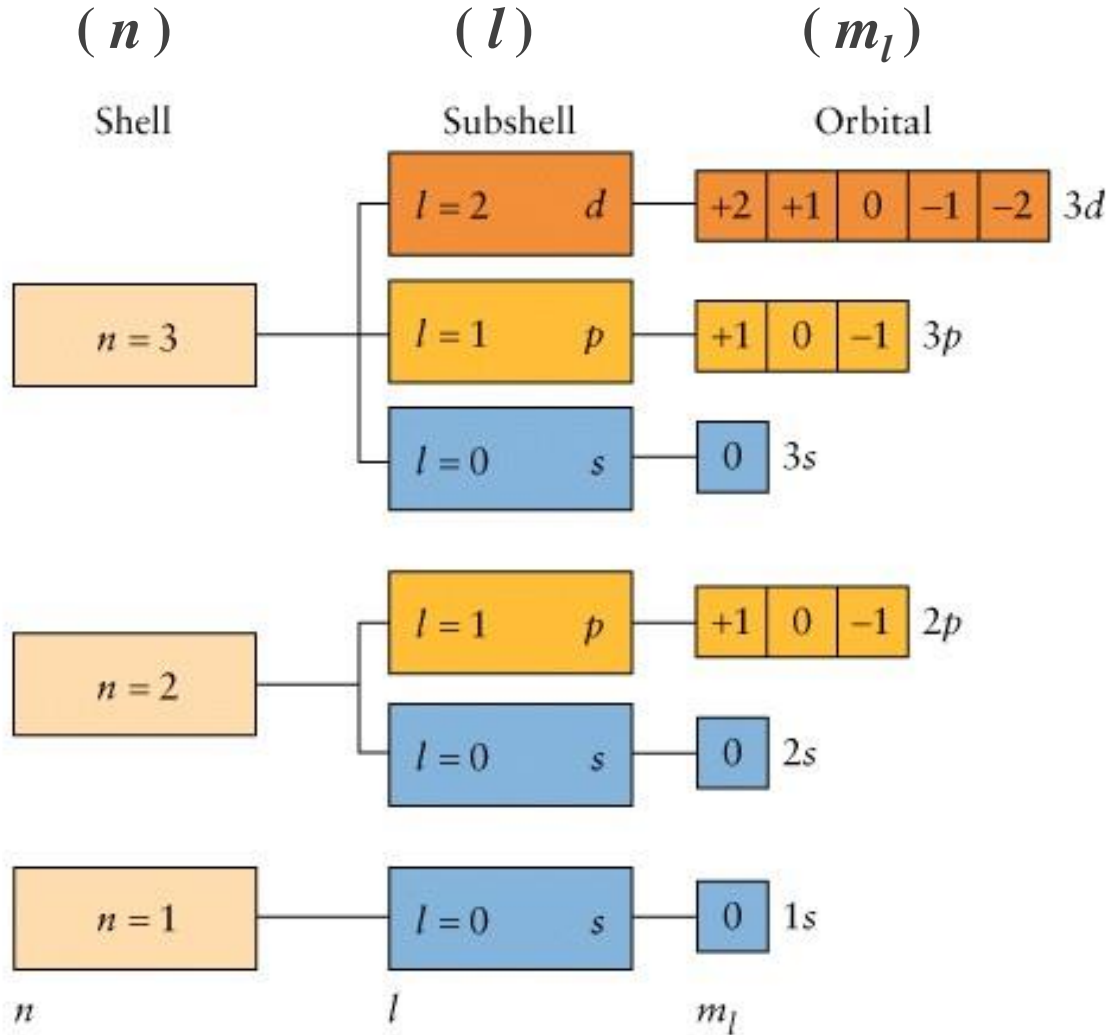
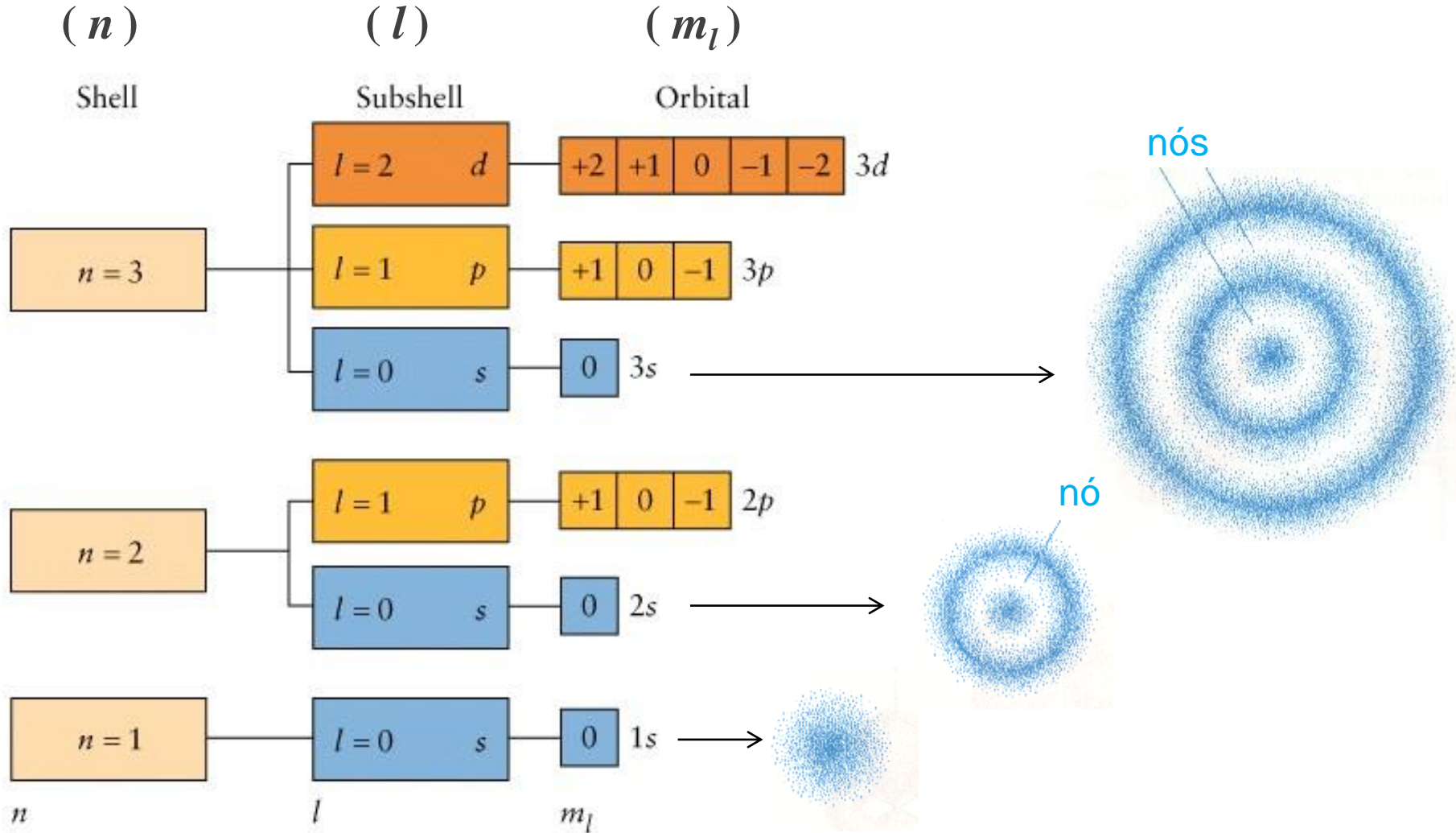


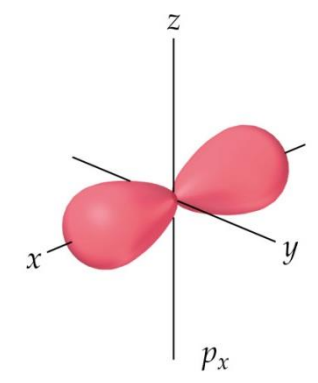
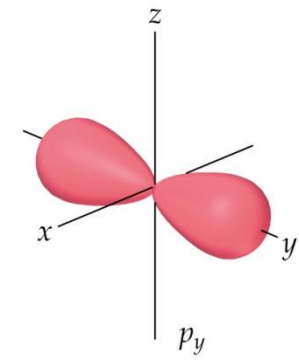
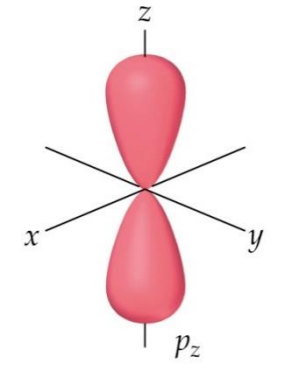
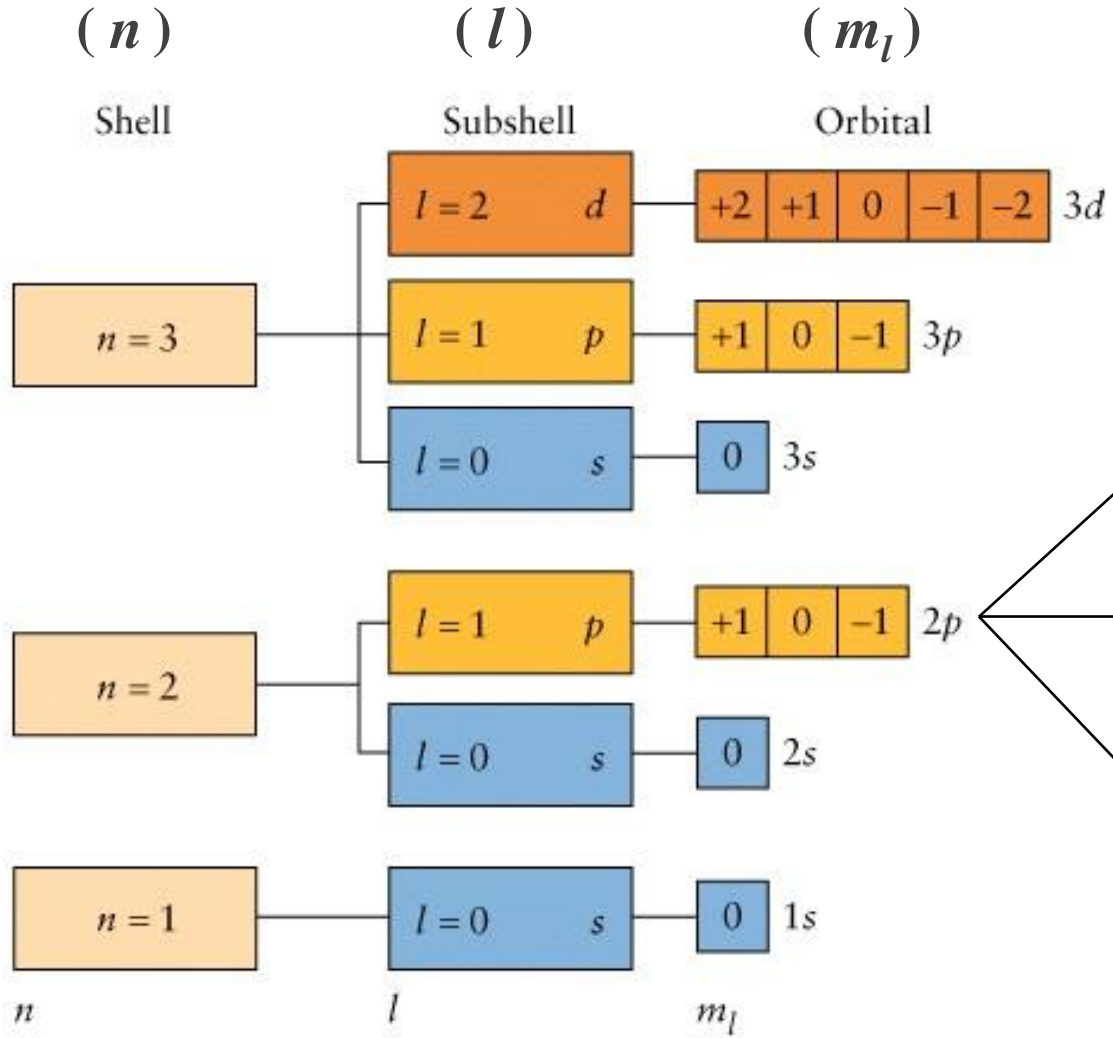
Resumo do arranjo em camadas, sub-camadas e orbitais



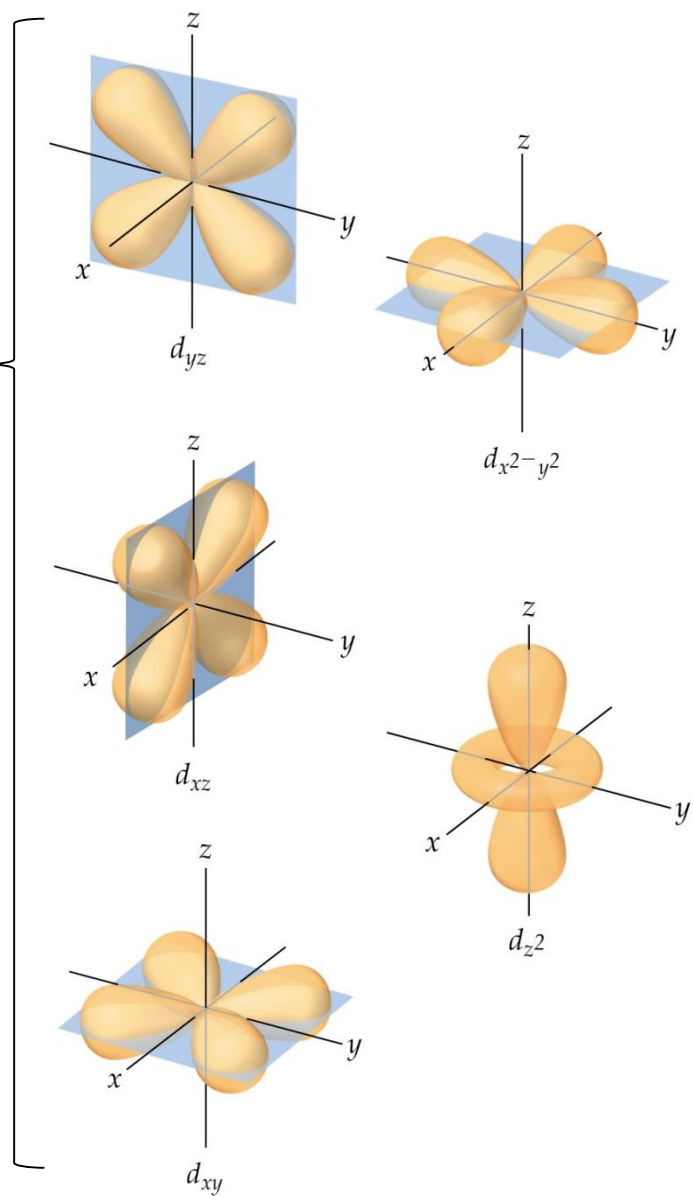
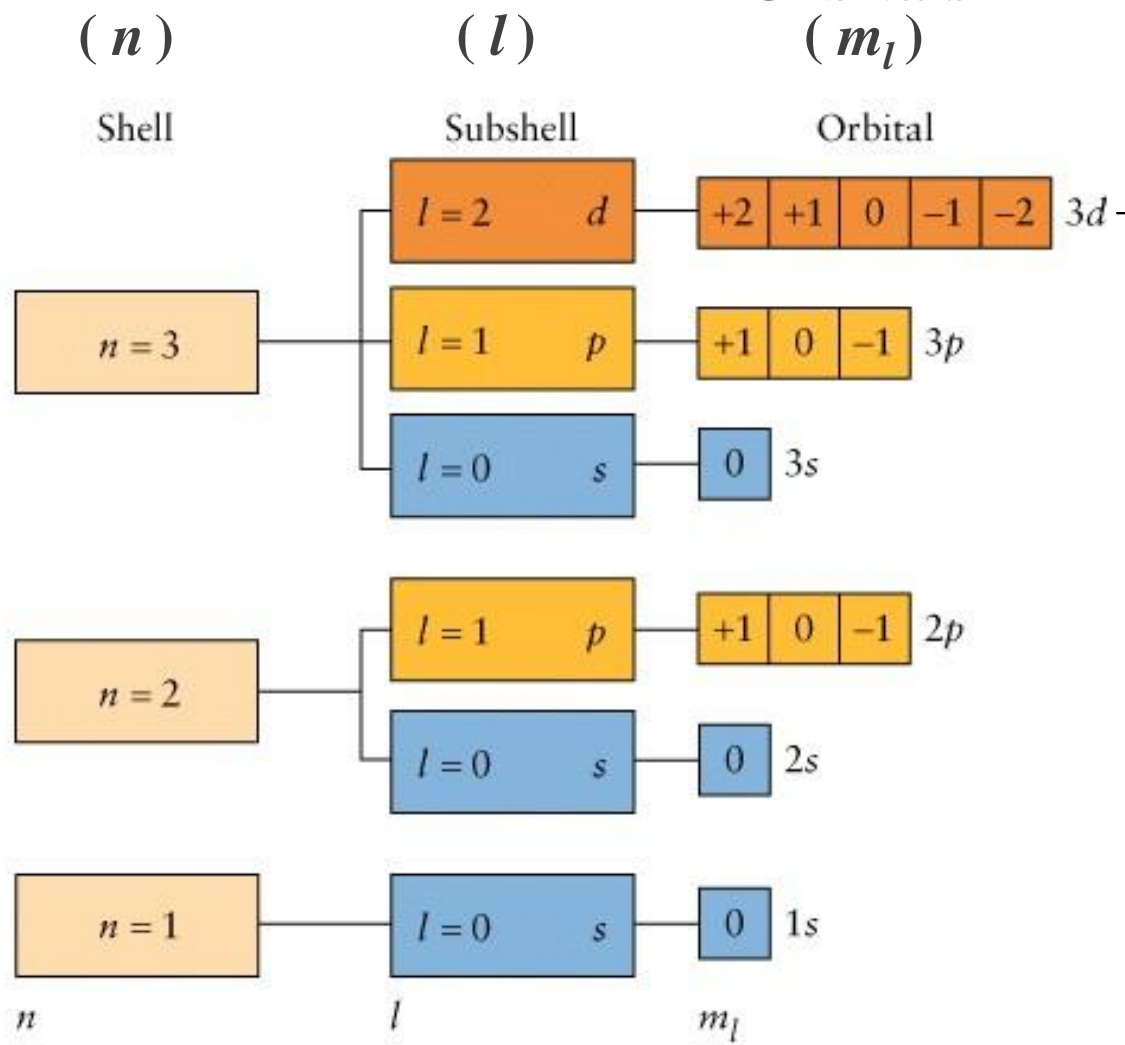
Orbitais



Orbitals

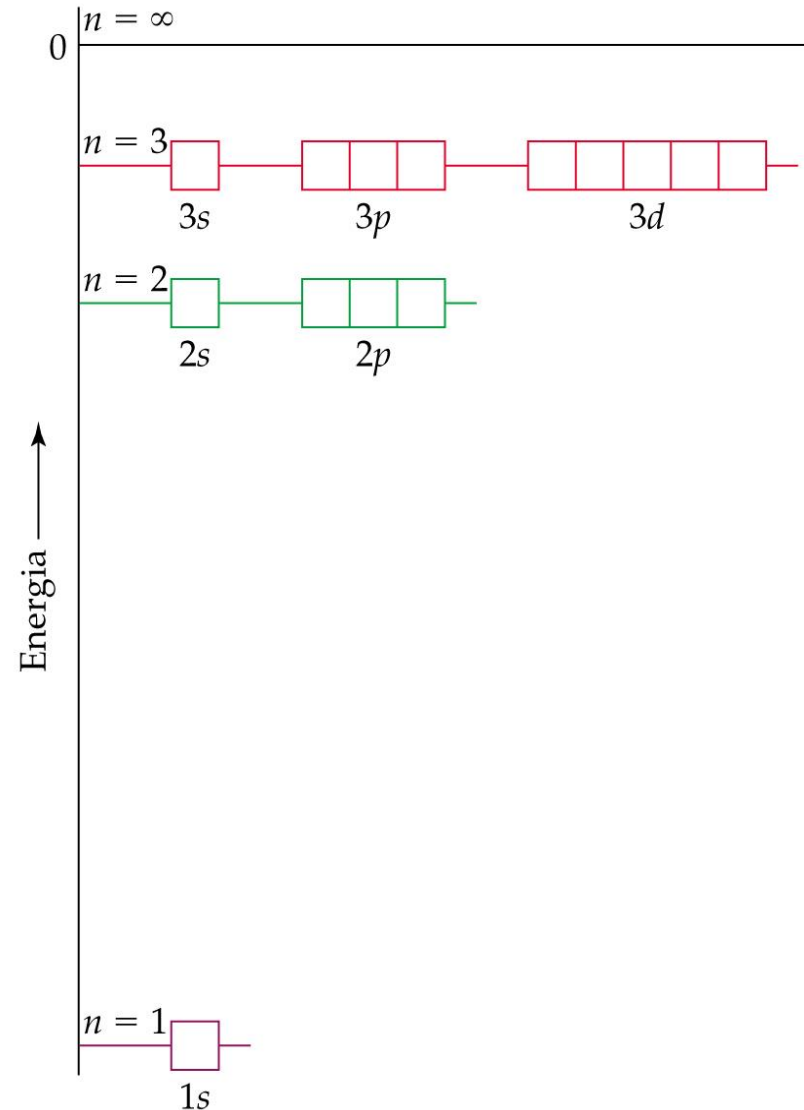


Orbitals



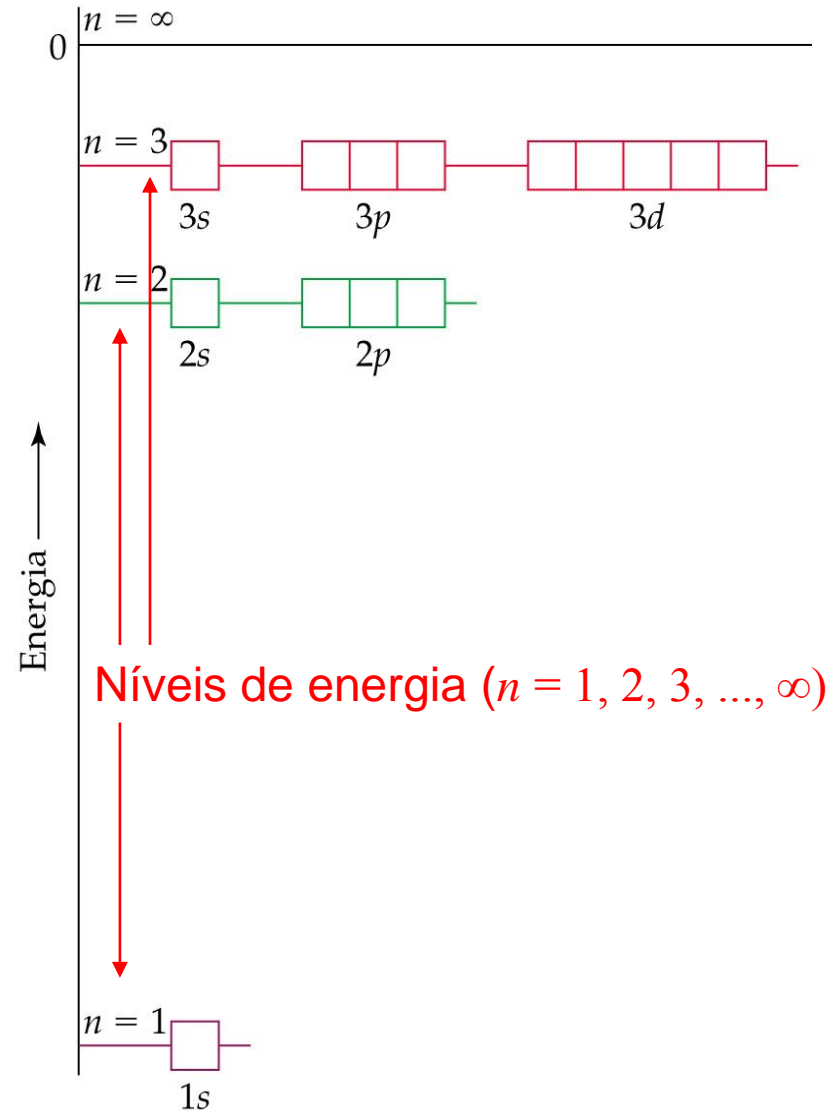
Orbitais e números quânticos

- Os orbitais podem ser classificados em termos de energia para produzir um **diagrama de Aufbau**.
- Esse diagrama de Aufbau é para um **um só elétron**.
- À medida que n aumenta, o espaçamento entre os níveis de energia torna-se menor.



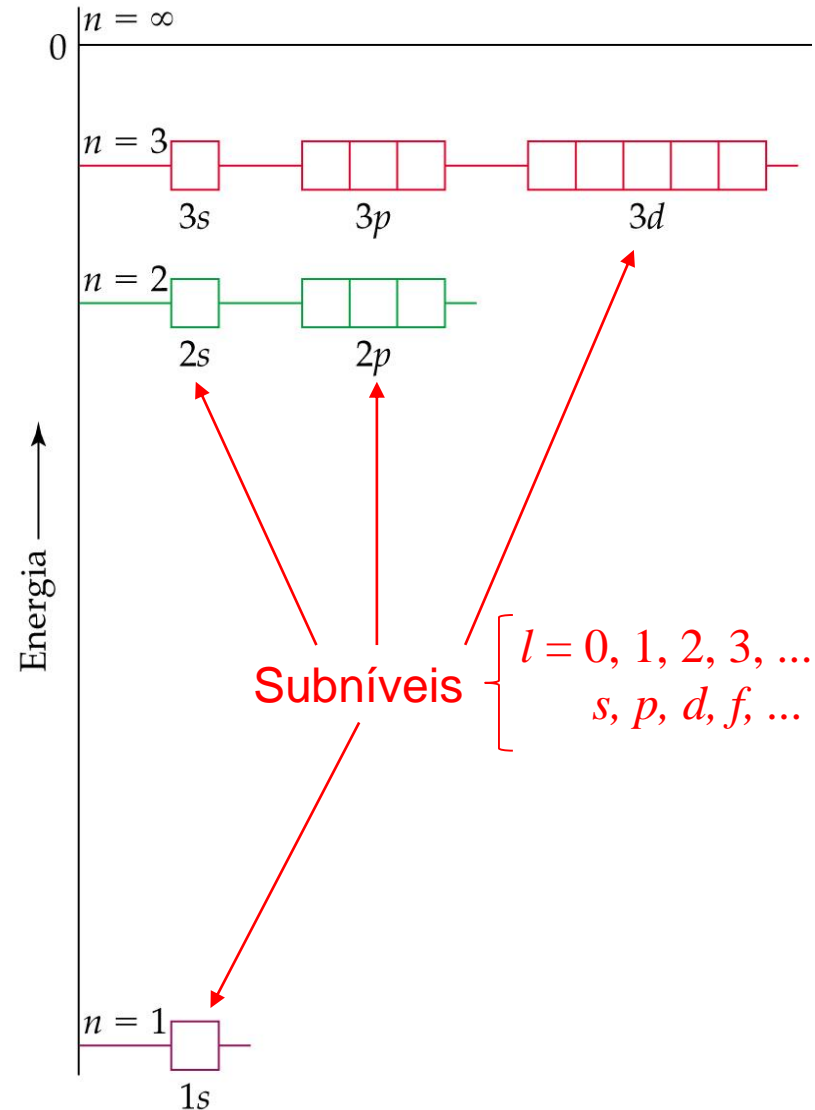
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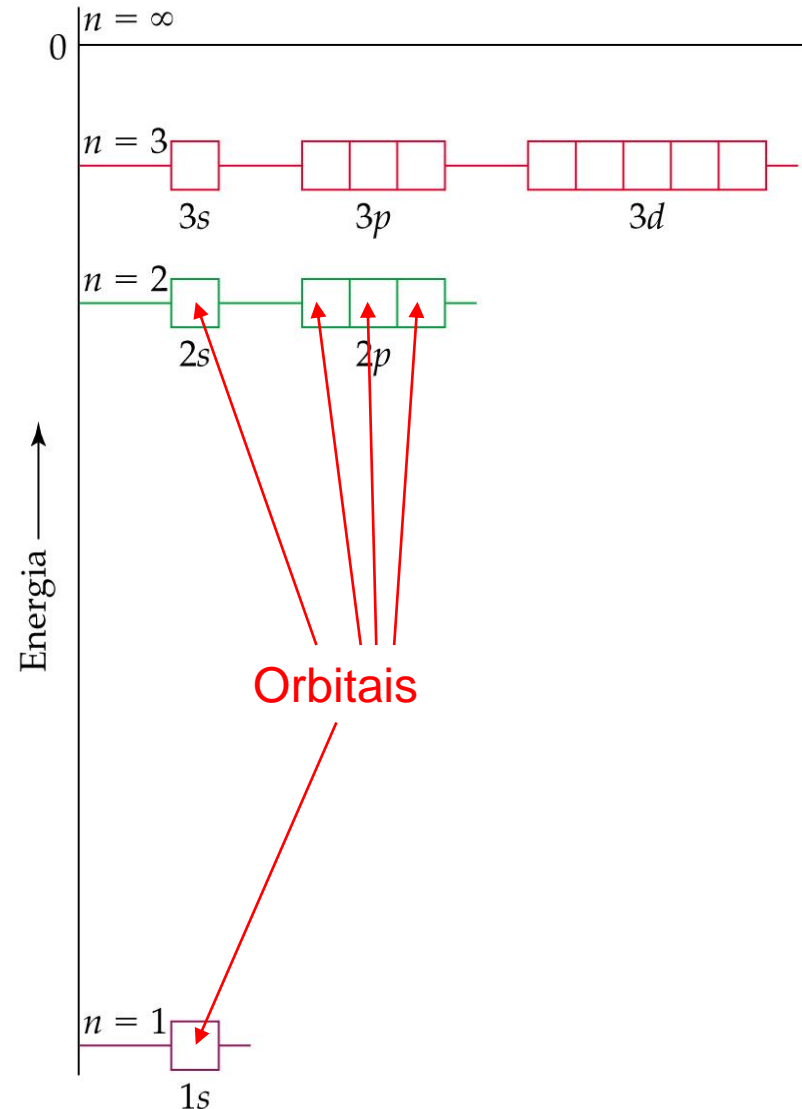
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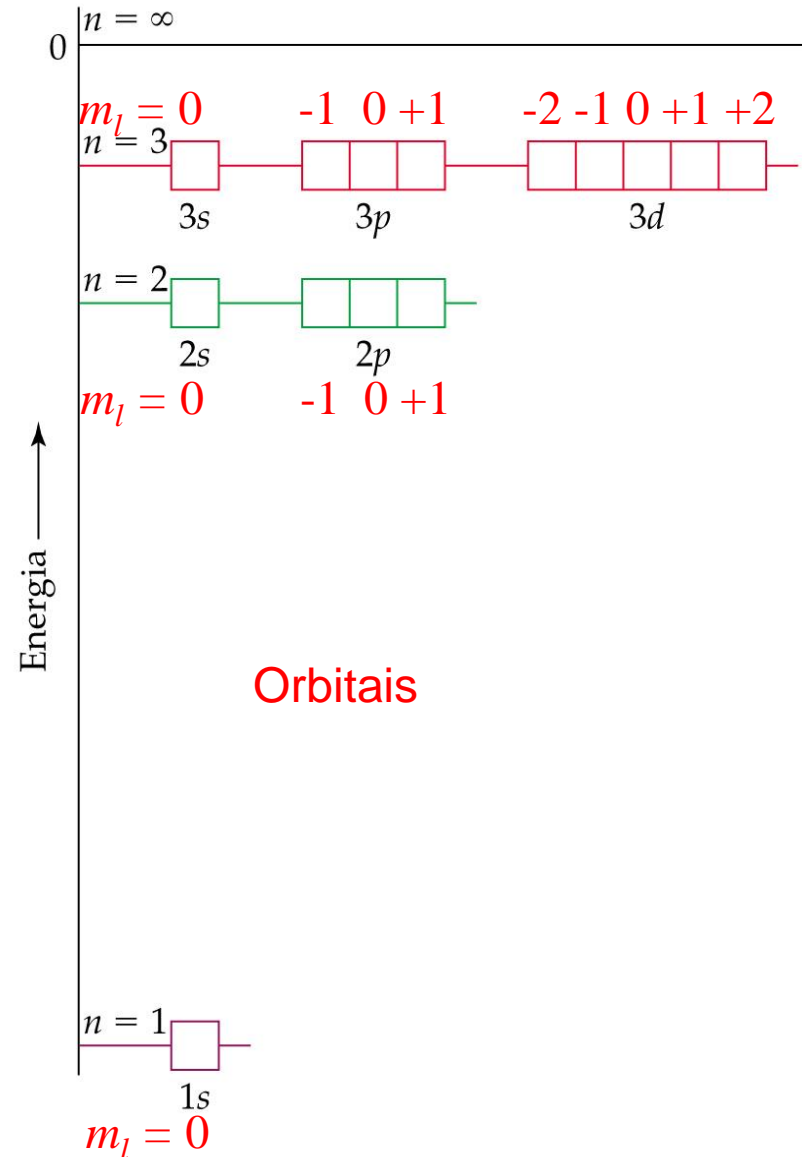
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Orbitais e números quânticos

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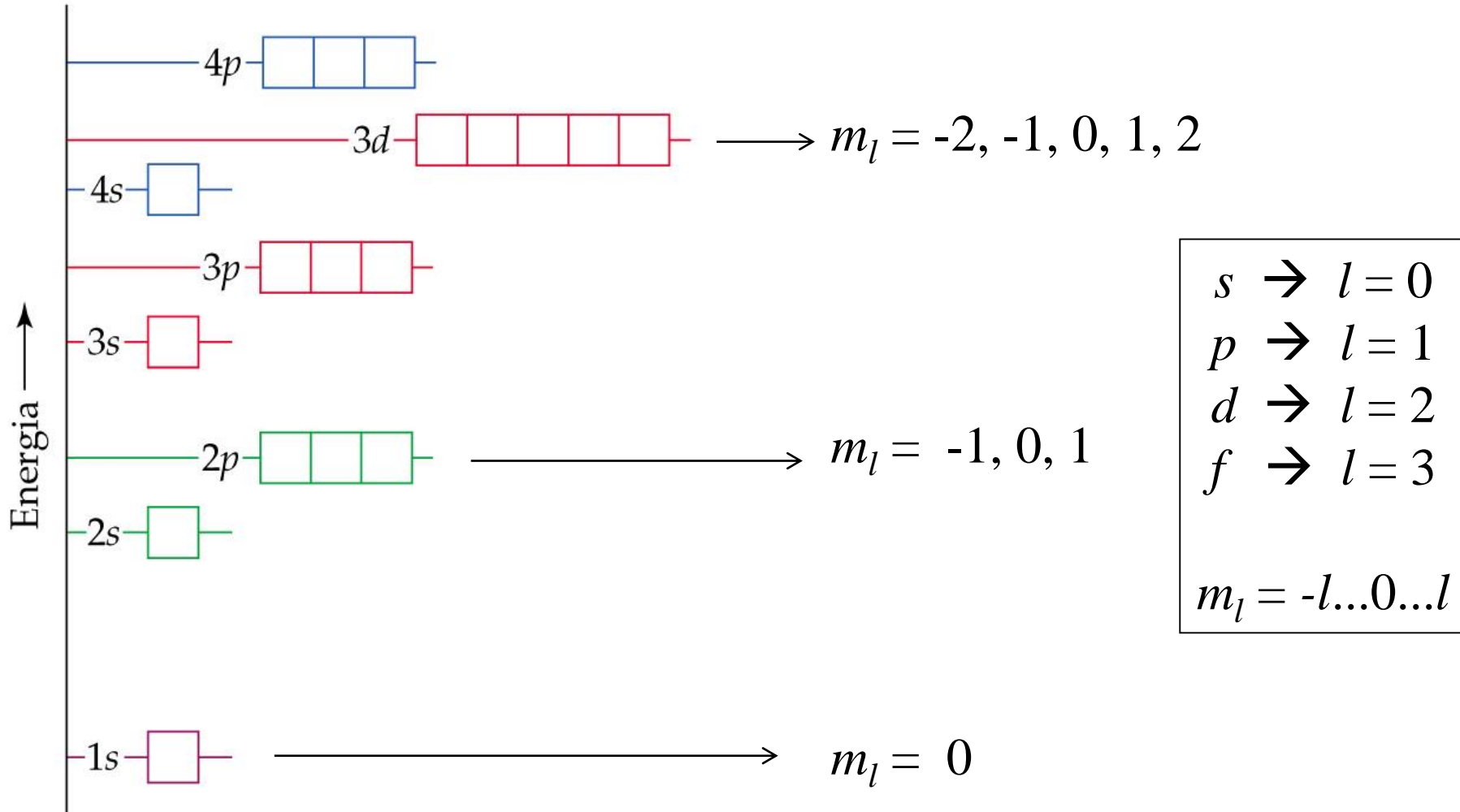
Átomos polieletrônicos

Orbitais e suas energias

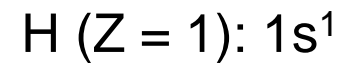
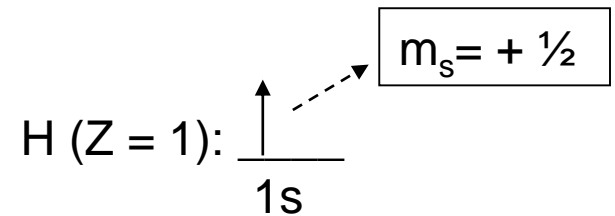
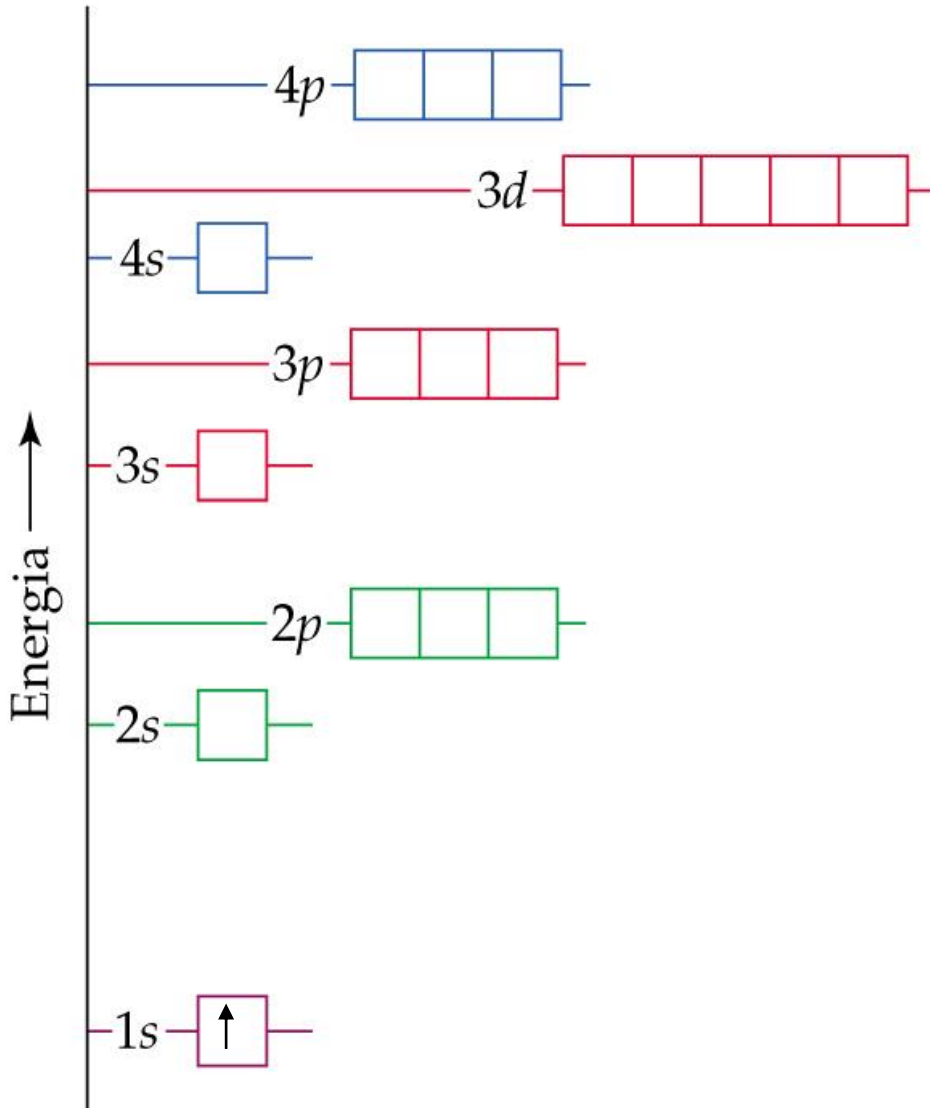
- Orbitais de mesma energia são conhecidos como degenerados.
- Para elementos com mais de um elétron, os orbitais s , p , d e f não são mais degenerados porque os elétrons interagem entre si.
- Portanto, o diagrama de Aufbau apresenta-se ligeiramente diferente para sistemas com muitos elétrons.

Átomos polieletrônicos

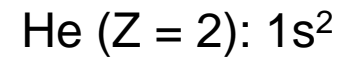
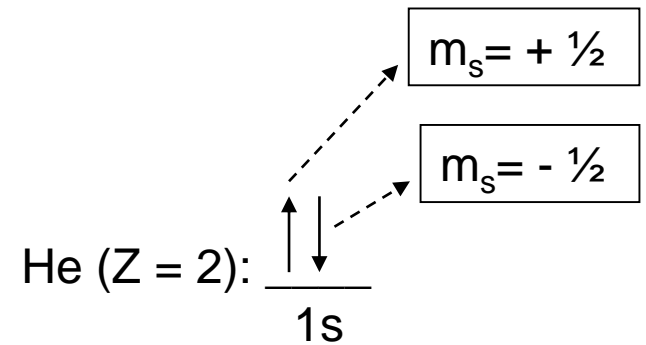
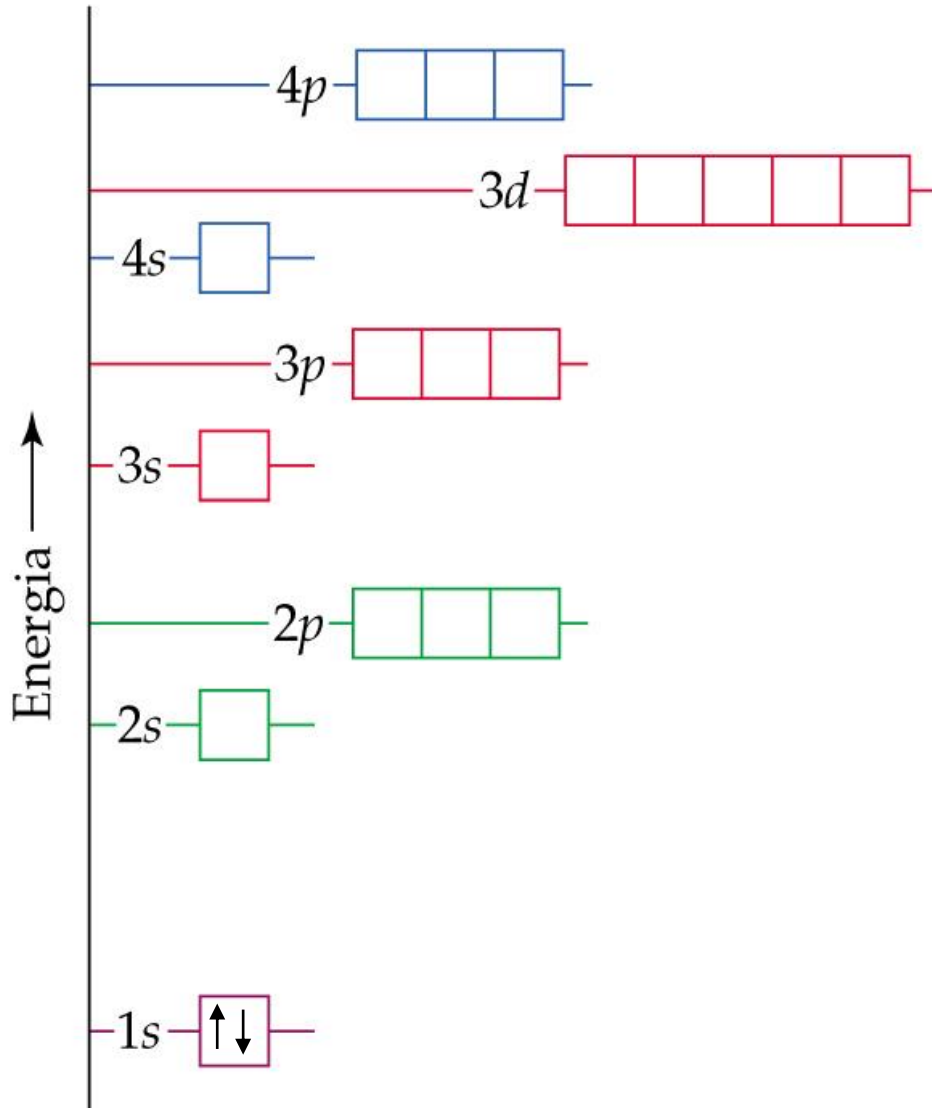
Orbitais e suas energias



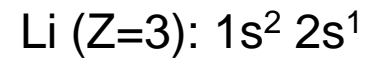
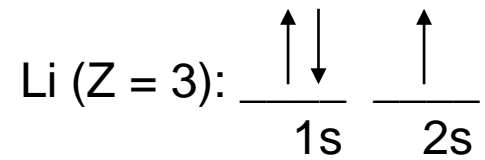
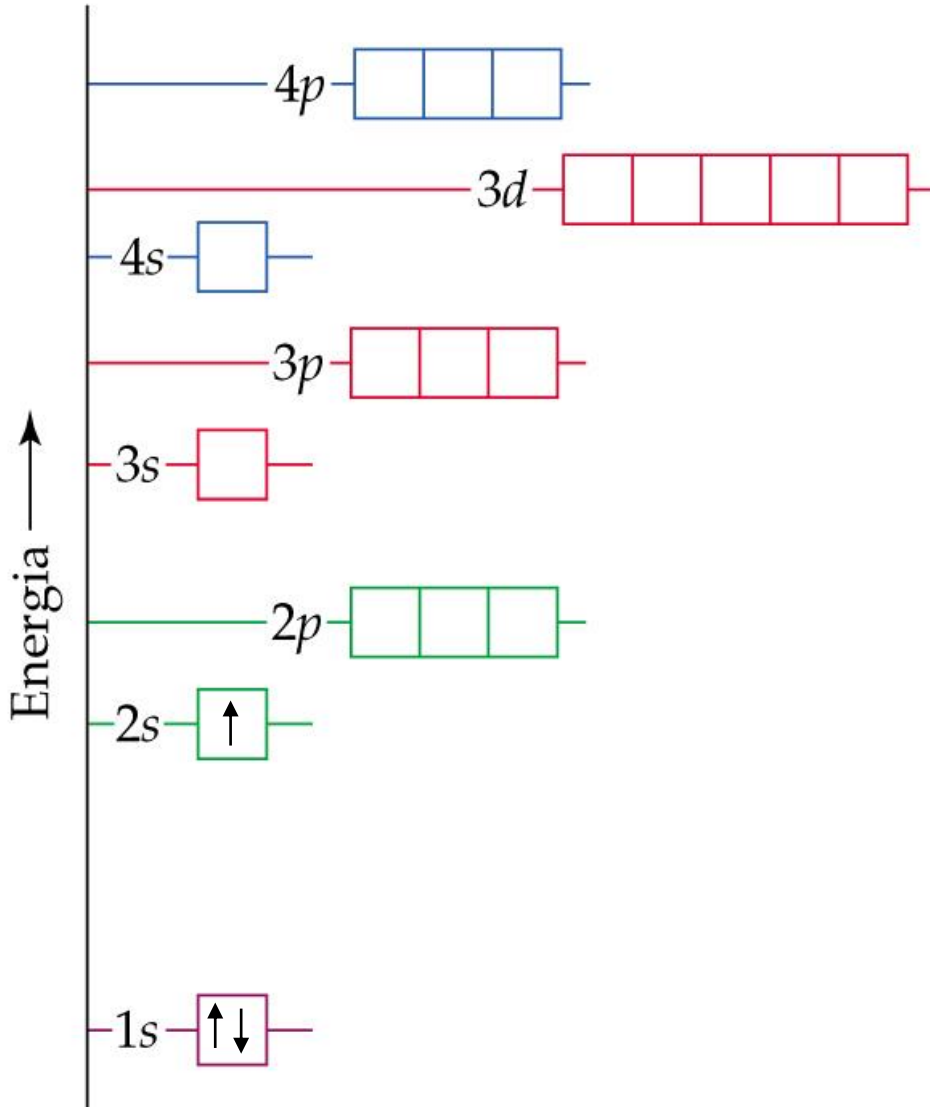
Configurações eletrônicas no estado fundamental



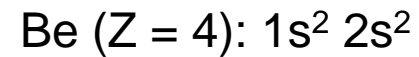
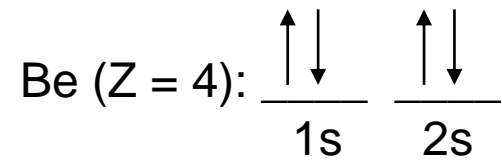
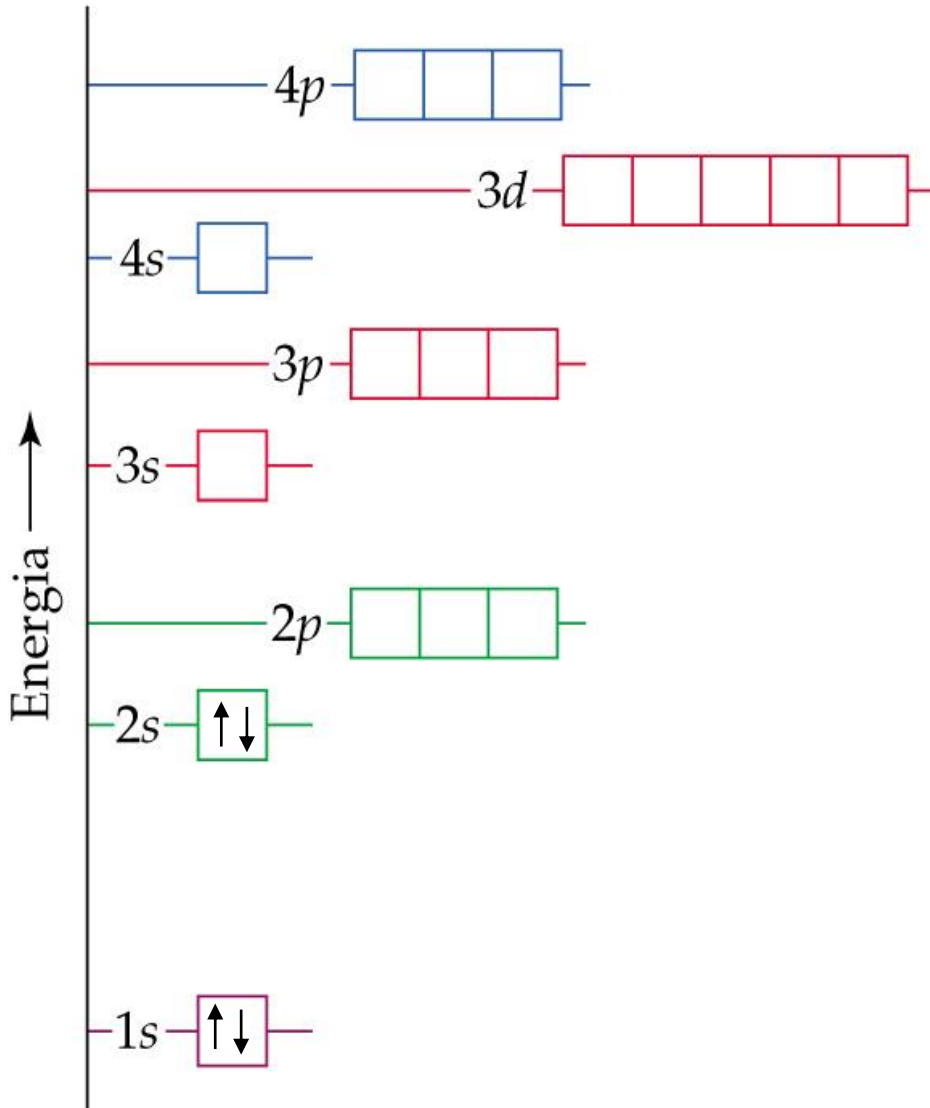
Configurações eletrônicas no estado fundamental



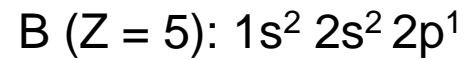
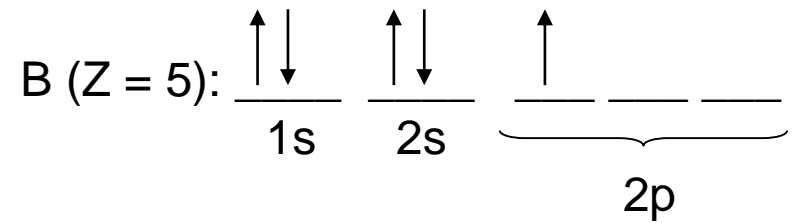
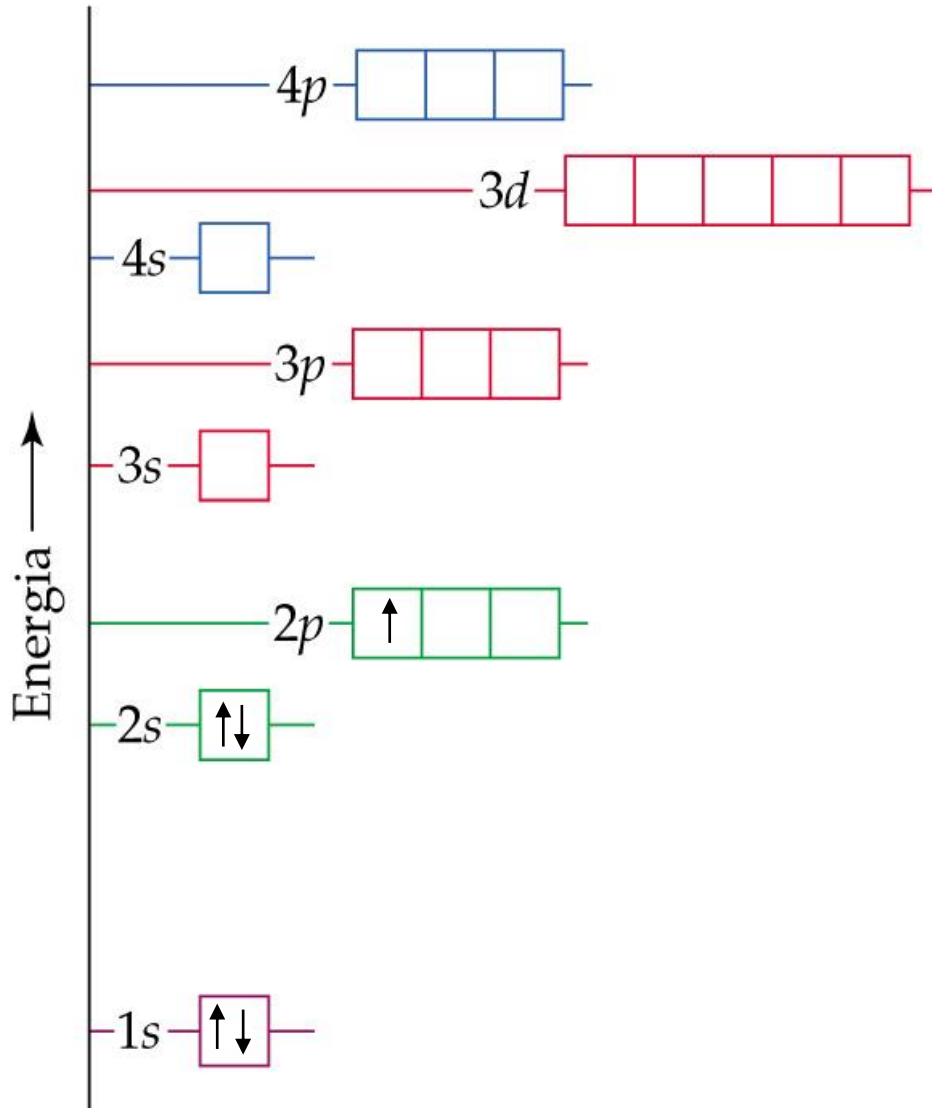
Configurações eletrônicas no estado fundamental



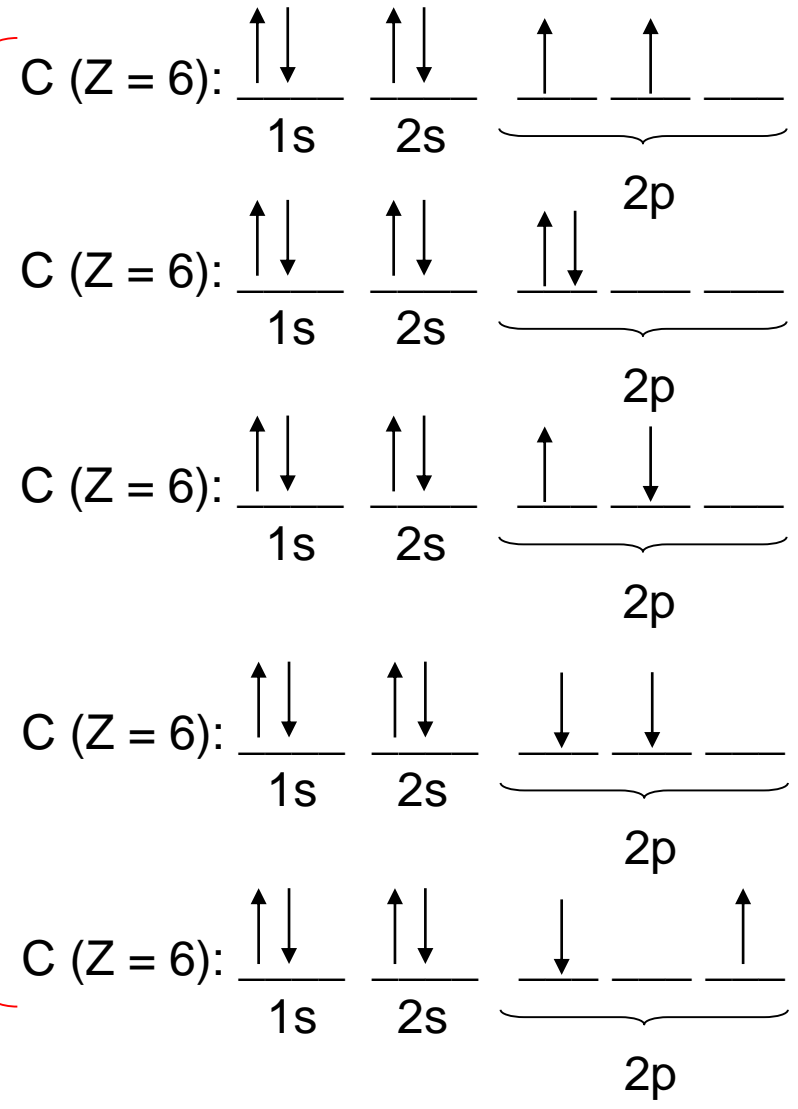
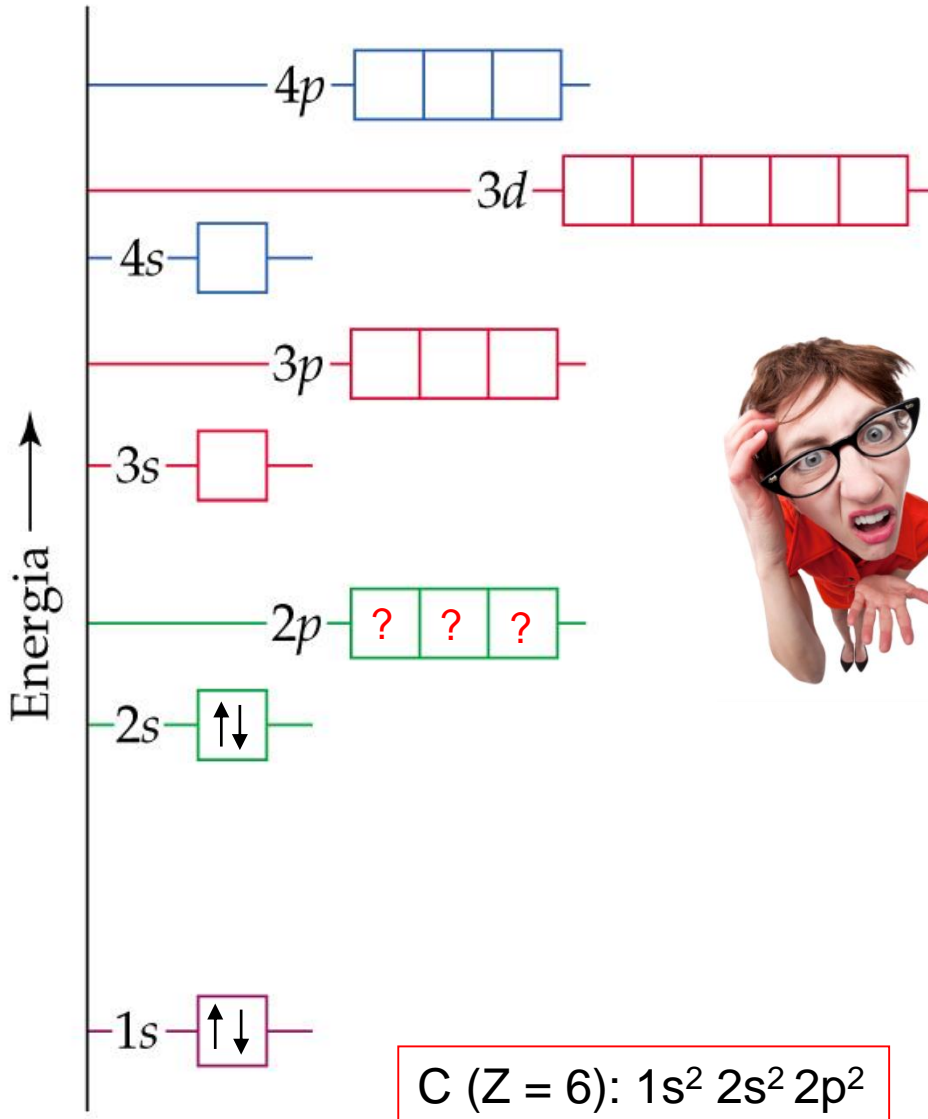
Configurações eletrônicas no estado fundamental



Configurações eletrônicas no estado fundamental



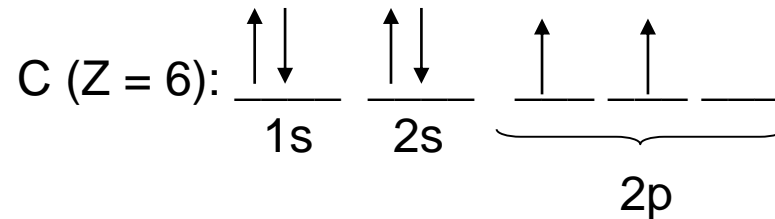
Configurações eletrônicas no estado fundamental



Configurações eletrônicas no estado fundamental

Regra de Hund:

Os elétrons numa mesma subcamada tendem a permanecer desemparelhados (necessariamente em orbitais separados), com spins paralelos.



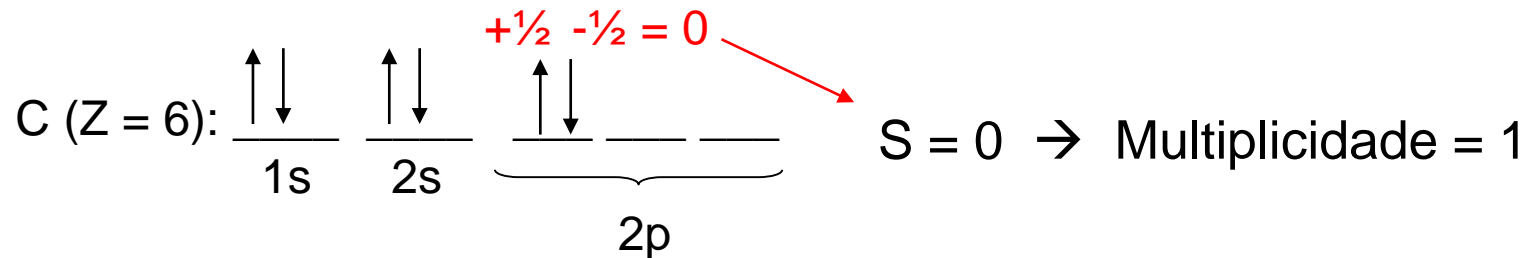
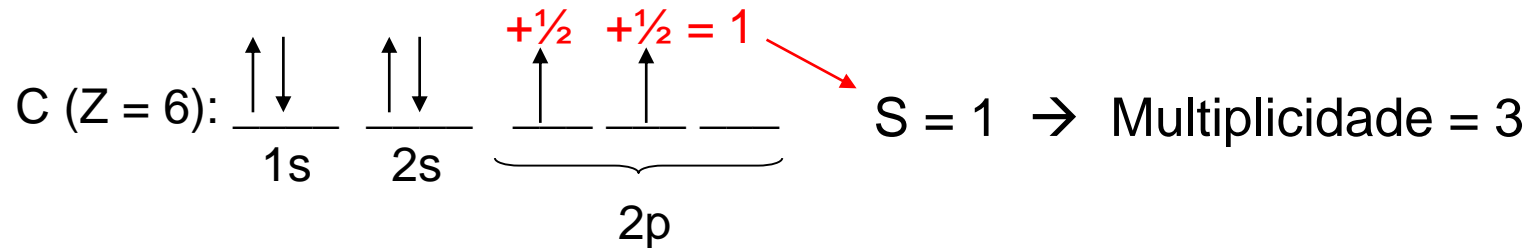
$$\text{Multiplicidade} = 2S+1 \rightarrow S = \sum m_s \quad (m_s = +\frac{1}{2} \text{ ou } -\frac{1}{2})$$

S =	0	1/2	1	1 1/2	2
Multiplicidade =	1	2	3	4	5

Configurações eletrônicas no estado fundamental

$$\text{Multiplicidade} = 2S+1 \rightarrow S = \sum m_s \quad (m_s = +\frac{1}{2} \text{ ou } -\frac{1}{2})$$

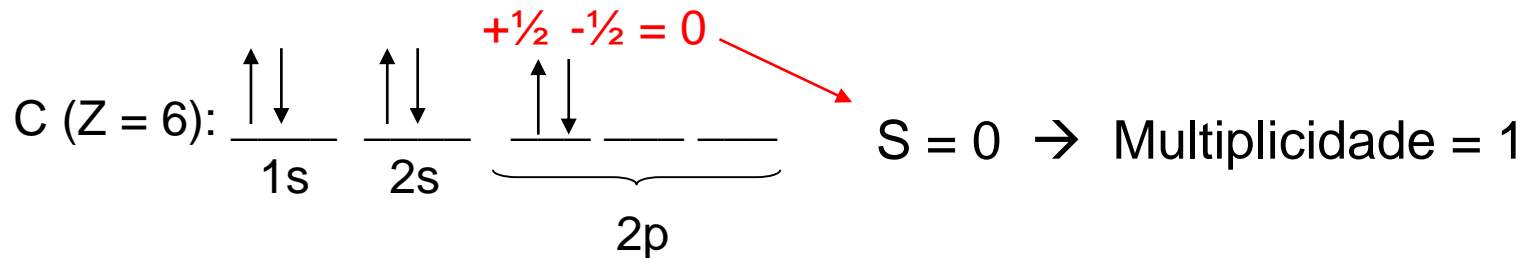
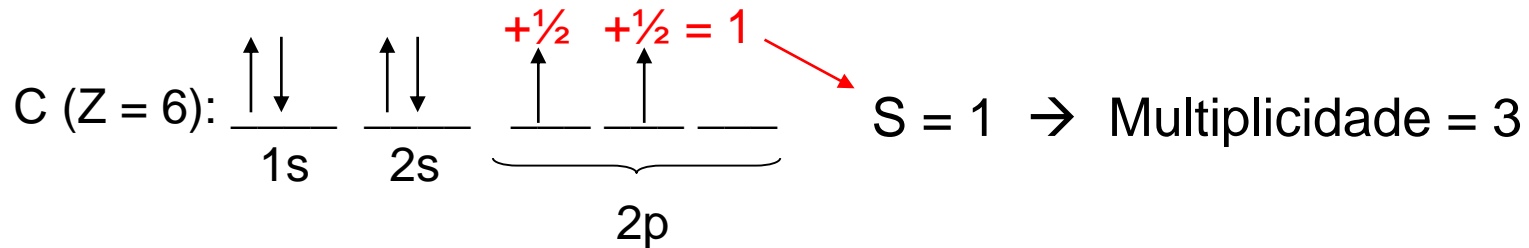
S =	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2
Multiplicidade =	1	2	3	4	5



Configurações eletrônicas no estado fundamental

$$\text{Multiplicidade} = 2S+1 \rightarrow S = \sum m_s \quad (m_s = +\frac{1}{2} \text{ ou } -\frac{1}{2})$$

S =	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2
Multiplicidade =	1	2	3	4	5

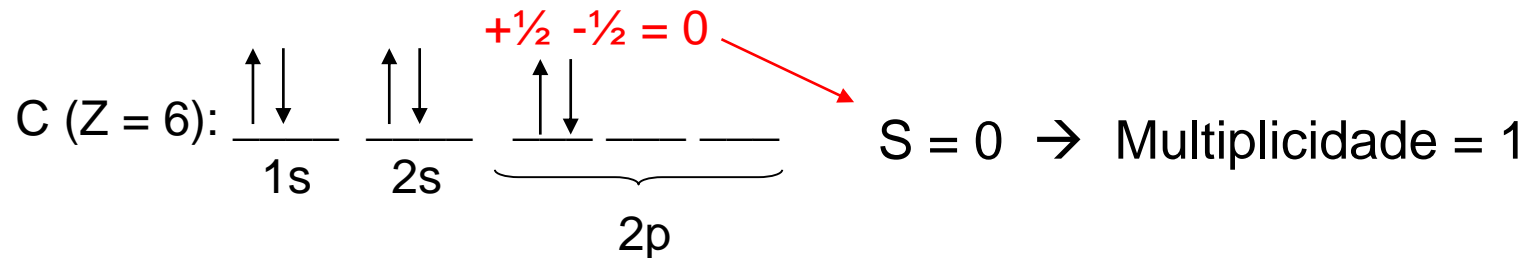
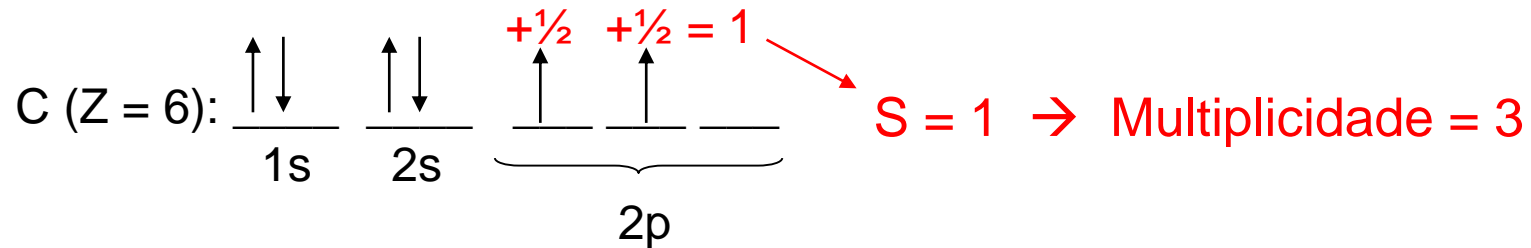


- Quanto maior a multiplicidade menor será a energia do estado.
- O estado fundamental será aquele que apresentar a maior multiplicidade entre todos os estados possíveis

Configurações eletrônicas no estado fundamental

$$\text{Multiplicidade} = 2S+1 \rightarrow S = \sum m_s \quad (m_s = +\frac{1}{2} \text{ ou } -\frac{1}{2})$$

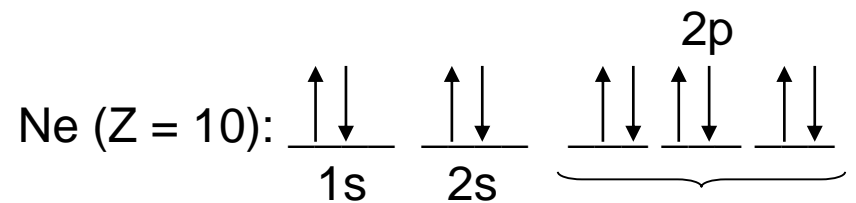
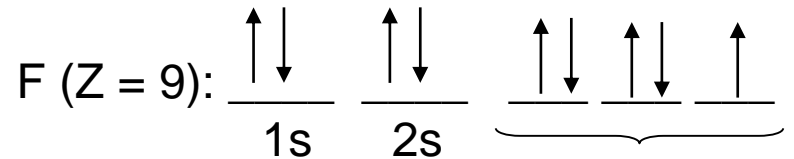
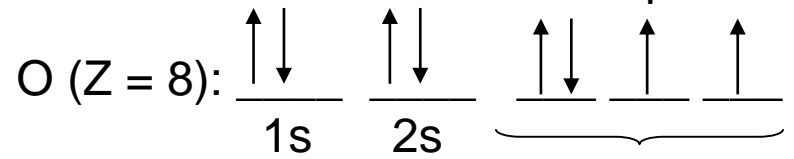
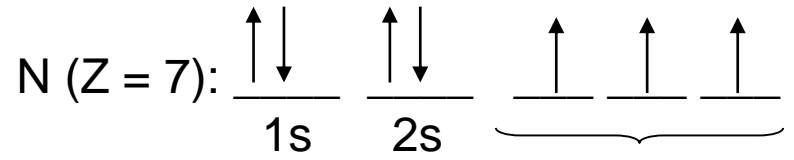
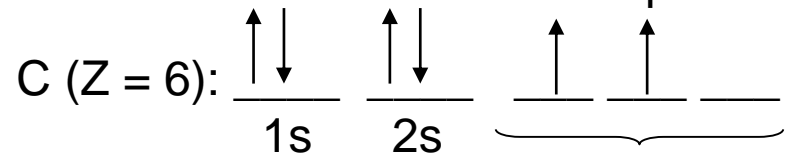
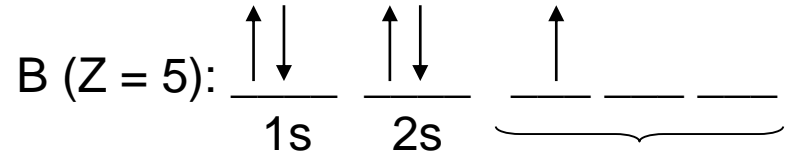
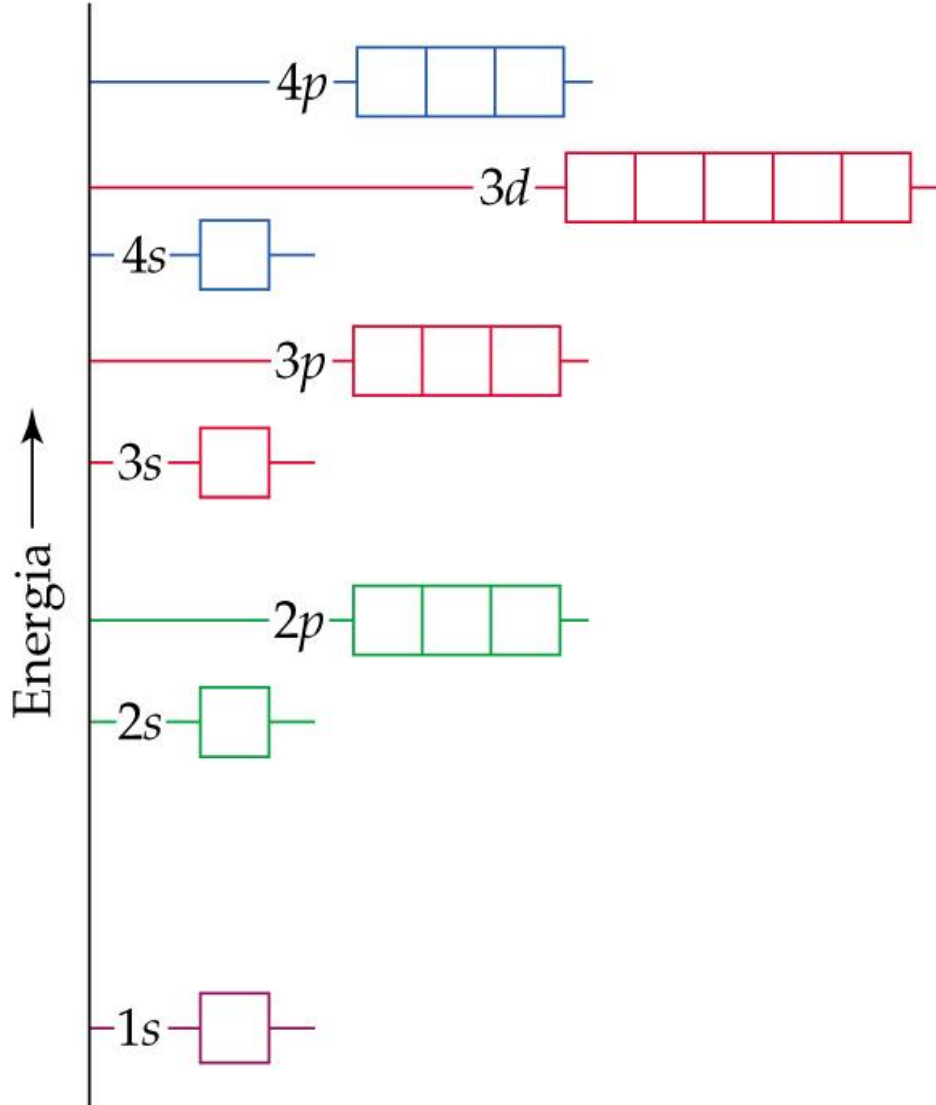
S =	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2
Multiplicidade =	1	2	3	4	5



- Quanto maior a multiplicidade menor será a energia do estado.

- O estado fundamental será aquele que apresentar a maior multiplicidade entre todos os estados possíveis

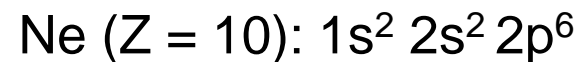
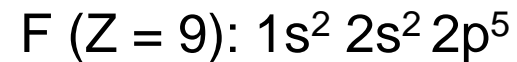
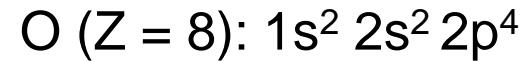
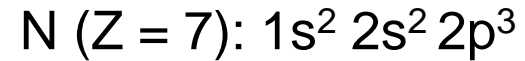
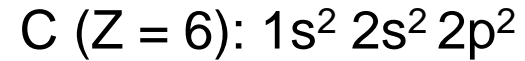
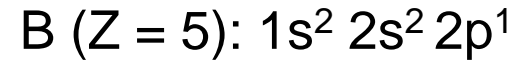
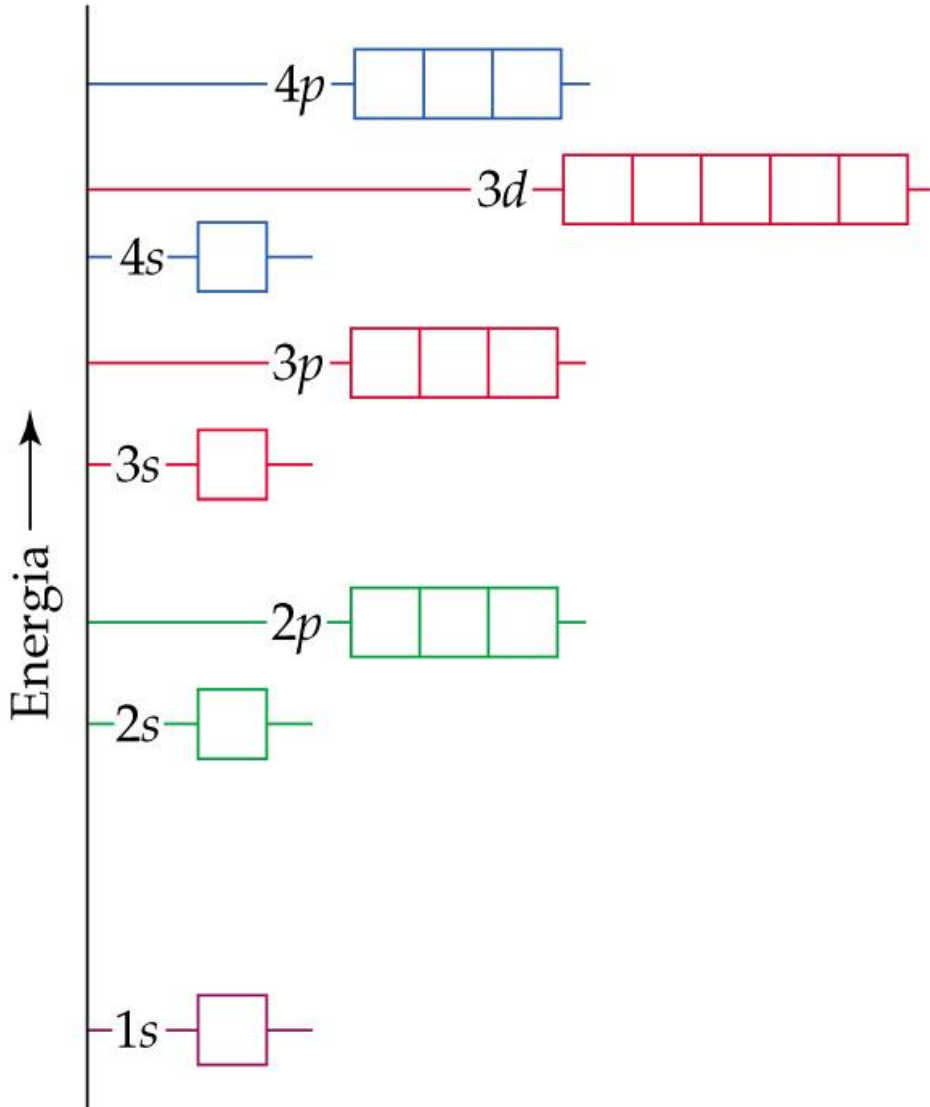
Configurações eletrônicas no estado fundamental



2p

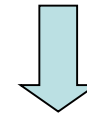
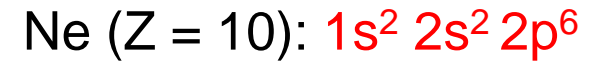
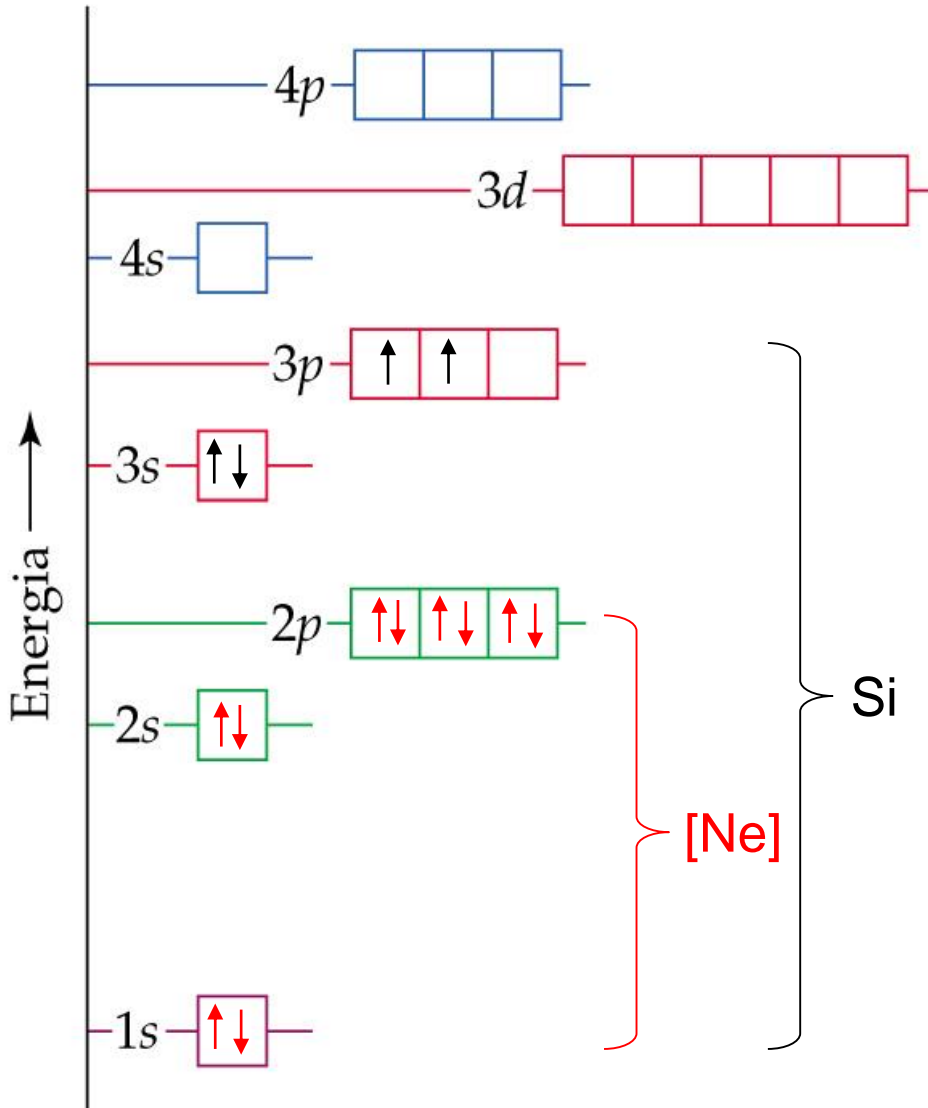
Configurações eletrônicas no estado fundamental

NOTAÇÃO ESPECTROSCÓPICA:



Configurações eletrônicas no estado fundamental

Convenção cerne do gás nobre

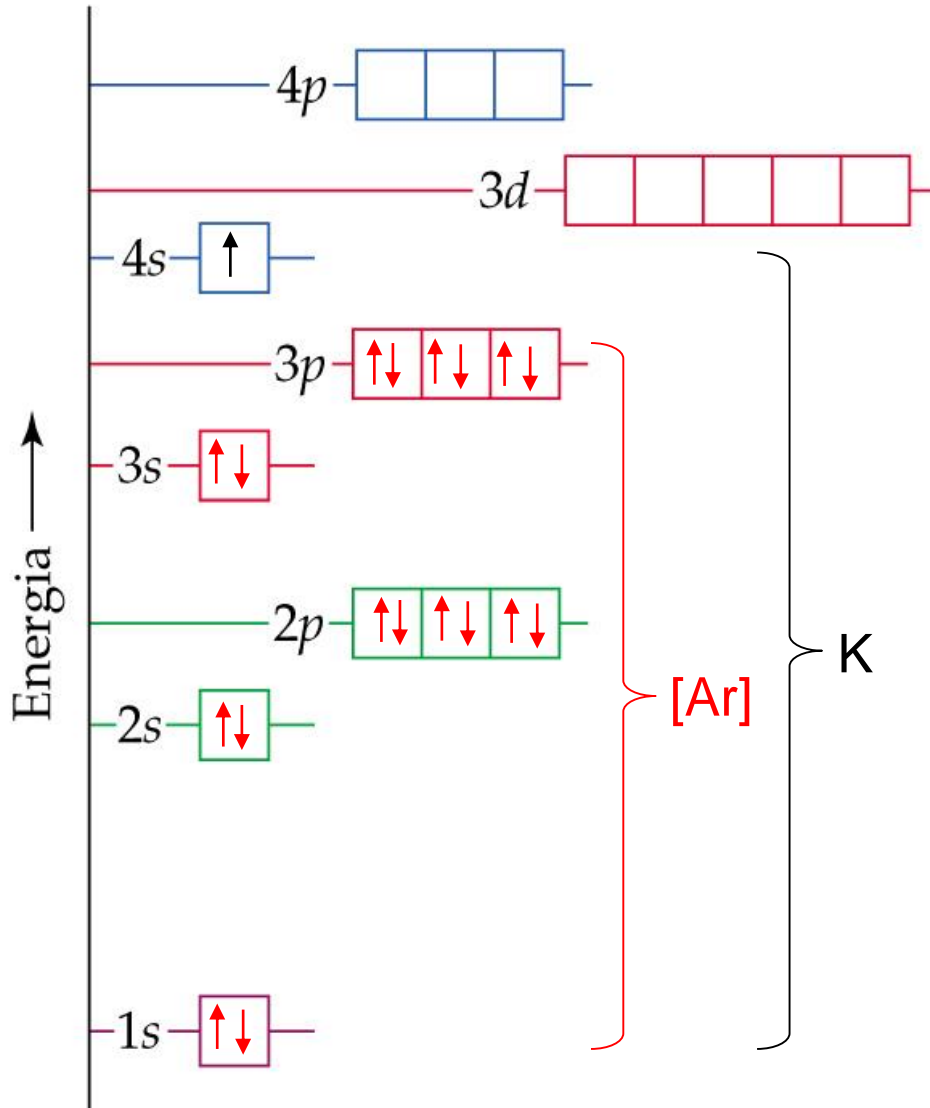


[Ne]

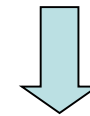


Configurações eletrônicas no estado fundamental

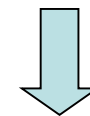
Convenção cerne do gás nobre



Ar (Z = 18): $1s^2 2s^2 2p^6 3s^2 3p^6$



[Ar]

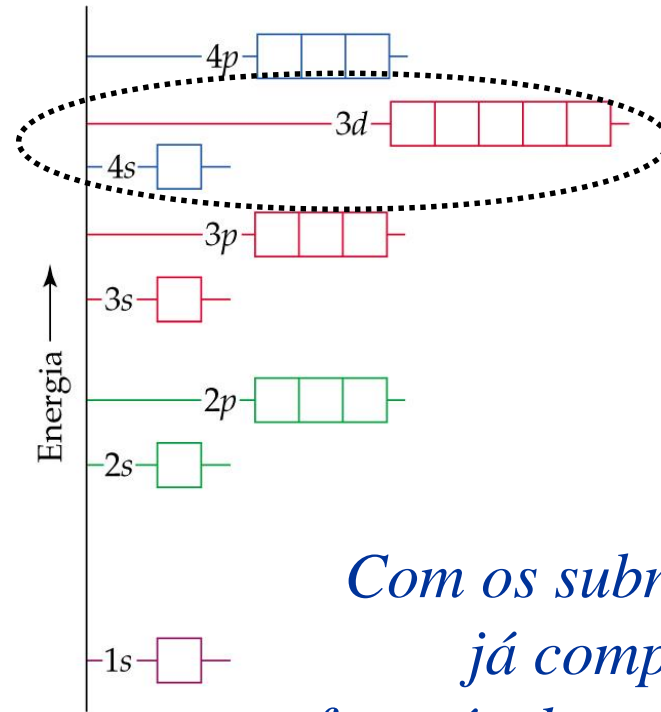
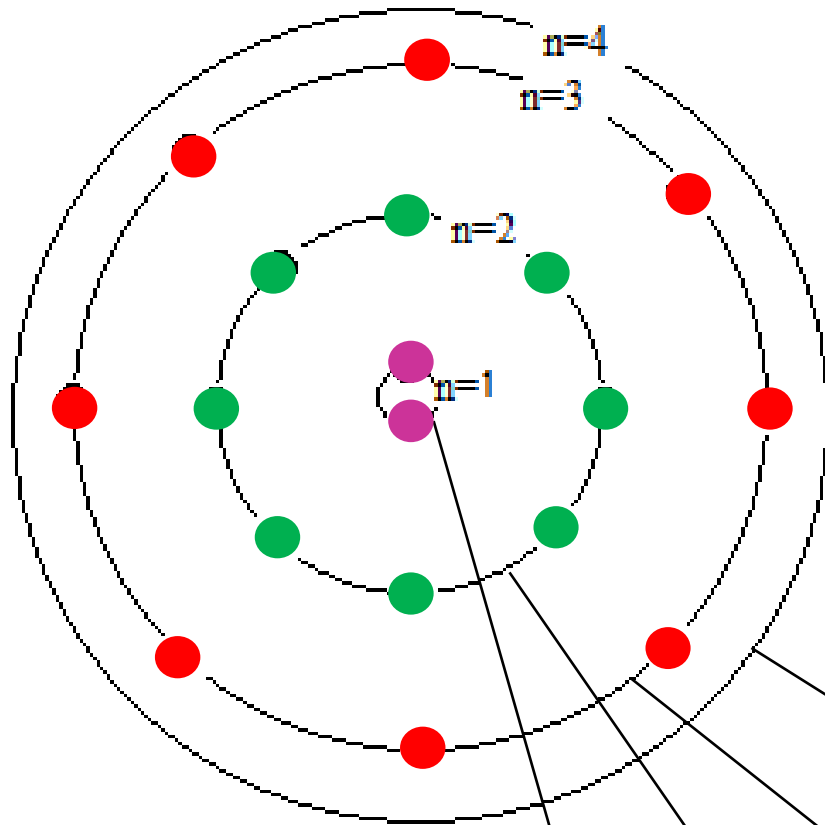


K (Z = 19): $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

K (Z = 19): [Ar] $4s^1$

Ca (Z = 20): [Ar] $4s^2$

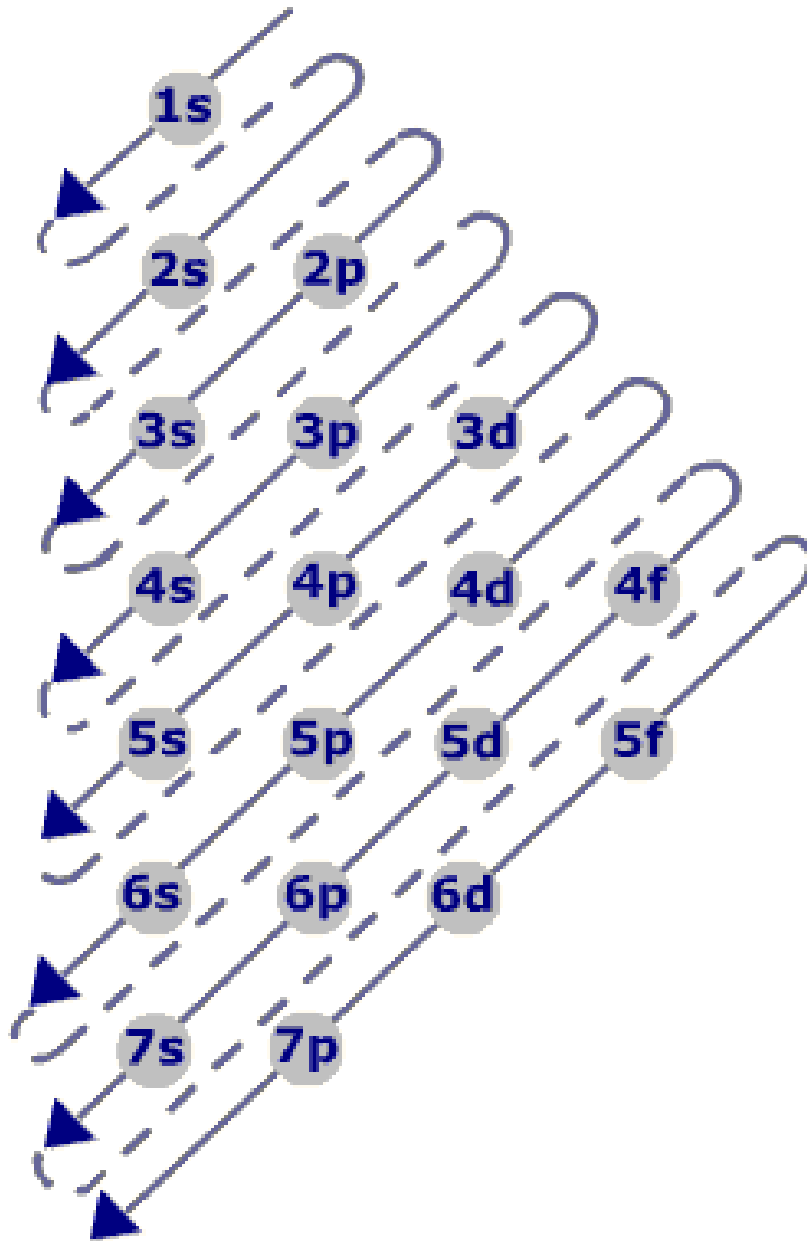
Configurações eletrônicas no estado fundamental



Com os subníveis 3s e 3p já completos, é mais favorável energeticamente o próximo elétron ocupar um orbital no 4º nível (4s) do que o subnível 3d.



Regra mnemônica para o preenchimento dos orbitais por elétrons



s: máximo 2 elétrons

p: máximo 6 elétrons

d: máximo 10 elétrons

f: máximo 14 elétrons

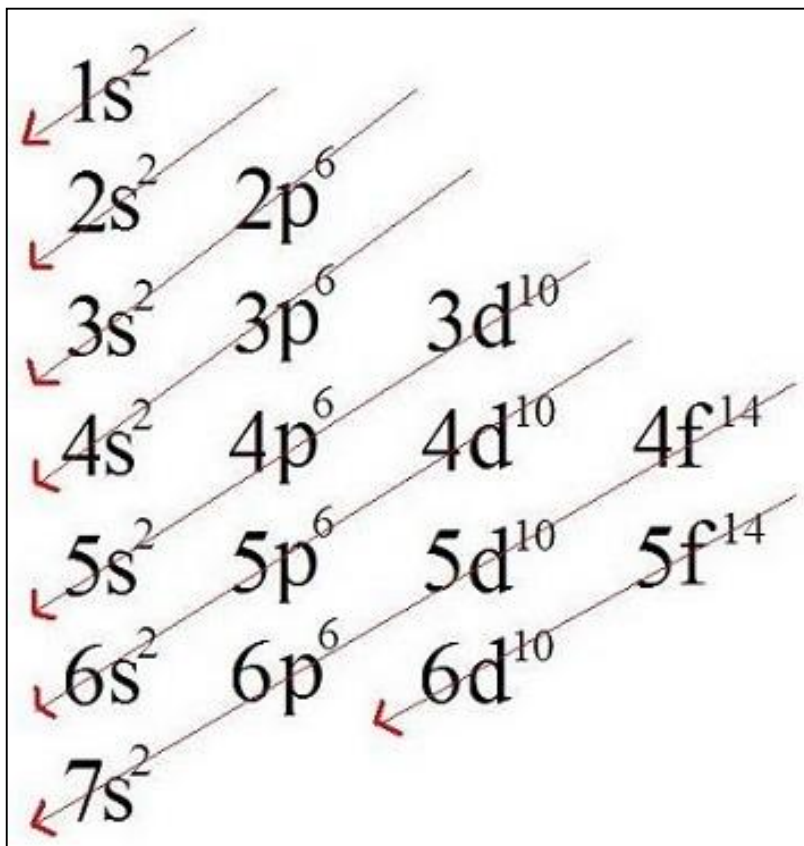
Regra mnemônica para o preenchimento dos orbitais por elétrons

n \ l	0	1	2	3	4	5	6	7
1	1s							
2	2s	2p						
3	3s	3p	3d					
4	4s	4p	4d	4f				
5	5s	5p	5d	5f	5g			
6	6s	6p	6d	6f	6g	6h		
7	7s	7p	7d	7f	7g	7h	7i	
8	8s	8p	8d	8f	8g	8h	8i	8j

* A tabela periódica termina aqui, por enquanto...

Regra mnemônica para o preenchimento dos orbitais por elétrons

Ex.: V ($Z = 23$)



$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$

Camada de valência: $n = 4$

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$



[Ar] $3d^3 4s^2$



[Ar] $4s^2 3d^3$

Configurações eletrônicas no estado fundamental

K (Z = 19): [Ar] 4s¹

Ca (Z = 20): [Ar] 4s²

Sc (Z = 21): [Ar] 3d¹ 4s²

Ti (Z = 22): [Ar] 3d² 4s²

V (Z = 23): [Ar] 3d³ 4s²

Cr (Z = 24): [Ar] 3d⁵ 4s¹

Mn (Z = 25): [Ar] 3d⁵ 4s²

Fe (Z = 26): [Ar] 3d⁶ 4s²

Co (Z = 27): [Ar] 3d⁷ 4s²

Ni (Z = 28): [Ar] 3d⁸ 4s²

Cu (Z = 29): [Ar] 3d¹⁰ 4s¹

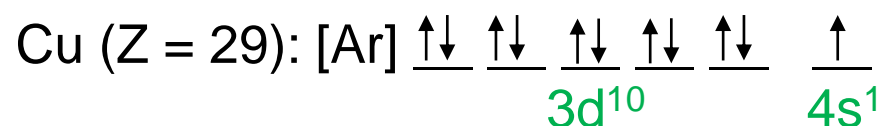
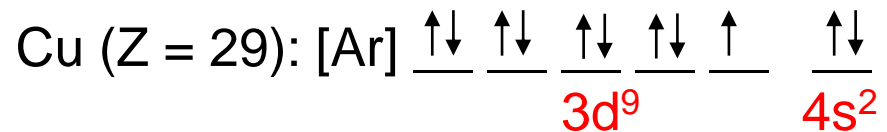
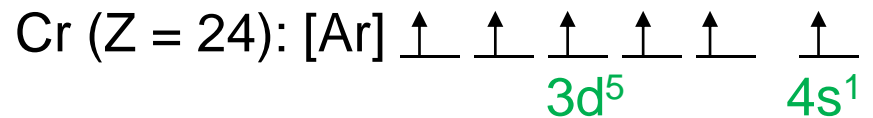
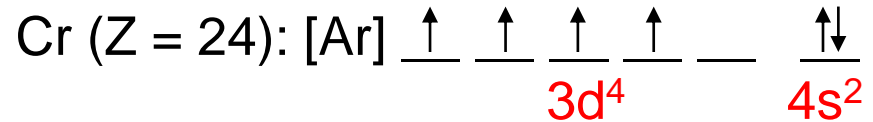
Zn (Z = 30): [Ar] 3d¹⁰ 4s²

As configurações eletrônicas são mais estáveis quando apresentam subníveis

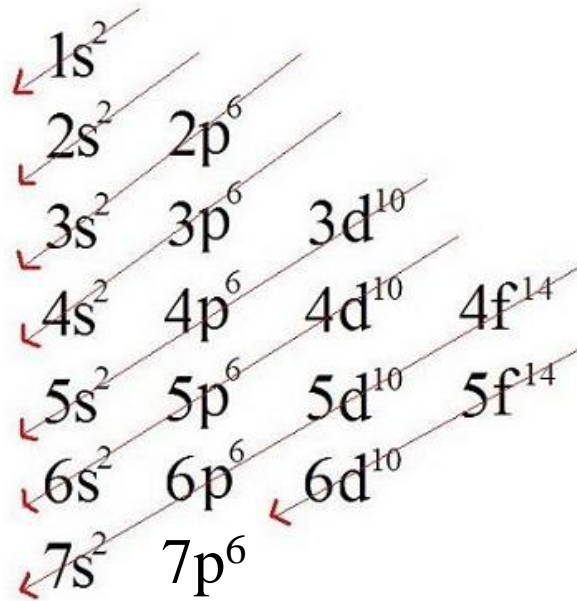
semi-preenchidos

ou

totalmente preenchidos



Configurações eletrônicas na tabela periódica



$1s^1$																					$1s^2$
$2s^1$	$2s^2$													$2p^1$	$2p^2$	$2p^3$	$2p^4$	$2p^5$	$2p^6$		
$3s^1$	$3s^2$													$3p^1$	$3p^2$	$3p^3$	$3p^4$	$3p^5$	$3p^6$		
$4s^1$	$4s^2$	$3d^1$	$3d^2$	$3d^3$	$3d^5$	$3d^5$	$3d^6$	$3d^7$	$3d^8$	$3d^{10}$	$3d^{10}$		$4p^1$	$4p^2$	$4p^3$	$4p^4$	$4p^5$	$4p^6$			
$5s^1$	$5s^2$	$4d^1$	$4d^2$	$4d^4$	$4d^5$	$4d^5$	$4d^7$	$4d^8$	$4d^{10}$	$4d^{10}$	$4d^{10}$		$5p^1$	$5p^2$	$5p^3$	$5p^4$	$5p^5$	$5p^6$			
$6s^1$	$6s^2$		$5d^2$	$5d^3$	$5d^4$	$5d^5$	$5d^6$	$5d^7$	$5d^9$	$5d^{10}$	$5d^{10}$		$6p^1$	$6p^2$	$6p^3$	$6p^4$	$6p^5$	$6p^6$			
$7s^1$	$7s^2$		$6d^2$	$6d^3$	$6d^4$	$6d^5$	$6d^6$	$6d^7$	$6d^8$	$6d^{10}$	$6d^{10}$		$7p^1$	$7p^2$	$7p^3$	$7p^4$	$7p^5$	$7p^6$			
			$5d^1$	$4f^1$	$4f^3$	$4f^4$	$4f^5$	$4f^6$	$4f^7$	$4f^7$	$4f^9$	$4f^{10}$	$4f^{11}$	$4f^{12}$	$4f^{13}$	$4f^{14}$	$4f^{14}$				
			$6d^1$	$6d^2$	$5f^2$	$5f^3$	$5f^4$	$5f^6$	$5f^7$	$5f^7$	$5f^9$	$5f^{10}$	$5f^{11}$	$5f^{12}$	$5f^{13}$	$5f^{14}$	$5f^{14}$				