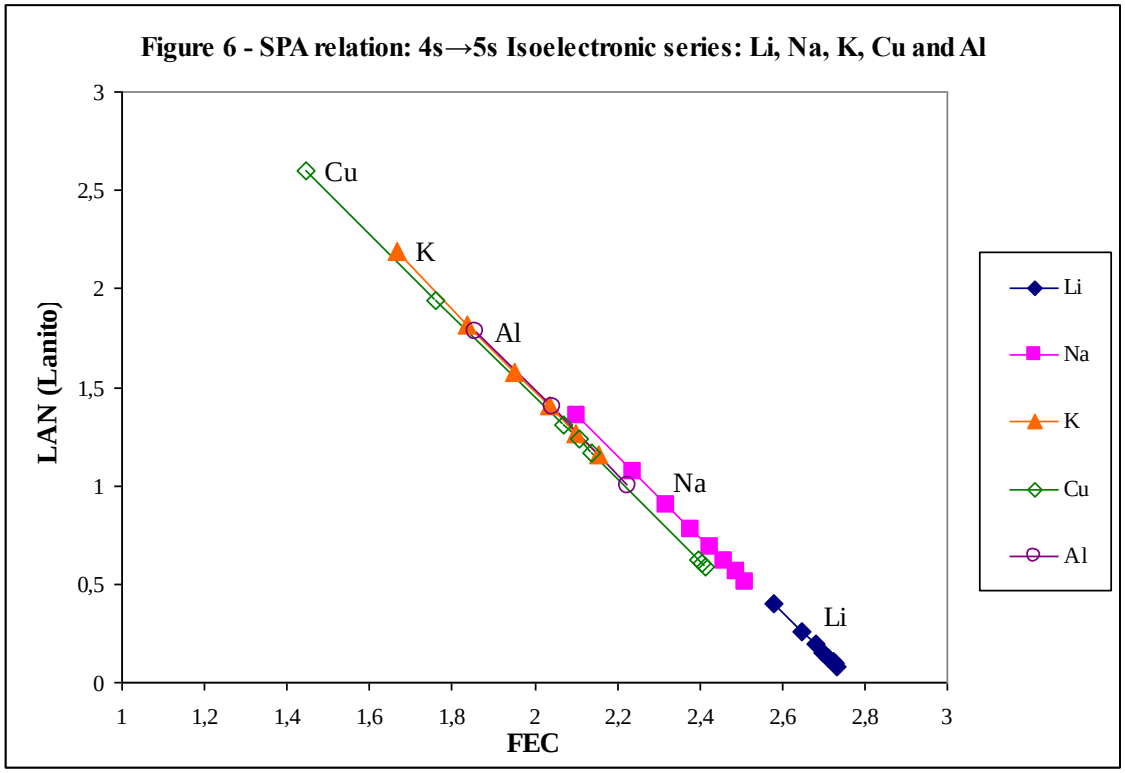


Table 10 - SPA relation equation for isoelectronic series of Li, Na, Al, K & Cu.			
Isoelectronic series	a (Y-intercept)	b (Slope)	R^2
Li	5,6265	-2,0271	1,0000
Na	5,6988	-2,0665	1,0000
Al	5,7238	-2,1221	0,9998
K	5,6867	-2,1037	0,9997
Cu	5,5945	-2,0732	0,9999

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[2] Javier Silvestre. LAN plains for Tete Vic Equation. Sent to: http://vixra.org/author/javier_silvestre
[3] Javier Silvestre. Relation of Riquelme de Gozy: LAN lineality with energy of excited states. Sent to: http://vixra.org/author/javier_silvestre
[4] Javier Silvestre. Relation of Flui Piep de Garberí: LAN^{-1} and Ionization Energy. Sent to: http://vixra.org/author/javier_silvestre
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Abbreviations Table
Following Table indicates abbreviations used in this theory and its use in article in question is marked with X. 14 is [5] and 15 is present article.

Abbreviation	**14**	**15**	**Meaning**
AC	X		Actual Change
BES	X		Born Electronic System
E_{dR}	X	X	Reference destiny energy
E_k	X	X	Reference Jump energy
$E_{k\text{-}SPA}$	X		E_k from LAN-SPA equality
E_o	X	X	1s OES Ionization energy
EC	X		Energetic correlation in SPA
FEC	X	X	Fundamental Energetic Correlation
FPG	X		Relation of Flui Piep de Garberí
IE	X	X	Ionization energy
LAN	X	X	Serelles Secondary Lines Factor
LAN_R	X	X	LAN with reference data
n	X	X	Principal quantum number
$n_{initial}$ or n_s	X	X	n of non-excited electron
OES	X		Origin Electronic System
RC	X		Relative Change
RG	X	X	Relation of Riquelme de Gozy
SPA	X	X	Relation of Silva de Peral y Alameda
Z	X		Atomic Number
z_o	X	X	1s Origin charge according to P46
z_s	X	X	Start charge according to P46

ANNEX

Figure 4.B. - Silva de Peral y Alameda: 4s→6s Isoelectronics with K and Cu

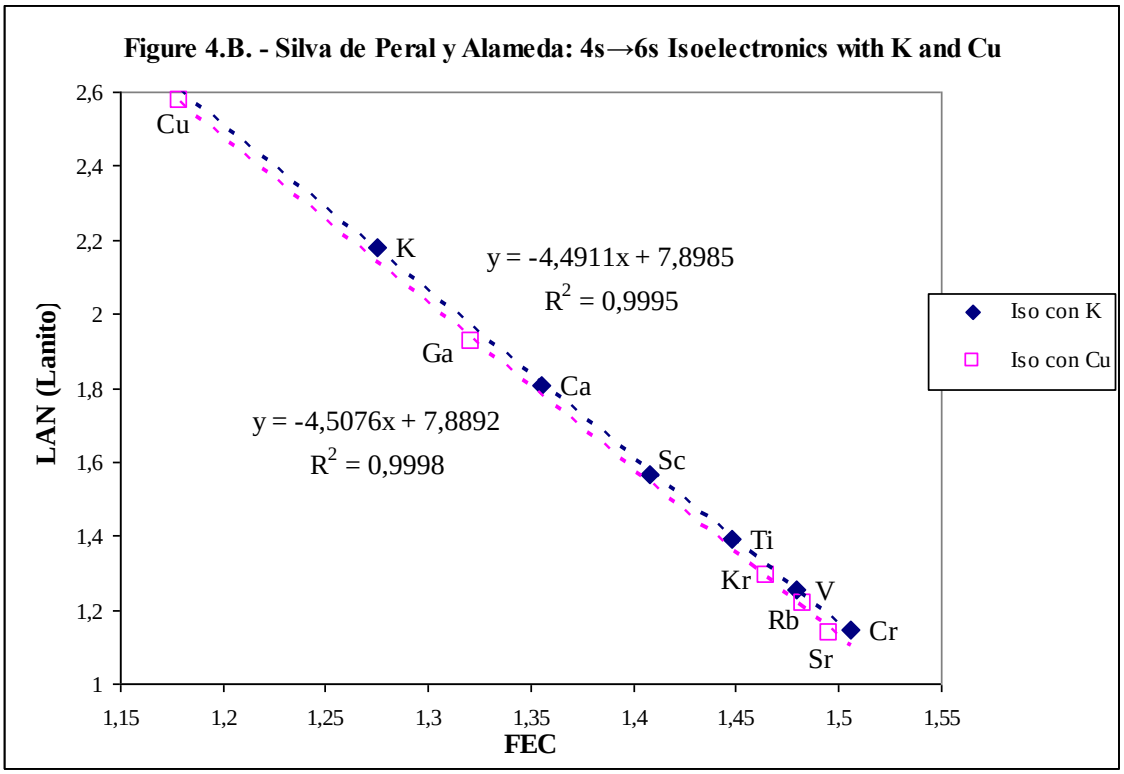


Figure 4.C. - Silva de Peral y Alameda: 4s→7s Isoelectronics with K and Cu

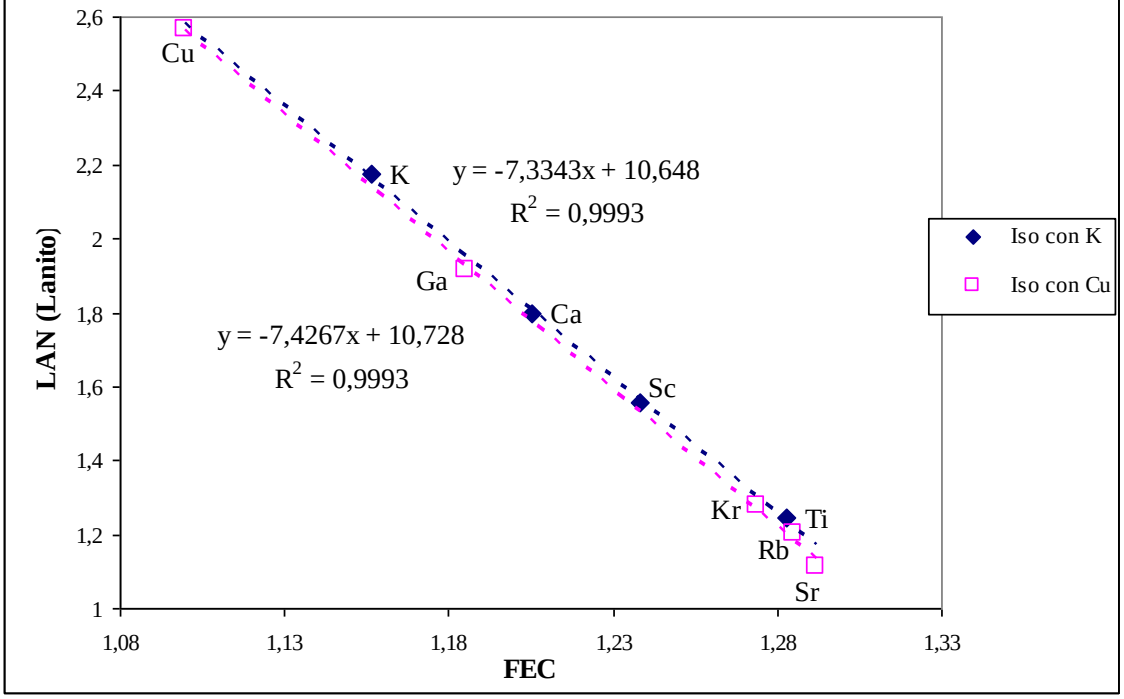


Figure 5.B. - Silva de Peral y Alameda: 5s→7s Isoelectronics with Rb and Ag

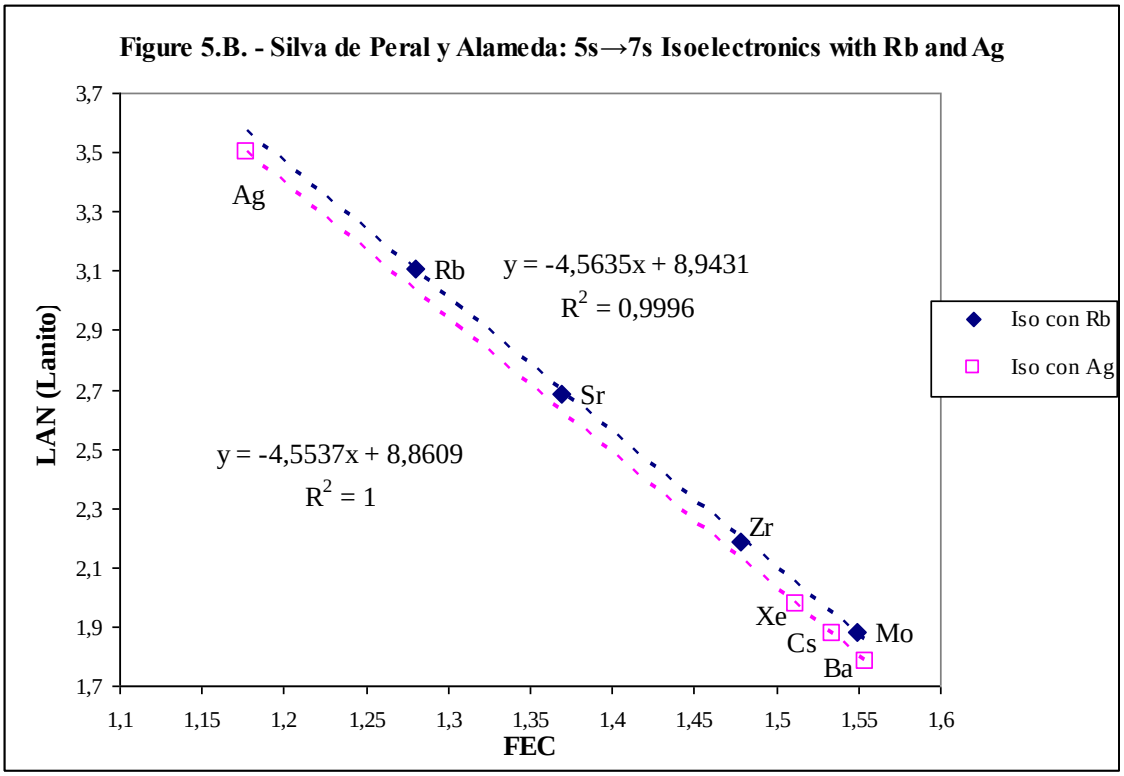
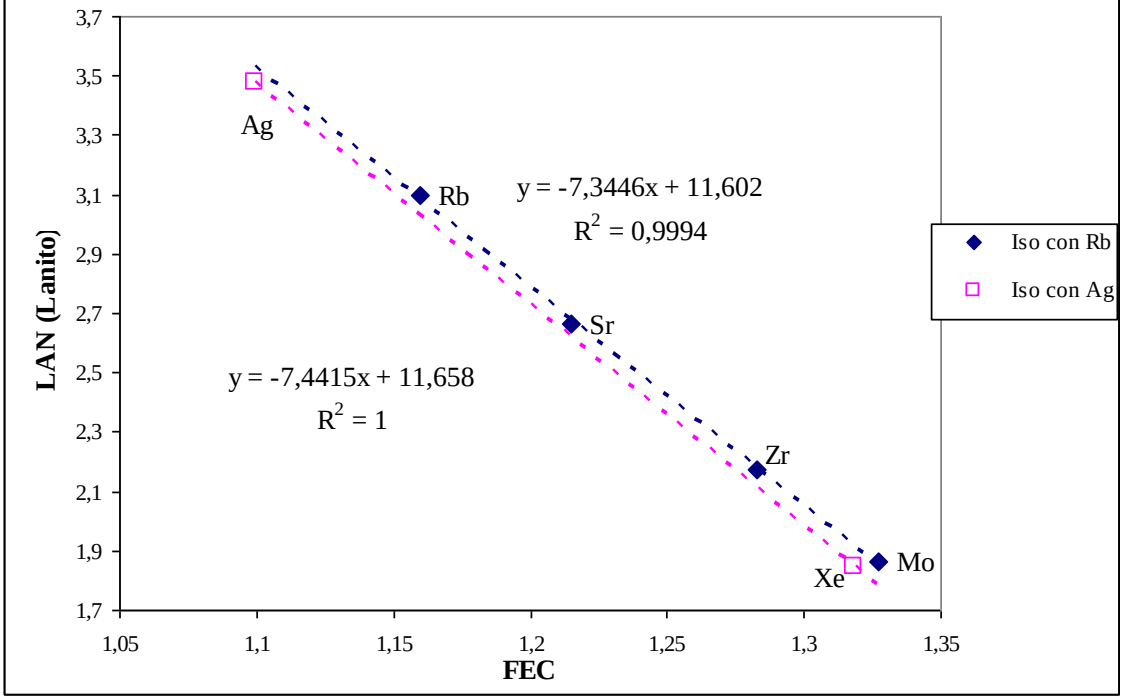


Figure 5.C. - Silva de Peral y Alameda: 5s→8s Isoelectronics with Rb and Ag



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