



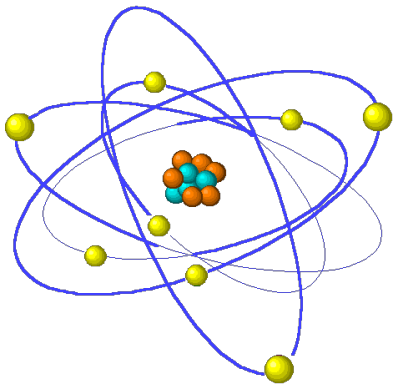
Universidad Nacional de Misiones



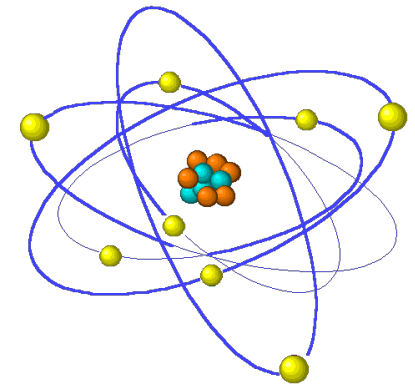
Facultad de Ingeniería
OBERA

ELECTRONICA GENERAL

SEMICONDUCTORES

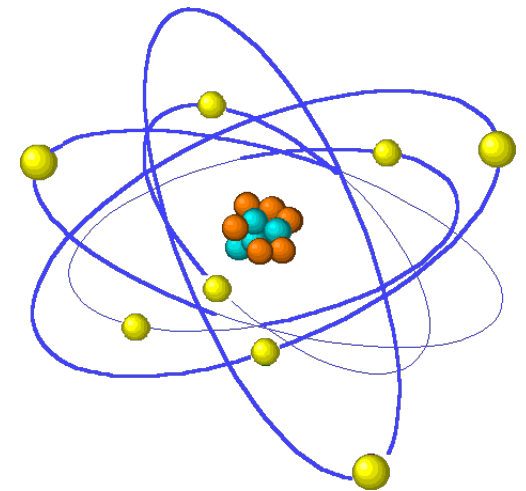
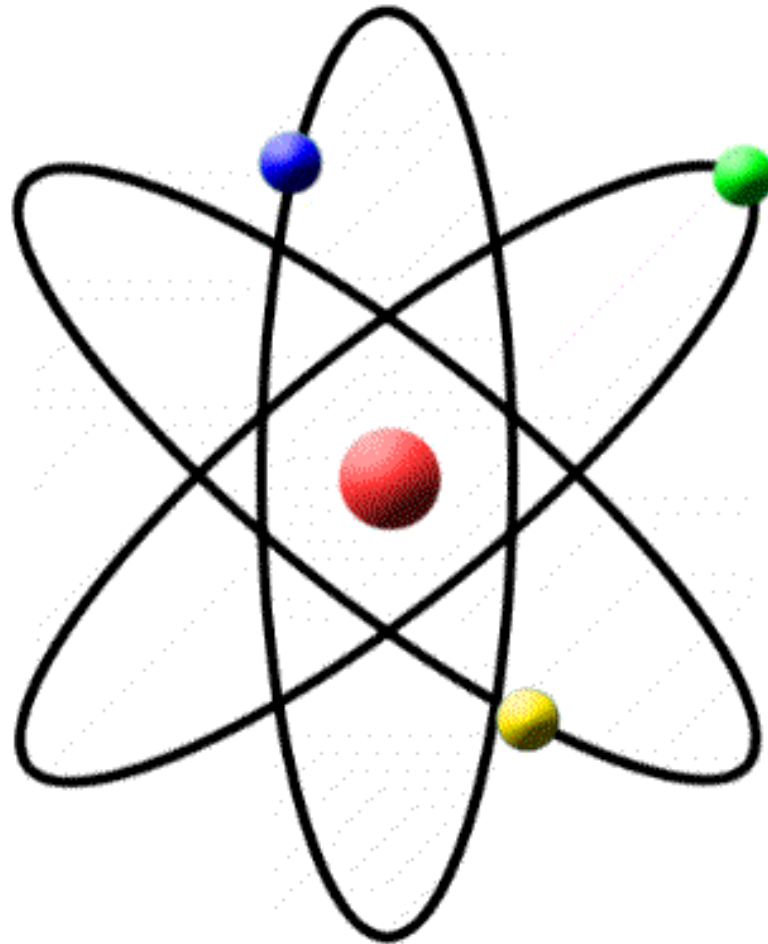


DOPADO

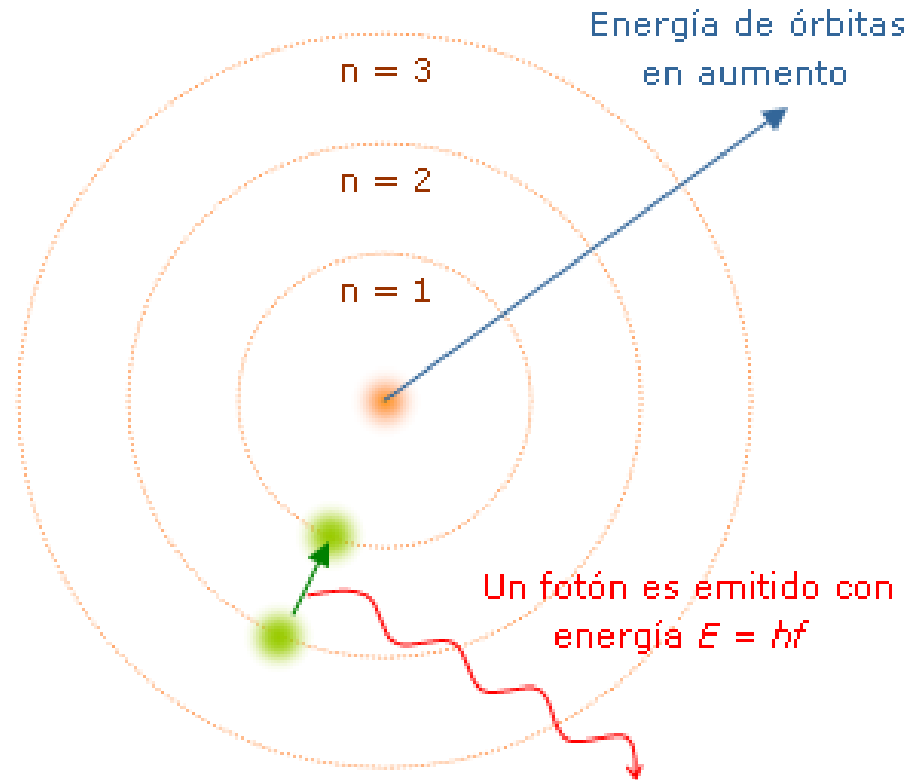


Mgtr. Ing. Victor Hugo Kurtz

MODELO ATÓMICO DE RUTHERFORD



Modelo Atómico de Bohr



Referencia:

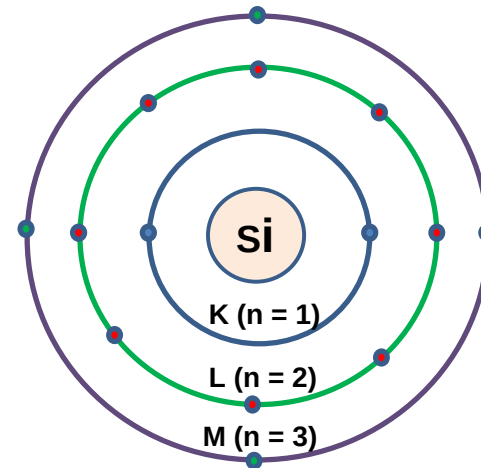
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NUMERO ATOMICO

- El **Número Atómico** en un **ELEMENTO QUIMICO**, es el número total de protones que tiene cada átomo de ese elemento.
- *Para un ATOMO NEUTRO, el numero de **PROTONES** coincide con el número de **ELECTRONES**.*
- **Átomo neutro: Nro. Protones = Nro. Electrones**
- **Se representa con la letra Z.** >

CAPA ELECTRONICA

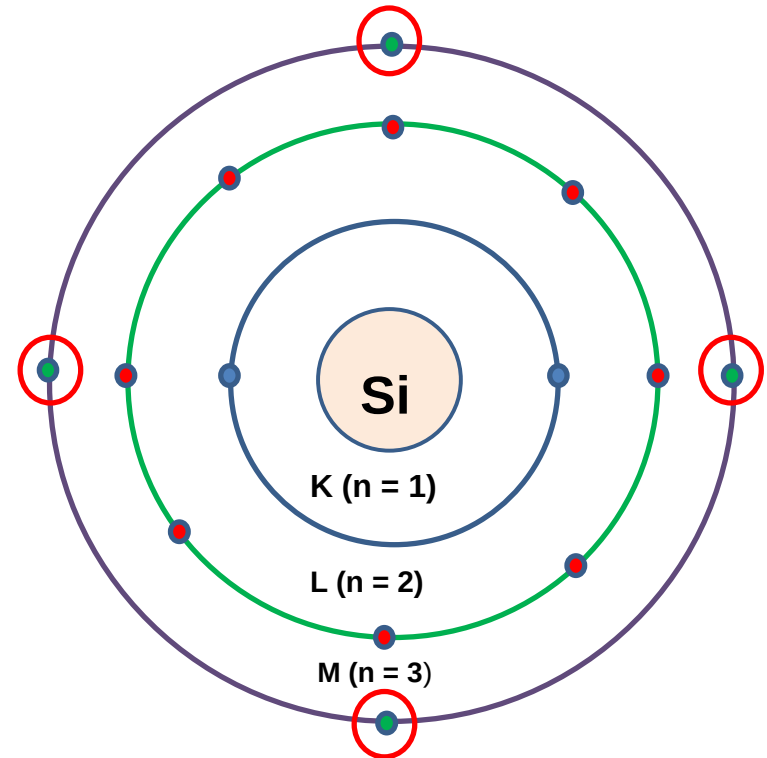
- Distribución orbital de electrones alrededor del núcleo (Bohr).
- Cada capa u orbita, puede alojar un numero máximo de electrones.
- Las capas se denominan alfabéticamente desde la letra “K”.
- Nro. de Electrones por capa = $2n^2$
Donde n = Capa (nivel).



DISTRIBUCION DE ELECTRONES

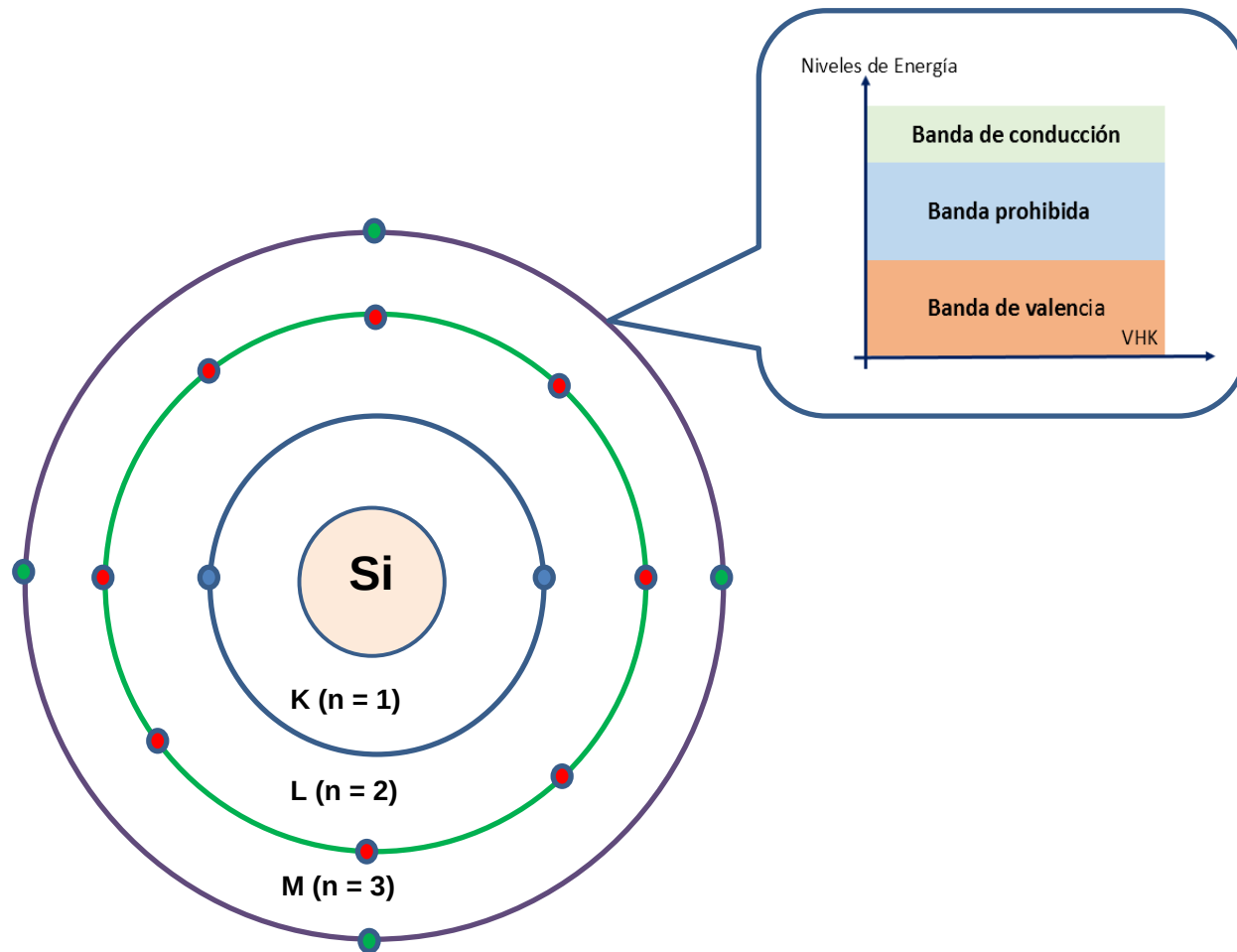
$$2n^2$$

- K ($n = 1$) ; Hasta $2 e^-$
L ($n = 2$) ; Hasta $8 e^-$
M ($n = 3$) ; Hasta $18 e^-$
- Supongamos **Silicio**
Nro. Atómico 14.
- **K = 2 electrones.**
L = 8 electrones.
M = 4 electrones.
- Ultima capa: $14 - 2 - 8 = 4$

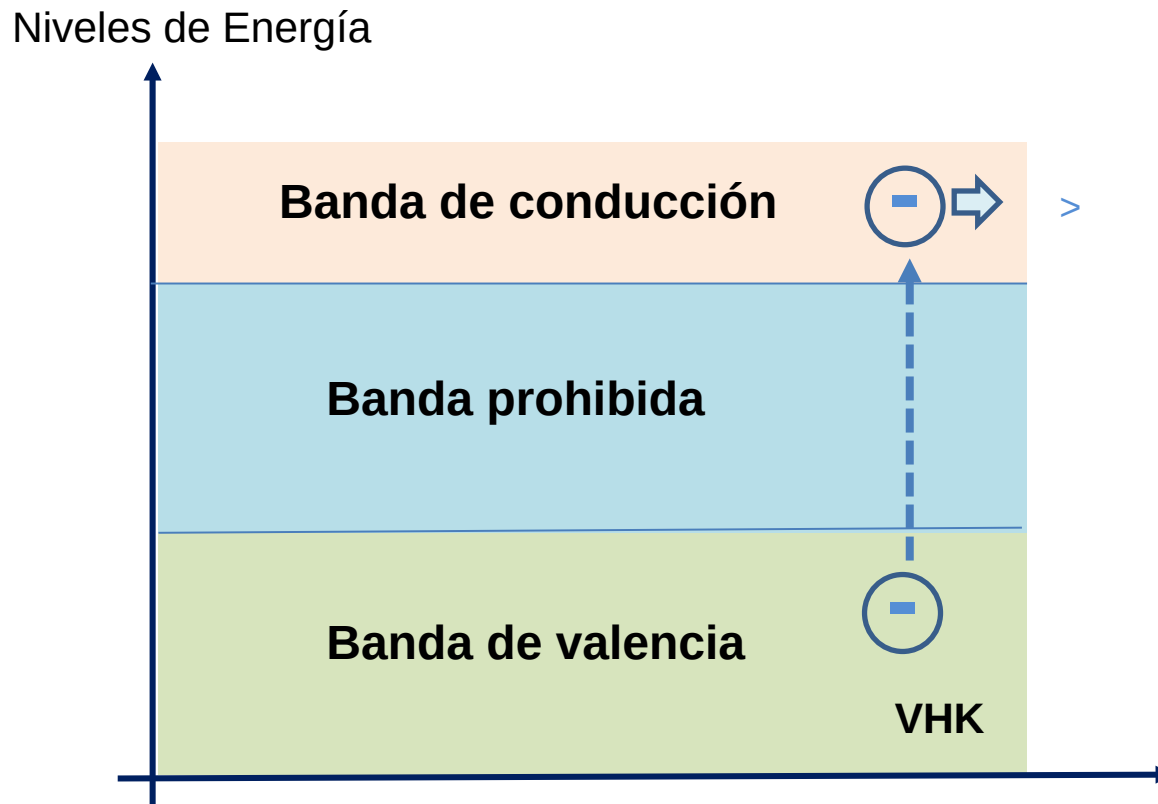


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NIVELES DE ENERGÍA

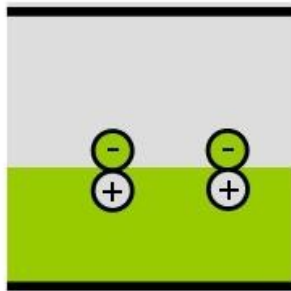


NIVELES DE ENERGÍA

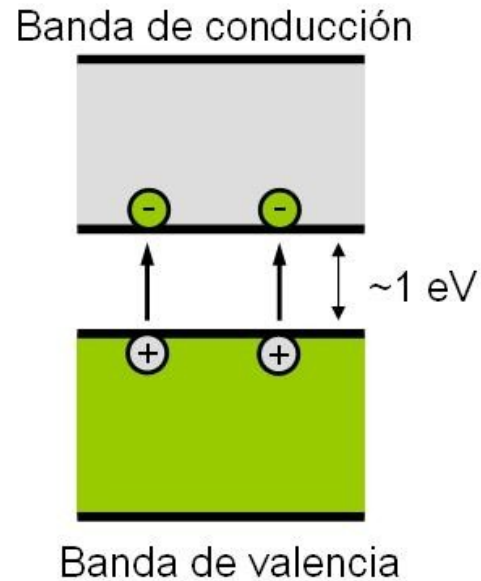


NIVELES DE ENERGÍA

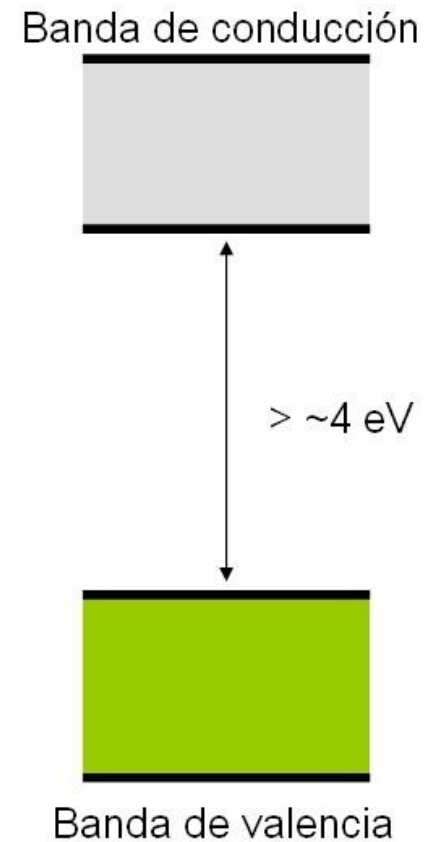
Conductor



Semiconductor



Aislante



Fuente: wix.com

TABLA PERIODICA DE LOS ELEMENTOS

Tabla periódica de los elementos

grupo 1 18

periodo 1 2

masa atómica o número másico del isótopo más estable

1.ª energía de ionización en kJ/mol

símbolo químico

nombre

configuración electrónica

número atómico

electronegatividad

estados de oxidación más comunes están en negrita

metales alcalinos

alcalinotérreos

otros metales

metales de transición

lantánidos

actínidos

metaloides

no metales

halógenos

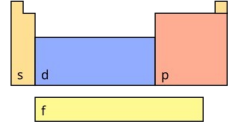
gases nobles

elementos desconocidos

masas de elementos radiactivos entre paréntesis

1.00794 1312.0 2.20 1																	4.002602 2372.3 1s ²	
6.941 520.2 0.98 1s ²	9.012182 899.5 1.57 1s ²																	10.811 800.6 2.04 1s ² 2s ²
22.98976 737.7 0.93 1s ² 2s ²	24.3050 737.7 1.31 1s ² 2s ²																	12.0107 1086.5 2.55 1s ² 2s ² 2p ²
39.0983 418.8 0.82 [Ne] 3s ²	40.078 589.8 1.00 [Ne] 3s ²																	14.0067 1402.3 3.04 1s ² 2s ² 2p ³
85.4678 403.0 0.82 [Kr] 4d ⁵	87.62 549.5 0.95 [Kr] 4d ⁵																	15.9994 1313.9 3.44 1s ² 2s ² 2p ⁴
132.9054 375.7 0.79 [Xe] 6s ²	137.327 502.9 0.89 [Xe] 6s ²																	18.998403 1681.0 3.98 1s ² 2s ² 2p ⁶
(223) 380.0 0.70 [Rn] 7s ²	(226) 509.3 0.90 [Rn] 7s ²																	20.1797 2080.7 1s ² 2s ² 2p ⁶

Bloques de configuración electrónica



- Notas
- 1 kJ/mol = 96.485 eV.
 - Todos los elementos tienen un estado de oxidación implícito cero.
 - Los estados de oxidación de los elementos 109, 110, 111, 112, 113, 114, 115, 116, 117 y 118 son predicciones.
 - Las configuraciones electrónicas de los elementos 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117 y 118 son predicciones.

138.9054 538.1 1.10 [Xe] 5d ¹ 6s ²	140.116 534.4 1.12 [Xe] 4f ¹ 5d ¹ 6s ²	140.9076 527.0 1.13 [Xe] 4f ¹ 5d ¹ 6s ²	144.242 533.1 1.14 [Xe] 4f ¹ 5d ¹ 6s ²	(145) 540.0 [Xe] 4f ¹ 5d ¹ 6s ²	150.36 544.5 1.17 [Xe] 4f ¹ 5d ¹ 6s ²	151.964 547.1 [Xe] 4f ¹ 5d ¹ 6s ²	157.25 593.4 1.20 [Xe] 4f ¹ 5d ¹ 6s ²	158.9253 565.8 [Xe] 4f ¹ 5d ¹ 6s ²	162.500 573.0 1.22 [Xe] 4f ¹ 5d ¹ 6s ²	164.9303 581.0 1.23 [Xe] 4f ¹ 5d ¹ 6s ²	167.259 589.3 1.24 [Xe] 4f ¹ 5d ¹ 6s ²	168.9342 596.7 1.25 [Xe] 4f ¹ 5d ¹ 6s ²	173.054 603.4 [Xe] 4f ¹ 5d ¹ 6s ²
(227) 499.0 1.10 [Xe] 5f ¹ 7s ²	232.0380 587.0 1.30 [Xe] 4f ¹ 5d ¹ 6s ²	231.0358 568.0 1.50 [Xe] 5f ¹ 6d ¹ 7s ²	238.0289 597.6 1.38 [Rn] 5f ¹ 6d ¹ 7s ²	(237) 604.5 1.36 [Rn] 5f ¹ 6d ¹ 7s ²	(244) 584.7 1.28 [Rn] 5f ¹ 7s ²	(243) 578.0 1.30 [Rn] 5f ¹ 7s ²	(247) 581.0 1.30 [Rn] 5f ¹ 6d ¹ 7s ²	(251) 608.0 1.30 [Rn] 5f ¹ 7s ²	(252) 619.0 1.30 [Rn] 5f ¹ 6s ²	(257) 627.0 1.30 [Rn] 5f ¹ 7s ²	(258) 635.0 1.30 [Rn] 5f ¹ 7s ²	(259) 642.0 1.30 [Rn] 5f ¹ 7s ²	



Original file: https://commons.wikimedia.org/wiki/File:Periodic_table_large-es.svg

Grupo

13
IIIa

14
IVa

15
Va

VIa

VIIa

4,22
0,93
31,8
1s



<p>5 10,811 B Boro</p> <p>3 2.34 2365 4275 0.82</p> <p>1.026 2.04 801 4.6</p> <p>[He]2s²2p¹</p>	<p>6 12,0107 C Carbono</p> <p>-4.2.4 2.26 4100 5100 0.77</p> <p>0.710 2.55 1087 4.6</p> <p>[He]2s²2p²</p>	<p>7 14,00674 N Nitrógeno</p> <p>3.2.3.4.5 1.251 3.15 7.35 0.75</p> <p>1.04 3.04 1402 17.3</p> <p>[He]2s²2p³</p>	<p>8 15,9994 O Oxígeno</p> <p>-2 1.429 54.8 90.18 0.73</p> <p>0.92 3.44 1314 14.0</p> <p>[He]2s²2p⁴</p>	<p>9 18,998403 F Flúor</p> <p>-1 1.696 53.48 84.95 0.72</p> <p>0.824 3.98 1681 17.1</p> <p>[He]2s²2p⁵</p>	<p>10 20,1797 Ne Neón</p> <p>- 0.900 24.55 27.1 0.71</p> <p>1.03 - 2081 16.7</p> <p>[He]2s²2p⁶</p>
<p>13 26,981538 Al Aluminio</p> <p>3 2.70 933.5 2793 1.18</p> <p>0.904 1.61 578 10.0</p> <p>[Ne]3s²3p¹</p>	<p>14 28,0855 Si Silicio</p> <p>4 2.33 1683 3540 1.11</p> <p>0.712 1.9 787 12.1</p> <p>[Ne]3s²3p²</p>	<p>15 30,973761 P Fósforo</p> <p>3.3.4.5 0.82 17.3 50 1.06</p> <p>0.770 2.19 1012 17.0</p> <p>[Ne]3s²3p³</p>	<p>16 32,066 S Azufre</p> <p>-2.2.4.6 2.07 388.4 717.8 1.02</p> <p>0.705 2.58 1000 15.5</p> <p>[Ne]3s²3p⁴</p>	<p>17 35,4527 Cl Cloro</p> <p>-1.1.3.5.7 3.214 172.2 239.1 0.99</p> <p>0.478 3.16 1251 18.7</p> <p>[Ne]3s²3p⁵</p>	<p>18 39,948 Ar Argón</p> <p>- 1.784 83.8 87.3 0.98</p> <p>0.52 - 1521 24.2</p> <p>[Ne]3s²3p⁶</p>
<p>31 69,723 Ga Galio</p> <p>3 5.91 302.9 2478 1.26</p> <p>0.371 1.81 579 11.8</p> <p>[Ar]3d¹⁰4s²4p¹</p>	<p>32 72,61 Ge Germanio</p> <p>4 5.32 1211.5 3107 1.22</p> <p>0.322 2.01 762 13.6</p> <p>[Ar]3d¹⁰4s²4p²</p>	<p>33 74,92160 As Arsénico</p> <p>3.3.5 1.72 090 (3sAtm) 86 (Sublim) 1.20</p> <p>0.328 2.18 947 13.1</p> <p>[Ar]3d¹⁰4s²4p³</p>	<p>34 78,96 Se Selenio</p> <p>-2.4.6 4.79 494 958 1.16</p> <p>0.321 2.55 941 16.5</p> <p>[Ar]3d¹⁰4s²4p⁴</p>	<p>35 79,904 Br Bromo</p> <p>-1.1.5 3.12 265.9 332.2 1.14</p> <p>0.473 2.96 1140 23.5</p> <p>[Ar]3d¹⁰4s²4p⁵</p>	<p>36 83,8 Kr Kriptón</p> <p>- 3.7 115.8 119.8 1.12</p> <p>0.248 - 1351 32.2</p> <p>[Ar]3d¹⁰4s²4p⁶</p>
<p>48 114,818 In Indio</p> <p>3 7.31 429.8 2346 1.44</p> <p>0.233 1.78 558 15.7</p> <p>[Kr]4d¹⁰5s²5p¹</p>	<p>50 118,71 Sn Estaño</p> <p>2.4 7.31 505.1 2876 1.41</p> <p>0.228 1.96 709 16.3</p> <p>[Kr]4d¹⁰5s²5p²</p>	<p>51 21,760 Sb Antimonio</p> <p>3.3.5 1.69 104 860 1.40</p> <p>0.207 2.05 834 18.4</p> <p>[Kr]4d¹⁰5s²5p³</p>	<p>52 127,60 Te Teluro</p> <p>-2.4.6 6.24 722.7 1261 1.36</p> <p>0.201 2.1 869 20.5</p> <p>[Kr]4d¹⁰5s²5p⁴</p>	<p>53 126,90447 I Yodo</p> <p>-1.1.5.7 4.93 386.7 458.4 1.33</p> <p>0.214 2.66 1008 25.7</p> <p>[Kr]4d¹⁰5s²5p⁵</p>	<p>54 131,29 Xe Xenón</p> <p>- 5.9 161.4 165.1 1.31</p> <p>0.158 2.6 1170 42.9</p> <p>[Kr]4d¹⁰5s²5p⁶</p>

Grupo

13

14

15

IIIa		IVa		Va		VIa		VIIa		4.22 0.93	31.8 1s
5 10,811 B Boro		6 12,0107 C Carbono		7 14,00674 N Nitrógeno		8 15,9994 O Oxígeno		9 18,998403 F Flúor		10 20,1797 Ne Neón	
3 2.34 2365 4275 0.82	1.026 2.04 801 4.6	-4.24 2.26 4100 5100 0.77	0.710 2.55 1087 4.6	-3.2.3.4.5 1.251 63.15 77.35 0.75	1.04 3.04 1402 17.3	-2 1.429 54.8 90.18 0.73	0.92 3.44 1314 14.0	-1 1.696 53.48 84.95 0.72	0.824 3.98 1681 17.1	- 0.900 24.55 27.1 0.71	1.03 - 2081 16.7
[He]2s ² 2p ¹		[He]2s ² 2p ²		[He]2s ² 2p ³		[He]2s ² 2p ⁴		[He]2s ² 2p ⁵		[He]2s ² 2p ⁶	
13 26,981538 Al Aluminio		14 28,0855 Si Silicio		15 30,973761 P Fósforo		16 32,066 S Azufre		17 35,4527 Cl Cloro		18 39,948 Ar Argón	
3 2.70 933.5 2793 1.18	0.904 1.61 578 10.0	4 2.33 1683 3540 1.11	0.712 1.9 787 12.1	-3.3.4.5 1.82 317.3 550 1.06	0.770 2.19 1012 17.0	-2.2.4.6 2.07 388.4 717.8 1.02	0.705 2.58 1000 15.5	-1.1.3.5.7 3.214 172.2 239.1 0.99	0.478 3.16 1251 18.7	- 1.784 83.8 87.3 0.98	0.52 - 1521 24.2
[Ne]3s ² 3p ¹		[Ne]3s ² 3p ²		[Ne]3s ² 3p ³		[Ne]3s ² 3p ⁴		[Ne]3s ² 3p ⁵		[Ne]3s ² 3p ⁶	
31 69,723 Ga Galio		32 72,61 Ge Germanio		33 74,92160 As Arsénico		34 78,96 Se Selenio		35 79,904 Br Bromo		36 83,8 Kr Kriptón	
3 5.91 302.9 2478 1.26	0.371 1.81 579 11.8	4 5.32 1211.5 3107 1.22	0.322 2.01 762 13.6	-3.3.5 5.72 1090 (35Atm) 386 (Sublim) 1.20	0.328 2.18 947 13.1	-2.4.6 4.79 494 958 1.16	0.321 2.55 941 16.5	-1.1.5 3.12 265.9 332.2 1.14	0.473 2.96 1140 23.5	- 3.7 115.8 119.8 1.12	0.248 - 1351 32.2
[Ar]3d ¹⁰ 4s ² 4p ¹		[Ar]3d ¹⁰ 4s ² 4p ²		[Ar]3d ¹⁰ 4s ² 4p ³		[Ar]3d ¹⁰ 4s ² 4p ⁴		[Ar]3d ¹⁰ 4s ² 4p ⁵		[Ar]3d ¹⁰ 4s ² 4p ⁶	
48 114,818 In Indio		50 118,71 Sn Estaño		51 121,760 Sb Antimonio		52 127,60 Te Teluro		53 126,90447 I Yodo		54 131,29 Xe Xenón	
3 7.31 429.8 2346 1.44	0.233 1.78 558 15.7	2.4 7.31 505.1 2876 1.41	0.228 1.96 709 16.3	-3.3.5 6.69 904 1860 1.40	0.207 2.05 834 18.4	-2.4.6 6.24 722.7 1261 1.36	0.201 2.1 869 20.5	-1.1.5.7 4.93 386.7 458.4 1.33	0.214 2.66 1008 25.7	- 5.9 161.4 165.1 1.31	0.158 2.6 1170 42.9
[Kr]4d ¹⁰ 5s ² 5p ¹		[Kr]4d ¹⁰ 5s ² 5p ²		[Kr]4d ¹⁰ 5s ² 5p ³		[Kr]4d ¹⁰ 5s ² 5p ⁴		[Kr]4d ¹⁰ 5s ² 5p ⁵		[Kr]4d ¹⁰ 5s ² 5p ⁶	

Grupo

13

14

15

IIIa

IVa

Va

VIa

VIIa

4.22
0.93
31.8
1s

<p>5</p> <p>10,811 B</p> <p>Boro</p> <p>3 2.34 1.026 2365 2.04 4275 801 0.82 4.6</p> <p>[He]2s²2p¹</p>	<p>6</p> <p>12,0107 C</p> <p>Carbono</p> <p>-4.2.4 2.26 0.710 4100 2.55 5100 1087 0.77 4.6</p> <p>[He]2s²2p²</p>	<p>7</p> <p>14,00674 N</p> <p>Nitrógeno</p> <p>-3.2.3.4.5 1.251 1.04 63.15 3.04 77.35 1402 0.75 17.3</p> <p>[He]2s²2p³</p>	<p>8</p> <p>15,9994 O</p> <p>Oxígeno</p> <p>-2 1.429 0.92 54.8 3.44 90.18 1314 0.73 14.0</p> <p>[He]2s²2p⁴</p>	<p>9</p> <p>18,998403 F</p> <p>Flúor</p> <p>-1 1.696 0.824 53.48 3.98 84.95 1681 0.72 17.1</p> <p>[He]2s²2p⁵</p>	<p>10</p> <p>20,1797 Ne</p> <p>Neón</p> <p>- 0.900 1.03 24.55 - 27.1 2081 0.71 16.7</p> <p>[He]2s²2p⁶</p>
<p>13</p> <p>26,981538 Al</p> <p>Aluminio</p> <p>3 2.70 0.904 933.5 1.61 2793 578 1.18 10.0</p> <p>[Ne]3s²3p¹</p>	<p>14</p> <p>28,0855 Si</p> <p>Silicio</p> <p>4 2.33 0.712 1683 1.9 3540 787 1.11 12.1</p> <p>[Ne]3s²3p²</p>	<p>15</p> <p>30,973761 P</p> <p>Fósforo</p> <p>-3.3.4.5 1.82 0.770 317.3 2.19 550 1012 1.06 17.0</p> <p>[Ne]3s²3p³</p>	<p>16</p> <p>32,066 S</p> <p>Azufre</p> <p>-2.2.4.6 2.07 0.705 388.4 2.58 717.8 1000 1.02 15.5</p> <p>[Ne]3s²3p⁴</p>	<p>17</p> <p>35,4527 Cl</p> <p>Cloro</p> <p>-1.1.3.5.7 3.214 0.478 172.2 3.16 239.1 1251 0.99 18.7</p> <p>[Ne]3s²3p⁵</p>	<p>18</p> <p>39,948 Ar</p> <p>Argón</p> <p>- 1.784 0.52 83.8 - 87.3 1521 0.98 24.2</p> <p>[Ne]3s²3p⁶</p>
<p>31</p> <p>69,723 Ga</p> <p>Galio</p> <p>3 5.91 0.371 302.9 1.81 2478 579 1.26 11.8</p> <p>[Ar]3d¹⁰4s²4p¹</p>	<p>32</p> <p>72,61 Ge</p> <p>Germanio</p> <p>4 5.32 0.322 1211.5 2.01 3107 762 1.22 13.6</p> <p>[Ar]3d¹⁰4s²4p²</p>	<p>33</p> <p>74,92160 As</p> <p>Arsénico</p> <p>-3.3.5 5.72 0.328 1090 (35Atm) 2.18 886 (Sublim) 947 1.20 13.1</p> <p>[Ar]3d¹⁰4s²4p³</p>	<p>34</p> <p>78,96 Se</p> <p>Selenio</p> <p>-2.4.6 4.79 0.321 494 2.55 958 941 1.16 16.5</p> <p>[Ar]3d¹⁰4s²4p⁴</p>	<p>35</p> <p>79,904 Br</p> <p>Bromo</p> <p>-1.1.5 3.12 0.473 265.9 2.96 332.2 1140 1.14 23.5</p> <p>[Ar]3d¹⁰4s²4p⁵</p>	<p>36</p> <p>83,8 Kr</p> <p>Kriptón</p> <p>- 3.7 0.248 115.8 - 119.8 1351 1.12 32.2</p> <p>[Ar]3d¹⁰4s²4p⁶</p>
<p>48</p> <p>114,818 In</p> <p>Indio</p> <p>3 7.31 0.233 429.8 1.78 2346 558 1.44 15.7</p> <p>[Kr]4d¹⁰5s²5p¹</p>	<p>50</p> <p>118,71 Sn</p> <p>Estaño</p> <p>2.4 7.31 0.228 505.1 1.96 2876 709 1.41 16.3</p> <p>[Kr]4d¹⁰5s²5p²</p>	<p>51</p> <p>121,760 Sb</p> <p>Antimonio</p> <p>-3.3.5 6.69 0.207 904 2.05 1860 834 1.40 18.4</p> <p>[Kr]4d¹⁰5s²5p³</p>	<p>52</p> <p>127,60 Te</p> <p>Teluro</p> <p>-2.4.6 6.24 0.201 722.7 2.1 1261 869 1.36 20.5</p> <p>[Kr]4d¹⁰5s²5p⁴</p>	<p>53</p> <p>126,90447 I</p> <p>Yodo</p> <p>-1.1.5.7 4.93 0.214 386.7 2.66 458.4 1008 1.33 25.7</p> <p>[Kr]4d¹⁰5s²5p⁵</p>	<p>54</p> <p>131,29 Xe</p> <p>Xenón</p> <p>- 5.9 0.158 161.4 2.6 165.1 1170 1.31 42.9</p> <p>[Kr]4d¹⁰5s²5p⁶</p>

DOPADO

O

METALIZACION

de un SEMICONDUCTOR



DOPADO

IIIa		IVa		Va		VIa		VIIa		4.22 0.93	31.8 1s
5 10,811 B Boro 3 2.34 1.026 2365 2.04 4275 801 0.82 4.6 [He]2s ² 2p ¹	6 12,0107 C Carbono -4.2,4 2.26 0.710 4100 2.55 5100 1087 0.77 4.6 [He]2s ² 2p ²	7 14,00674 N Nitrógeno -3.2,3.4,5 1.251 1.04 63.15 3.04 77.35 1402 0.75 17.3 [He]2s ² 2p ³	8 15,9994 O Oxígeno -2 1.429 0.92 54.8 3.44 90.18 1314 0.73 14.0 [He]2s ² 2p ⁴	9 18,998403 F Flúor -1 1.696 0.824 53.48 3.98 84.95 1681 0.72 17.1 [He]2s ² 2p ⁵	10 20,1797 Ne Neón - 0.900 1.03 24.55 - 27.1 2081 0.71 16.7 [He]2s ² 2p ⁶						
13 26,981538 Al Aluminio 3 2.70 0.904 933.5 1.61 2793 578 1.18 10.0 [Ne]3s ² 3p ¹	14 28,0855 Si Silicio 4 2.33 0.712 1683 1.9 3540 787 1.11 12.1 [Ne]3s ² 3p ²	15 30,973761 P Fósforo -3.3,4,5 1.82 0.770 317.3 2.19 550 1012 1.06 17.0 [Ne]3s ² 3p ³	16 32,066 S Azufre -2.2,4,6 2.07 0.705 388.4 2.58 717.8 1000 1.02 15.5 [Ne]3s ² 3p ⁴	17 35,4527 Cl Cloro -1.1,3,5,7 3.214 0.478 172.2 3.16 239.1 1251 0.99 18.7 [Ne]3s ² 3p ⁵	18 39,948 Ar Argón - 1.784 0.52 83.8 - 87.3 1521 0.98 24.2 [Ne]3s ² 3p ⁶						
31 69,723 Ga Galio 3 5.91 0.371 302.9 1.81 2478 579 1.26 11.8 [Ar]3d ¹⁰ 4s ² 4p ¹	32 72,61 Ge Germanio 4 5.32 0.322 1211.5 2.01 3107 762 1.22 13.6 [Ar]3d ¹⁰ 4s ² 4p ²	33 74,92160 As Arsénico -3.3,5 5.72 0.328 1090 (3sAtm) 2.18 886 (Sublim) 947 1.20 13.1 [Ar]3d ¹⁰ 4s ² 4p ³	34 78,96 Se Selenio -2,4,6 4.79 0.321 494 2.55 958 941 1.16 16.5 [Ar]3d ¹⁰ 4s ² 4p ⁴	35 79,904 Br Bromo -1,1,5 3.12 0.473 265.9 2.96 332.2 1140 1.14 23.5 [Ar]3d ¹⁰ 4s ² 4p ⁵	36 83,8 Kr Kriptón - 3.7 0.248 115.8 - 119.8 1351 1.12 32.2 [Ar]3d ¹⁰ 4s ² 4p ⁶						
49 114,818 In Indio 3 7.31 0.233 429.8 1.78 2346 558 1.44 15.7 [Kr]4d ¹⁰ 5s ² 5p ¹	50 118,71 Sn Estaño 2,4 7.31 0.228 505.1 1.96 2876 709 1.41 16.3 [Kr]4d ¹⁰ 5s ² 5p ²	51 121,760 Sb Antimonio -3.3,5 6.69 0.207 904 2.05 1860 834 1.40 18.4 [Kr]4d ¹⁰ 5s ² 5p ³	52 127,60 Te Teluro -2,4,6 6.24 0.201 722.7 2.1 1261 869 1.36 20.5 [Kr]4d ¹⁰ 5s ² 5p ⁴	53 126,90447 I Yodo -1,1,5,7 4.93 0.214 386.7 2.66 458.4 1008 1.33 25.7 [Kr]4d ¹⁰ 5s ² 5p ⁵	54 131,29 Xe Xenón - 5.9 0.158 161.4 2.6 165.1 1170 1.31 42.9 [Kr]4d ¹⁰ 5s ² 5p ⁶						

Grupo 13

14

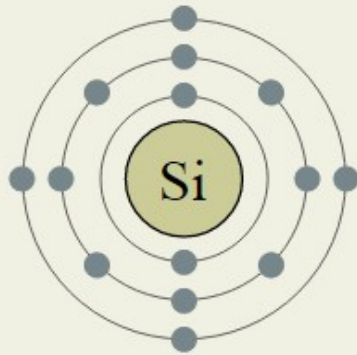
15



Dopado o Metalización



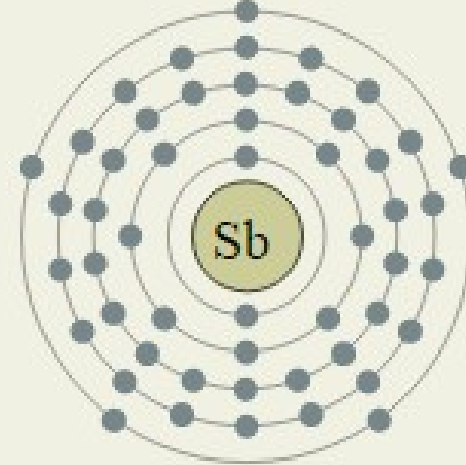
14 SILICO



4 Electrones en la ultima capa

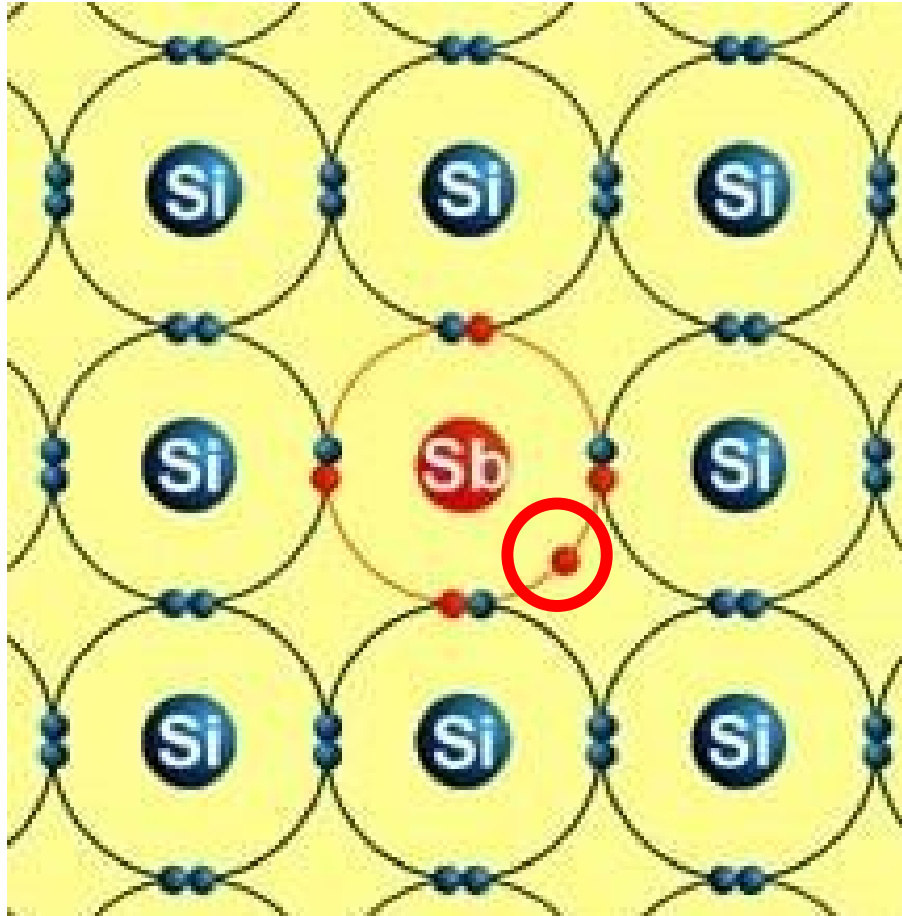
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51 ANTIMONIO



5 Electrones en la ultima capa

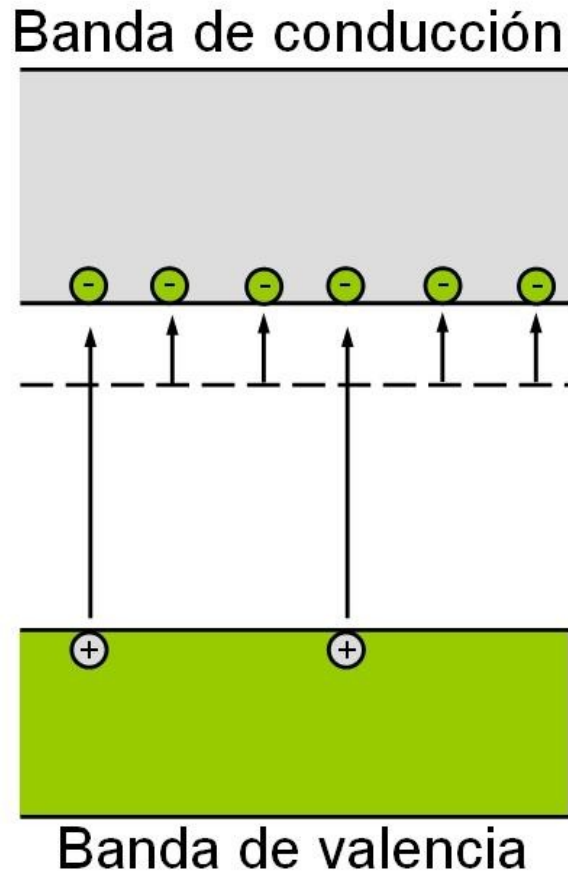
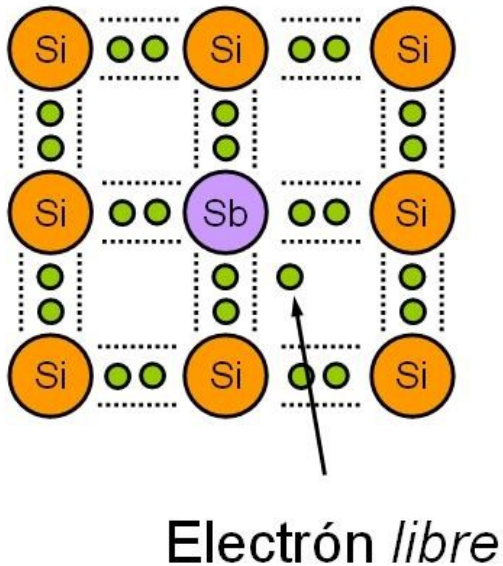
SEMICONDUCTOR Tipo N



Un electrón libre >

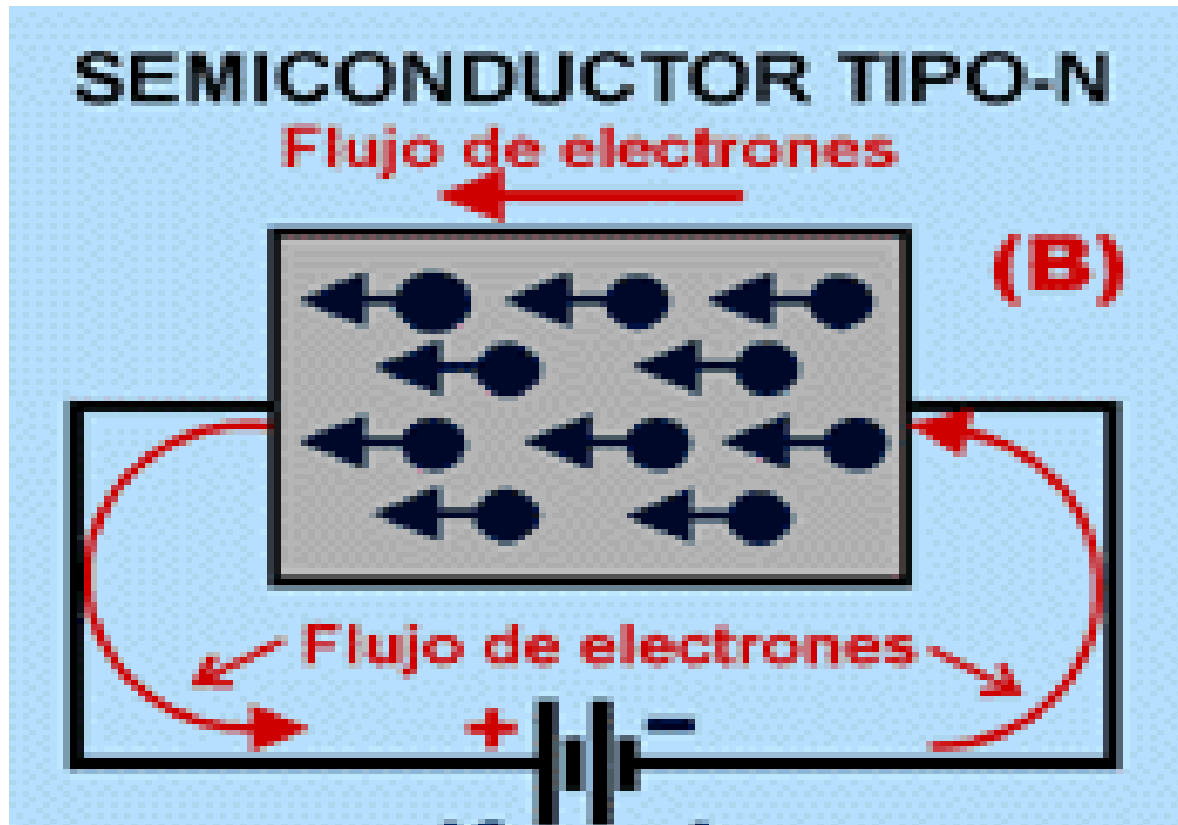
Fuente: www.asifunciona.com

SEMICONDUCTOR Tipo N



Fuente: <https://thetuzaro.wordpress.com/>

Semiconductor tipo N



Fuente: www.asifunciona.com

DOPADO



IIIa

IVa

Va

VIa

VIIa

4.22	31.8
0.93	1s

5 10,811 B Boro 3 2.34 1.026 2365 2.04 4275 801 0.82 4.6 [He]2s ² 2p ¹	6 12,0107 C Carbono 4 -4.24 0.710 2.26 2.55 4100 1087 5100 4.6 0.77 [He]2s ² 2p ²	7 14,00674 N Nitrógeno 5 -3.2.3.4.5 1.04 1.251 3.04 63.15 1402 77.35 17.3 0.75 [He]2s ² 2p ³	8 15,9994 O Oxígeno 6 -2 0.92 1.429 3.44 54.8 1314 90.18 14.0 0.73 [He]2s ² 2p ⁴	9 18,998403 F Flúor 7 -1 0.824 1.696 3.98 53.48 1681 84.95 17.1 0.72 [He]2s ² 2p ⁵	10 20,1797 Ne Neón 8 - 1.03 0.900 - 24.55 2081 27.1 16.7 0.71 [He]2s ² 2p ⁶
13 26,981538 Al Aluminio 3 2.70 0.904 933.5 1.61 2793 578 1.18 10.0 [Ne]3s ² 3p ¹	14 28,0855 Si Silicio 4 1.3.4.5 0.712 2.33 1.9 1683 787 3540 12.1 1.11 [Ne]3s ² 3p ²	15 30,973761 P Fósforo 5 -1.3.4.5 0.770 1.82 2.19 317.3 1012 260 17.0 1.06 [Ne]3s ² 3p ³	16 32,066 S Azufre 6 -2.2.4.6 0.705 2.07 2.58 388.4 1000 717.8 15.5 1.02 [Ne]3s ² 3p ⁴	17 35,4527 Cl Cloro 7 -1.1.3.5.7 0.478 3.214 3.16 172.2 1251 239.1 18.7 0.99 [Ne]3s ² 3p ⁵	18 39,948 Ar Argón 8 - 0.52 1.784 - 83.8 1521 87.3 24.2 0.98 [Ne]3s ² 3p ⁶
31 69,723 Ga Galio 3 5.91 0.371 302.9 1.81 2478 579 1.26 11.8 [Ar]3d ¹⁰ 4s ² 4p ¹	32 72,61 Ge Germanio 4 5.32 0.322 1211.5 2.01 3107 762 1.22 13.6 [Ar]3d ¹⁰ 4s ² 4p ²	33 74,92160 As Arsénico 5 -3.3.5 0.328 5.72 2.18 1090 (36Atm) 947 886 (Sublim) 13.1 1.20 [Ar]3d ¹⁰ 4s ² 4p ³	34 78,96 Se Selenio 6 -2.4.6 0.321 4.79 2.55 494 941 958 16.5 1.16 [Ar]3d ¹⁰ 4s ² 4p ⁴	35 79,904 Br Bromo 7 -1.1.5 0.473 3.12 2.96 265.9 1140 332.2 23.5 1.14 [Ar]3d ¹⁰ 4s ² 4p ⁵	36 83,8 Kr Kriptón 8 - 0.248 3.7 - 115.8 1351 119.8 32.2 1.12 [Ar]3d ¹⁰ 4s ² 4p ⁶
49 114,818 In Indio 3 7.31 0.233 429.8 1.78 2346 558 1.44 15.7 [Kr]4d ¹⁰ 5s ² 5p ¹	50 118,71 Sn Estaño 4 7.31 0.228 505.1 1.96 2876 709 1.41 16.3 [Kr]4d ¹⁰ 5s ² 5p ²	51 121,760 Sb Antimonio 5 -3.3.5 0.207 6.69 2.05 904 834 1860 18.4 1.40 [Kr]4d ¹⁰ 5s ² 5p ³	52 127,60 Te Teluro 6 -2.4.6 0.201 6.24 2.1 722.7 869 1261 20.5 1.36 [Kr]4d ¹⁰ 5s ² 5p ⁴	53 126,90447 I Yodo 7 -1.1.5.7 0.214 4.93 2.66 386.7 1008 458.4 25.7 1.33 [Kr]4d ¹⁰ 5s ² 5p ⁵	54 131,29 Xe Xenón 8 - 0.158 5.9 2.6 161.4 1170 165.1 42.9 1.31 [Kr]4d ¹⁰ 5s ² 5p ⁶

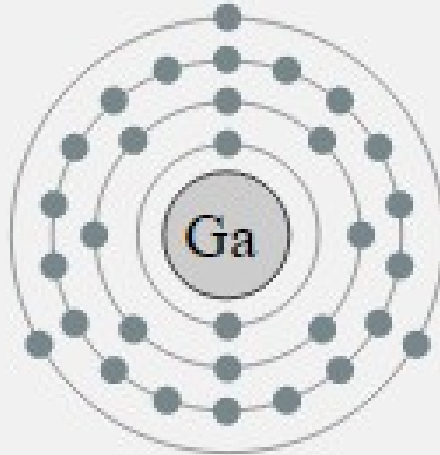
V

Dopado o Metalización



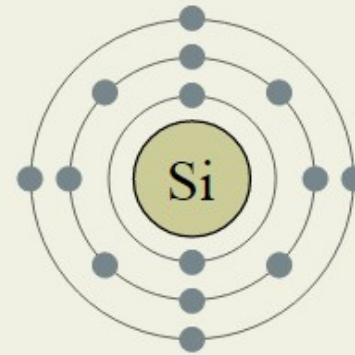
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31 GALIO



3 Electrones en la ultima capa

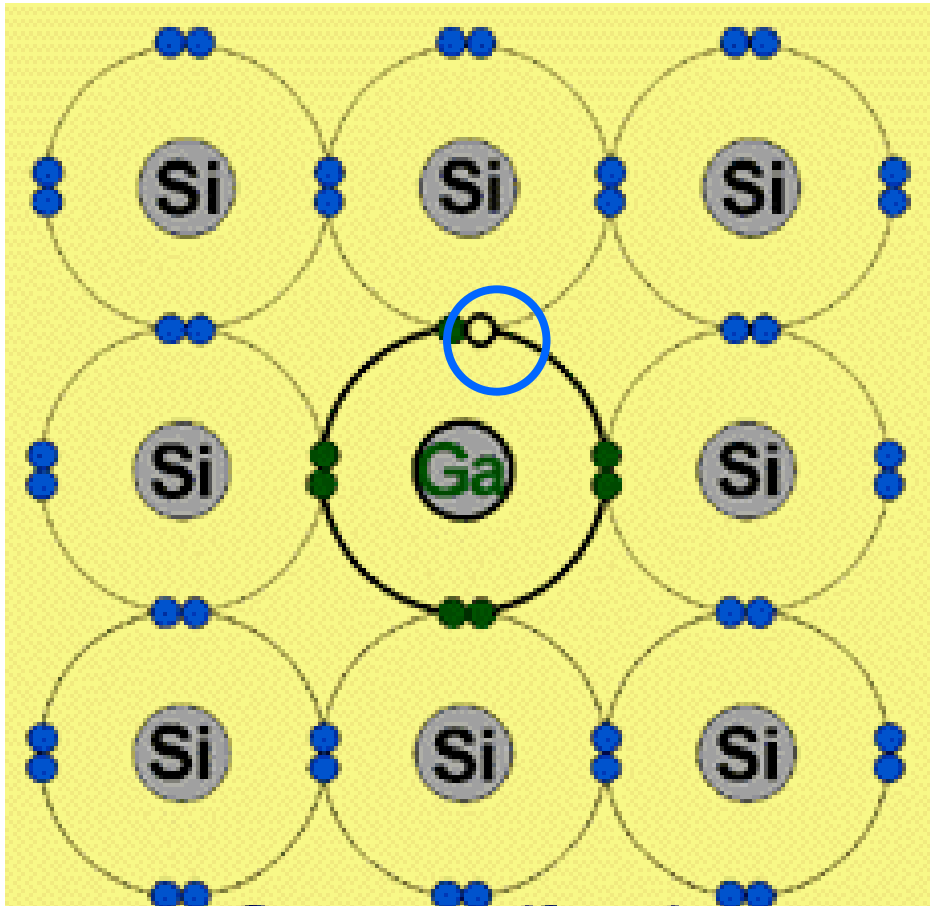
14 SILICO



4 Electrones en la ultima capa

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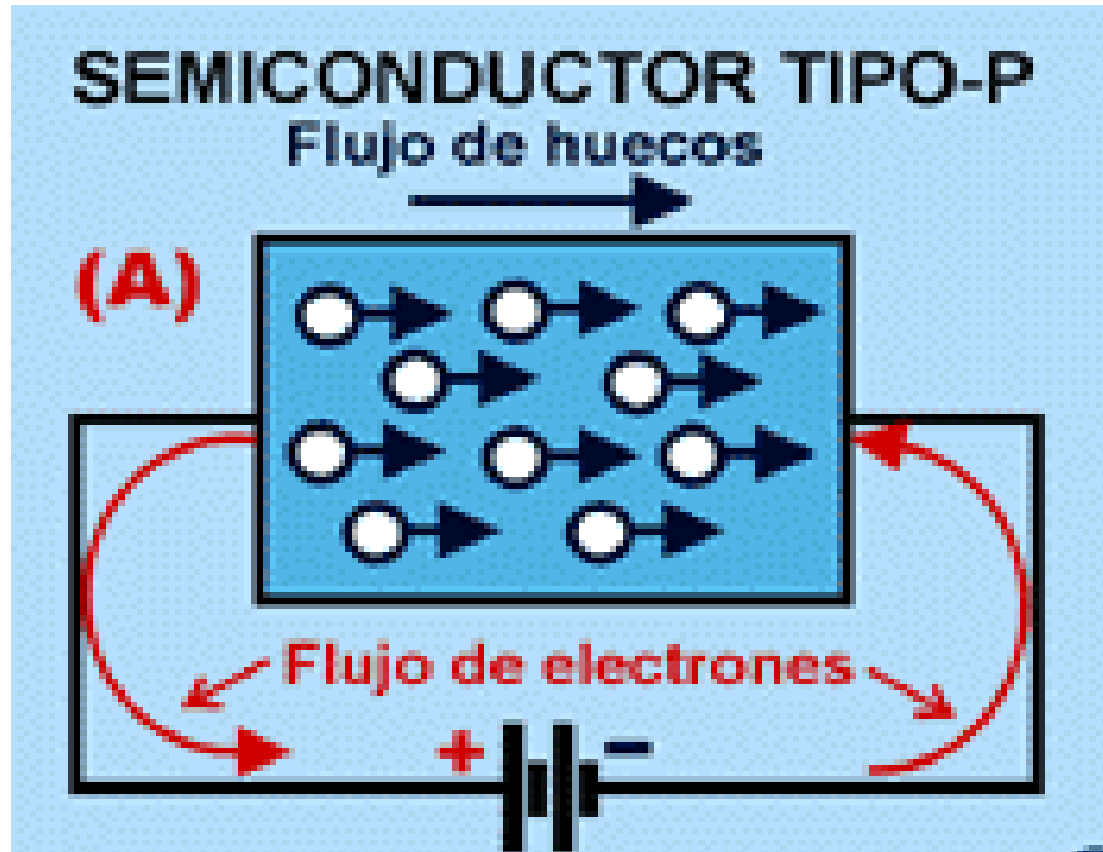
SEMICONDUCTOR Tipo P



Falta un electrón,
hueco (laguna) >

Fuente: www.asifunciona.com

Semiconductor tipo P

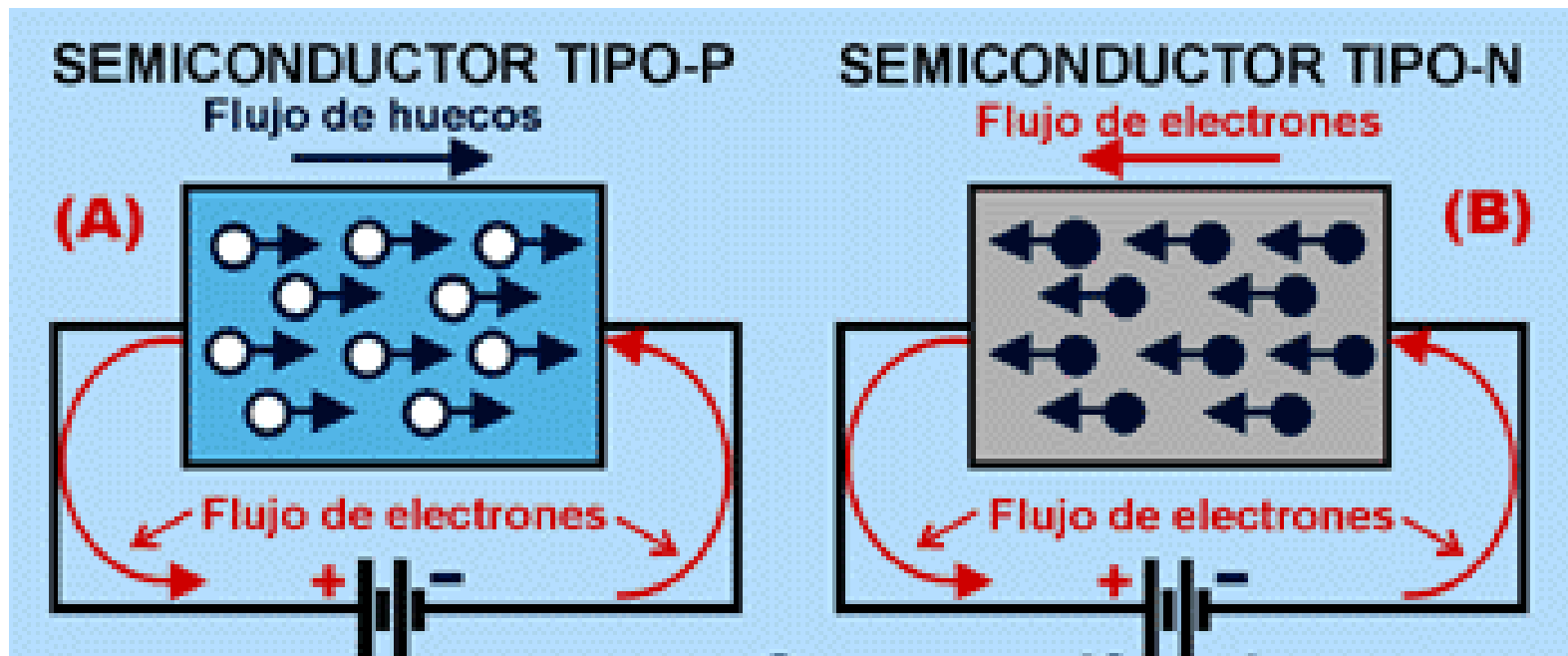


Fuente: www.asifunciona.com

Conducción en Materiales

SEMICONDUCTORES

Extrínsecos



Fuente: www.asifunciona.com

CONDUCCION DE MATERIAL SEMICONDUCTOR EXTRINSECO (Metalizado)



FIN

