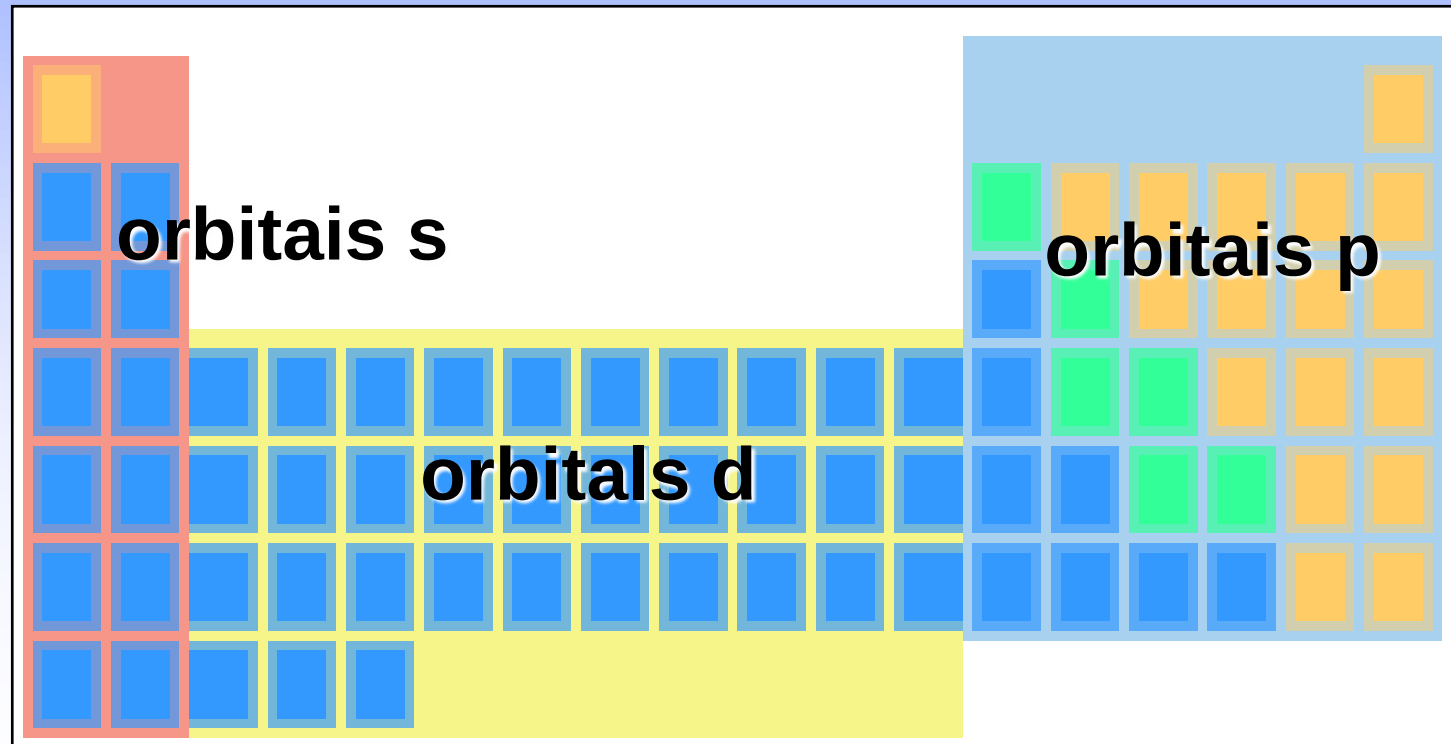
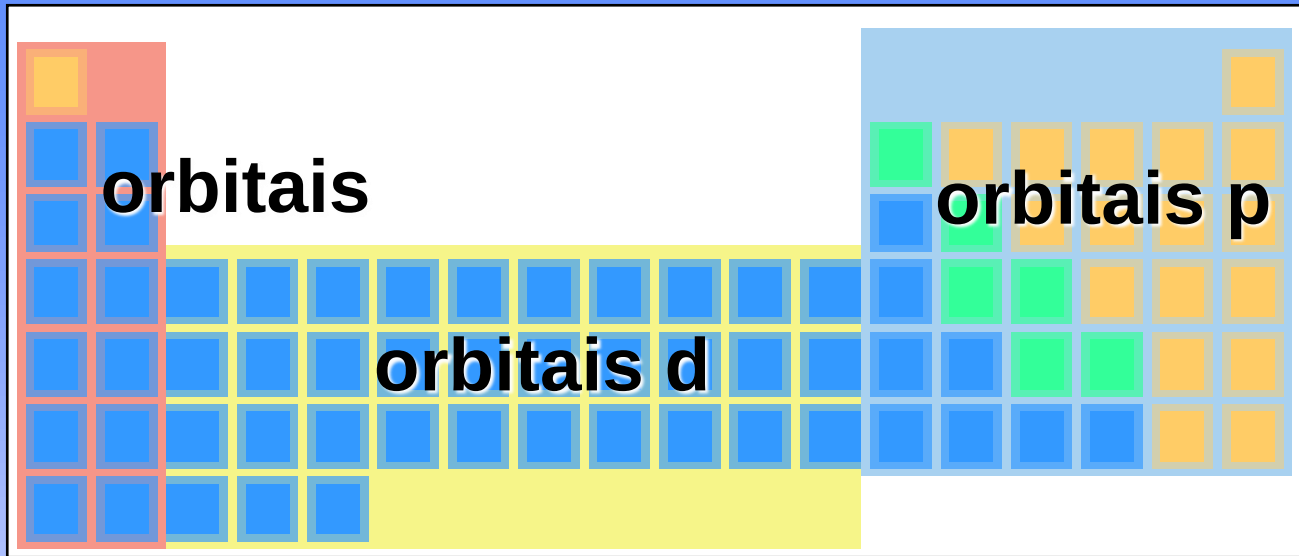


Orbitais

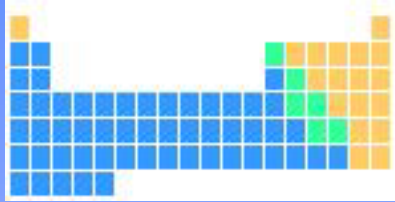
1

- 2 e- associados a cada orbital
- Orbitais agrupados em subcamadas: s, p, d, f



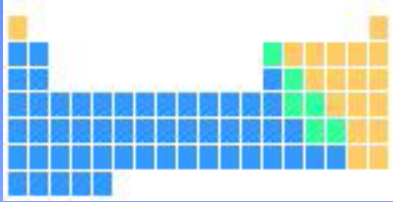


	orbitais s	orbitais p	orbitais d
No. orbs.	1	3	5
No. e-	2	6	10



Camadas e Subcamadas

- Subcamadas agrupadas em camadas.
- Cada camada tem associada um **Número Quântico principal, n**
- Número quântico principal está associado ao número do período ou linha da tabela periódica.



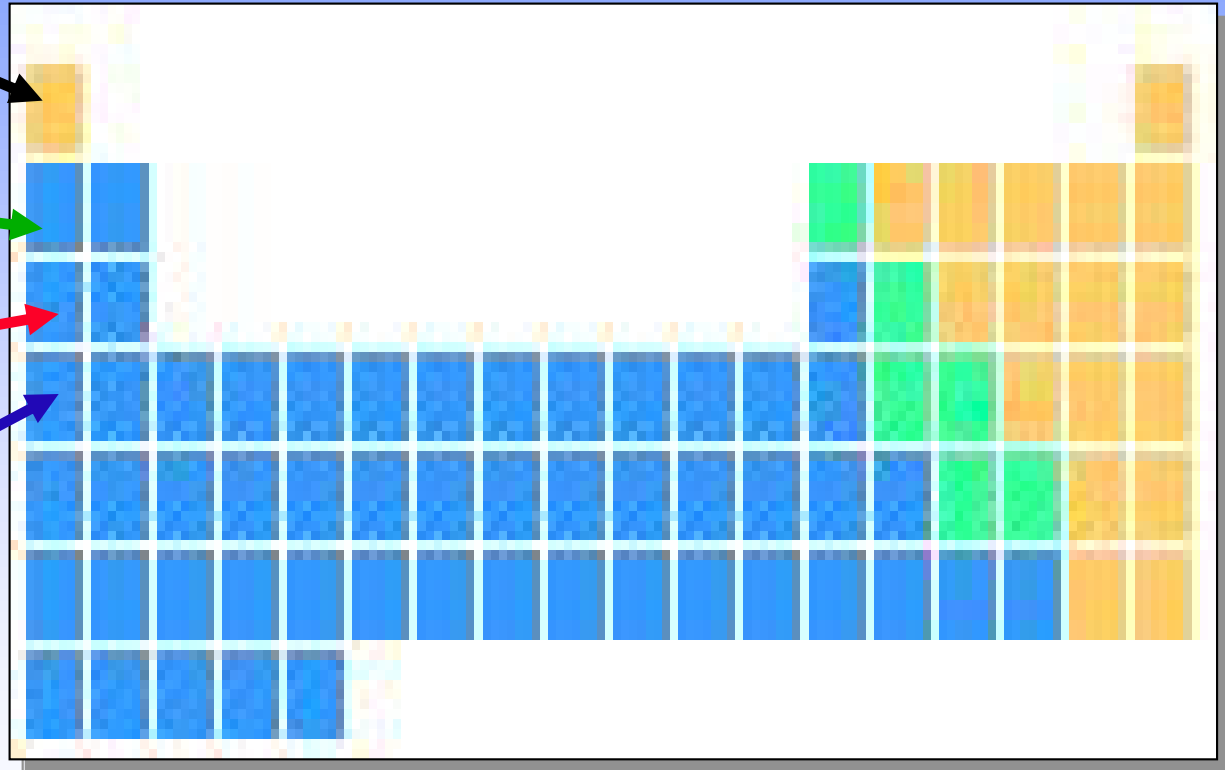
Camadas e subcamadas

$n = 1$

$n = 2$

$n = 3$

$n = 4$



Números quânticos

Forma, tamanho e energia de cada orbital são especificados por 3 números quânticos :

n (principal) ---> camada

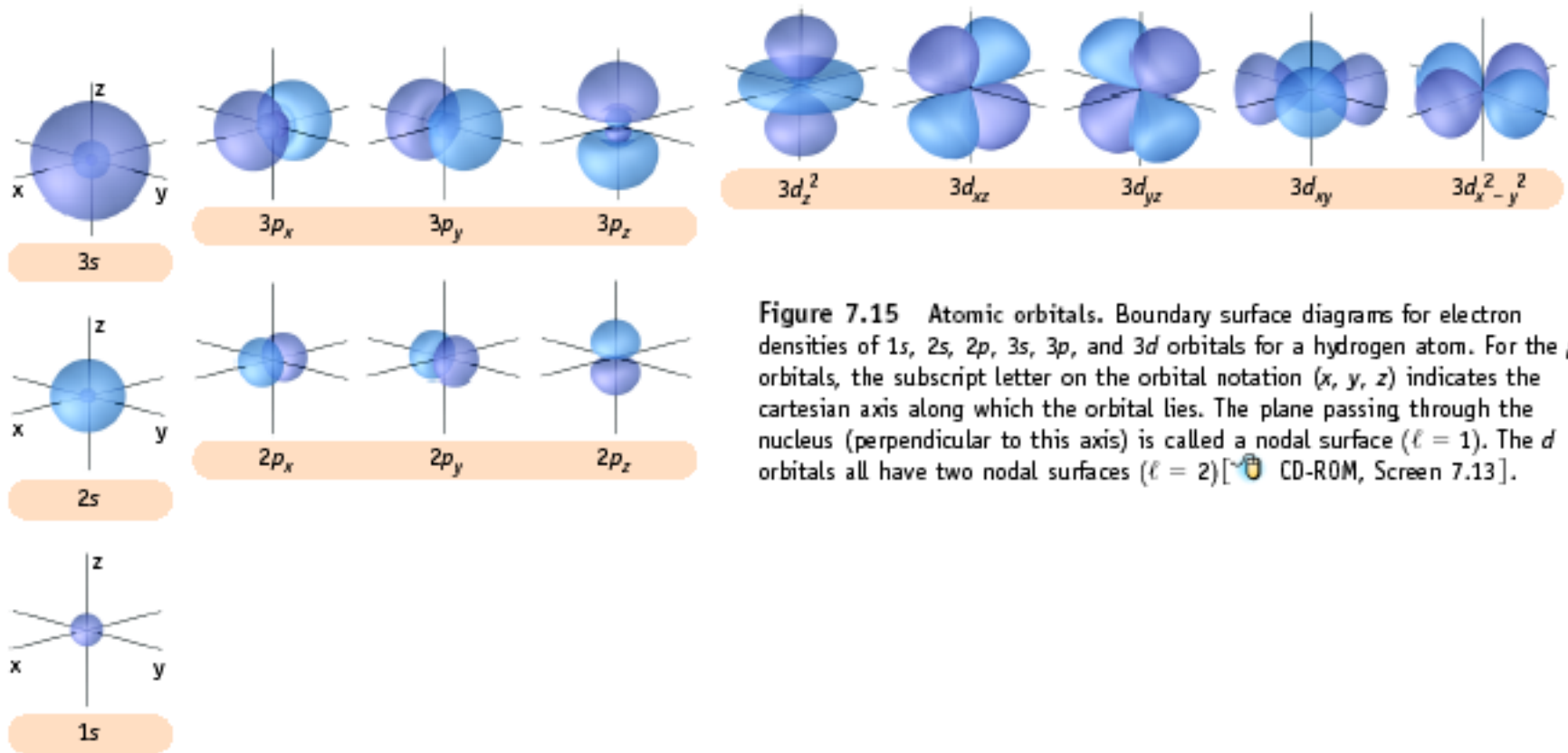
l (angular) ---> subcamada

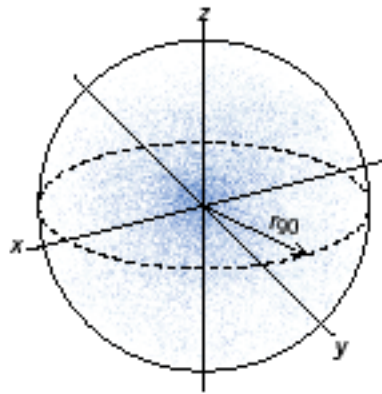
m_l (magnético) ---> designa um orbital dentro de uma subcamada

Números Quânticos

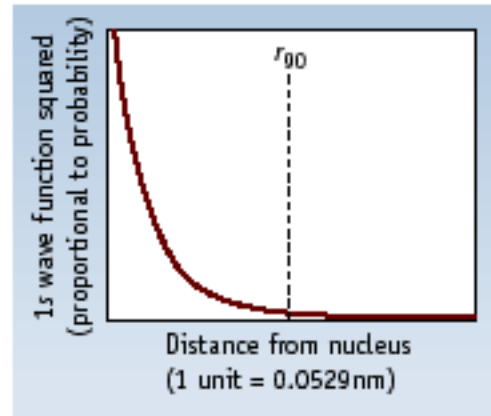
Símbolo	Valores	Descrição
n (principal)	1, 2, 3, ..	Tamanho orbital e energia $E = -R(1/n^2)$
l (angular)	0, 1, 2, .. n-1	Tipo do orbital (subcamada)
m_l (magnético)	-l..0..+l	Orientação orbital
# orbitais na subcamada = $2l + 1$		

Tipos de Orbitais Atômicos

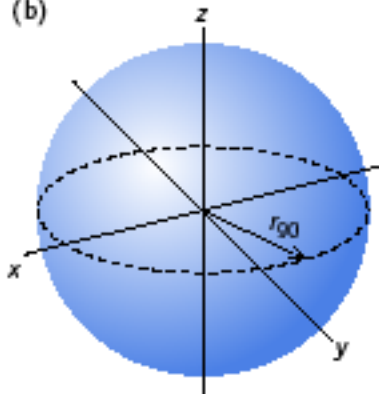




(a)



(b)

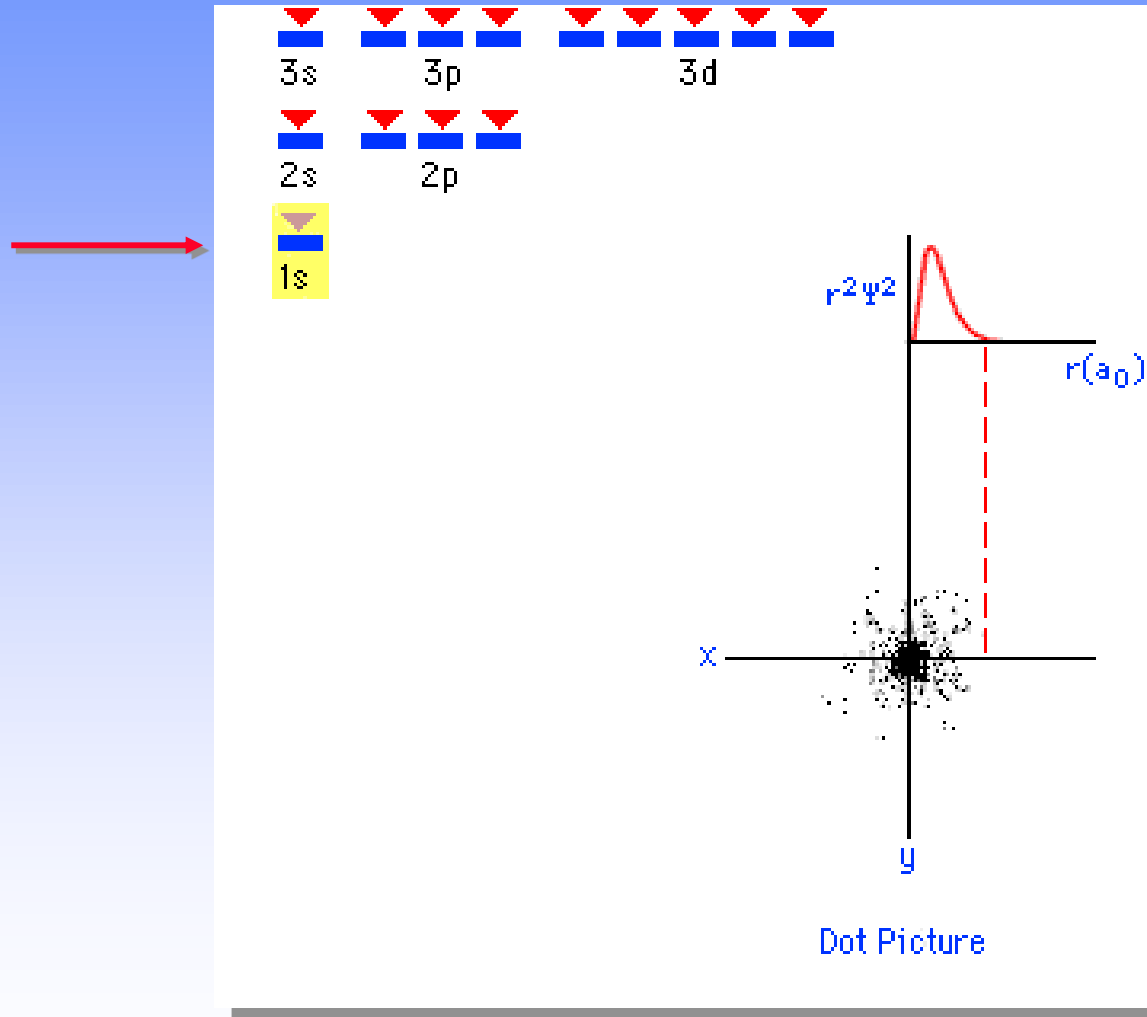


(c)

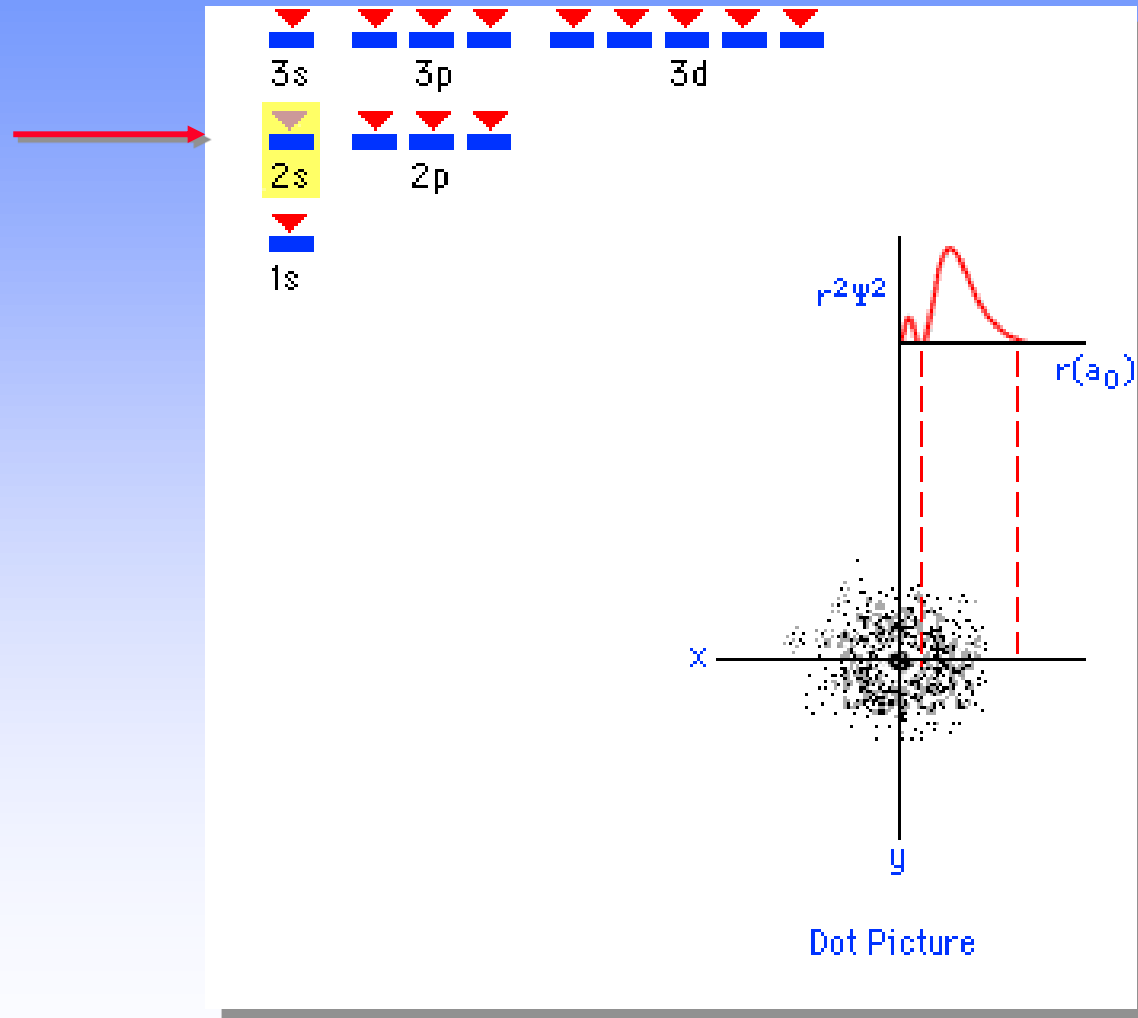
Orbitais s

**Todos orbitais s
têm formato
esférico**

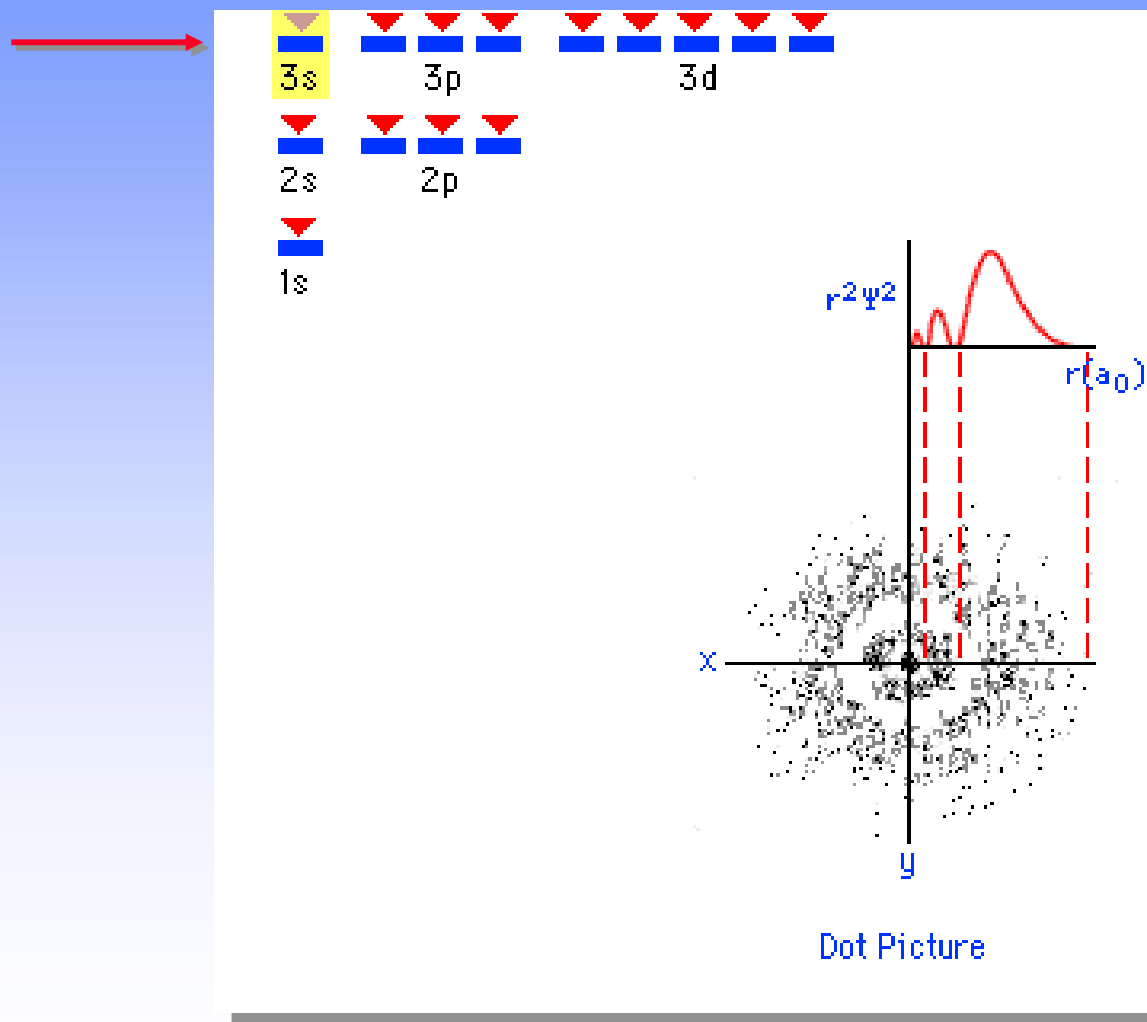
Orbital 1s



Orbital 2s



Orbital 3s



Orbitais

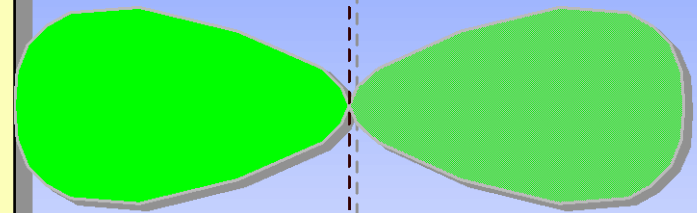
$n = 2$, então $l = 0$ e 1

Camada $n = 2$ tem 2 tipos de orbitais — 2 subcamadas

Para $l = 0$, $m_l = 0$
subcamada s (1 orbital)

Para $l = 1$, $m_l = -1, 0, +1$
subcamada p (3 orbitais)

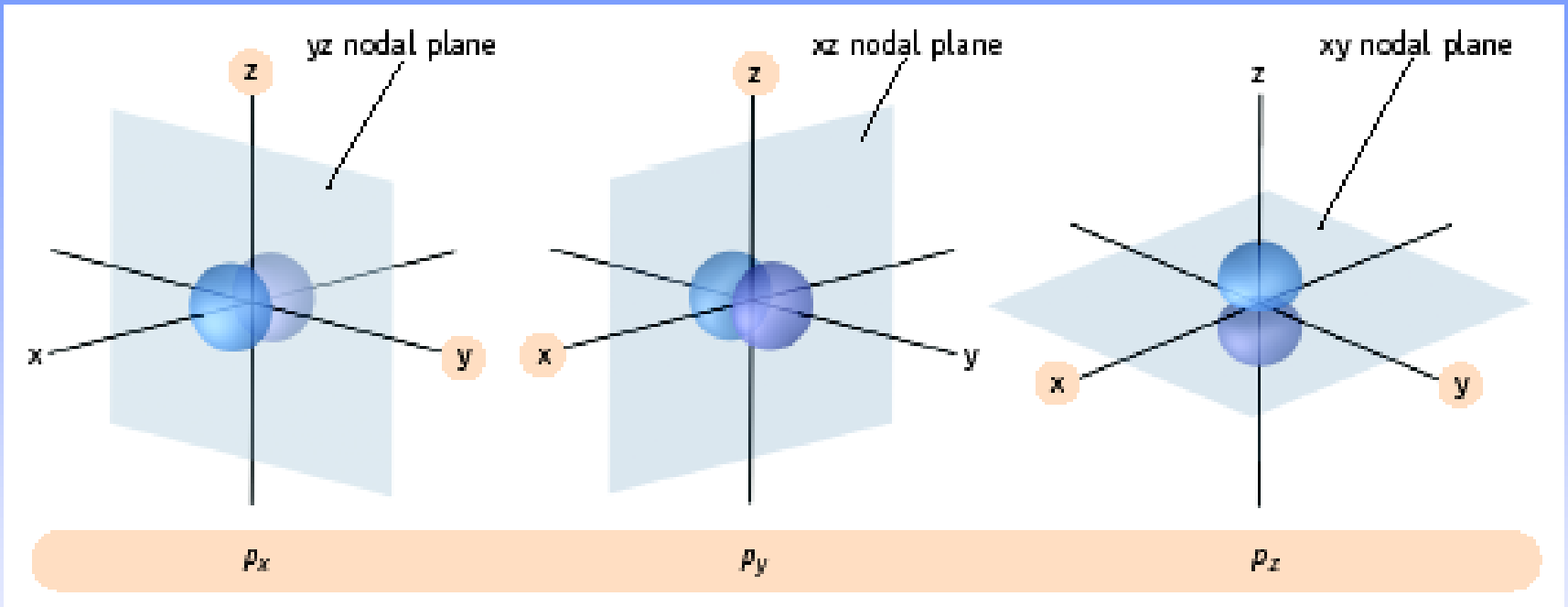
Typical p orbital



planar node

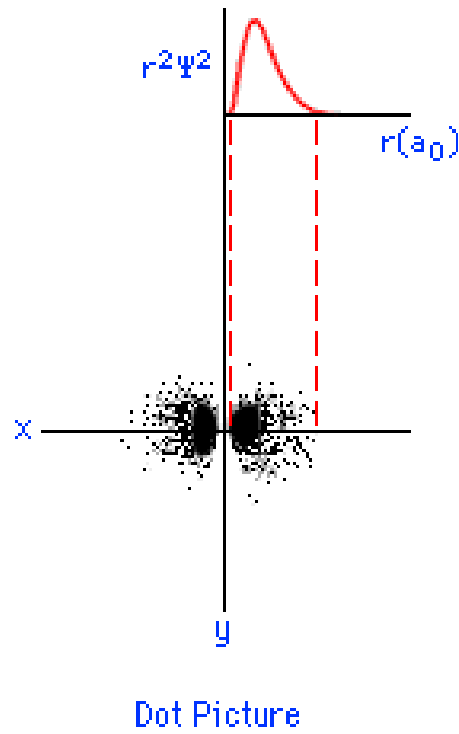
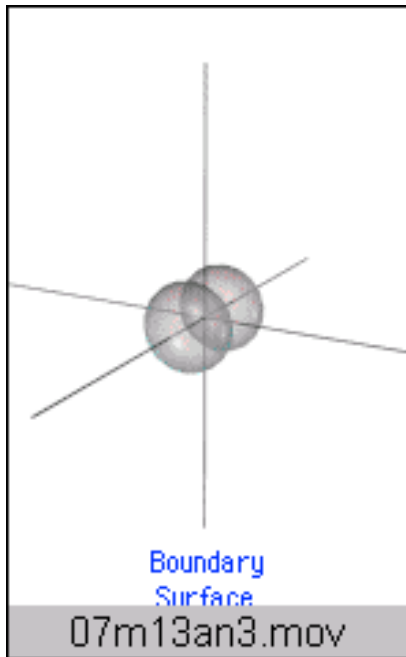
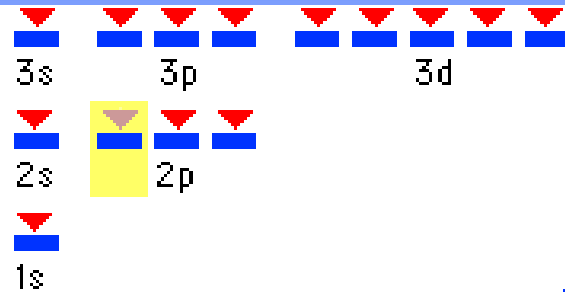
Para $l = 1$, há um
PLANO NODAL

Orbitais p

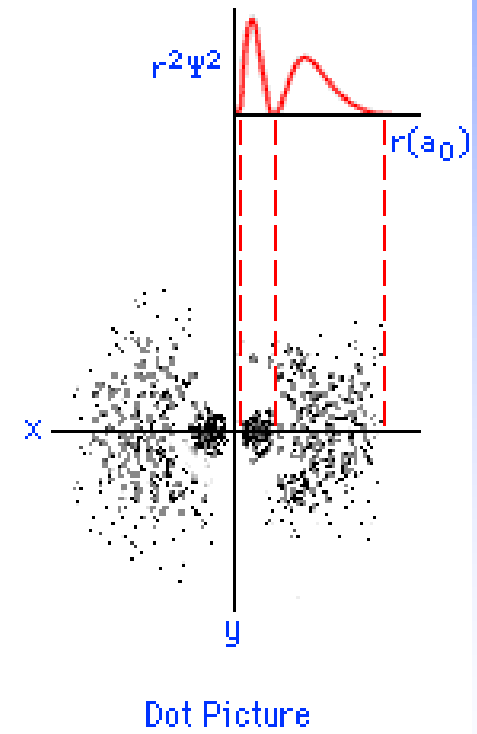
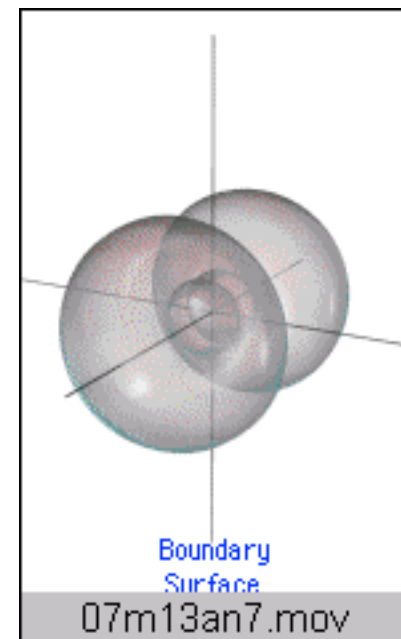
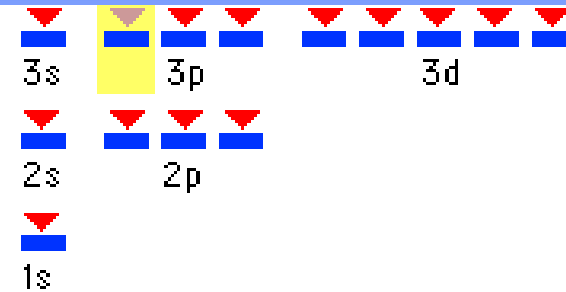


- Os três orbitais p são perpendiculares entre si.

Orbital $2p_x$



Orbital $3p_x$



Orbitais d

Para $n = 3$, quais os valores de l ?

$l = 0, 1, 2 \rightarrow$ três subcamadas

Para $l = 0, m_l = 0$

$\rightarrow$ subcamada com um único orbital s

Para $l = 1, m_l = -1, 0, +1$

$\rightarrow$ subcamada com 3 orbitais p

Para $l = 2, m_l = -2, -1, 0, +1, +2$

$\rightarrow$ subcamada com 5 orbitais

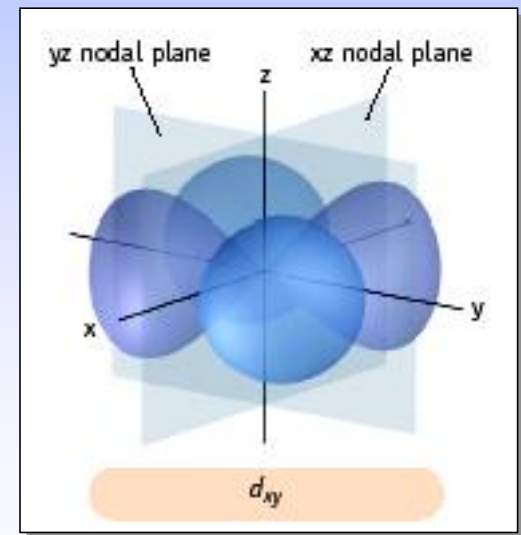
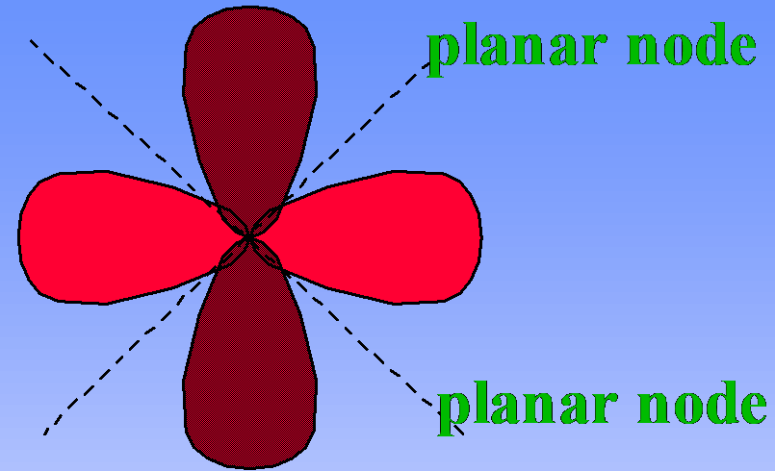
Orbitais d

Orbitais s ($l = 0$) não têm plano nodal - são esféricos

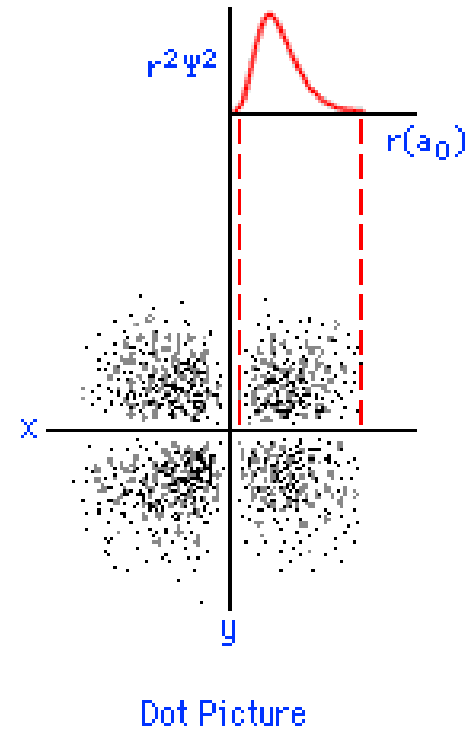
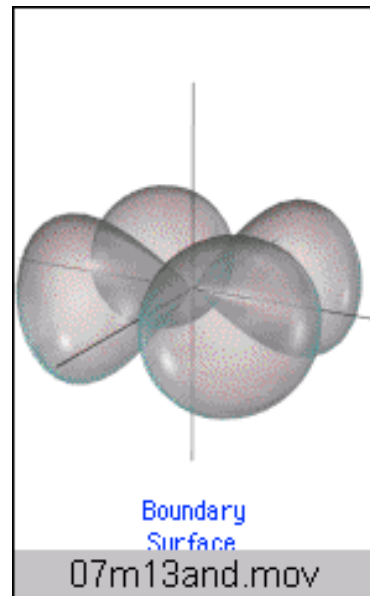
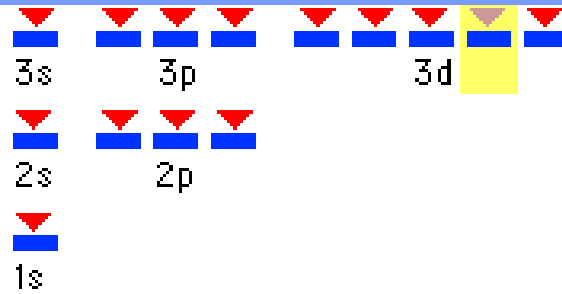
Orbitais p ($l = 1$) têm 1 plano nodal – formato de ‘alteres’

Orbitais d ($l = 2$) têm 2 planos nodais

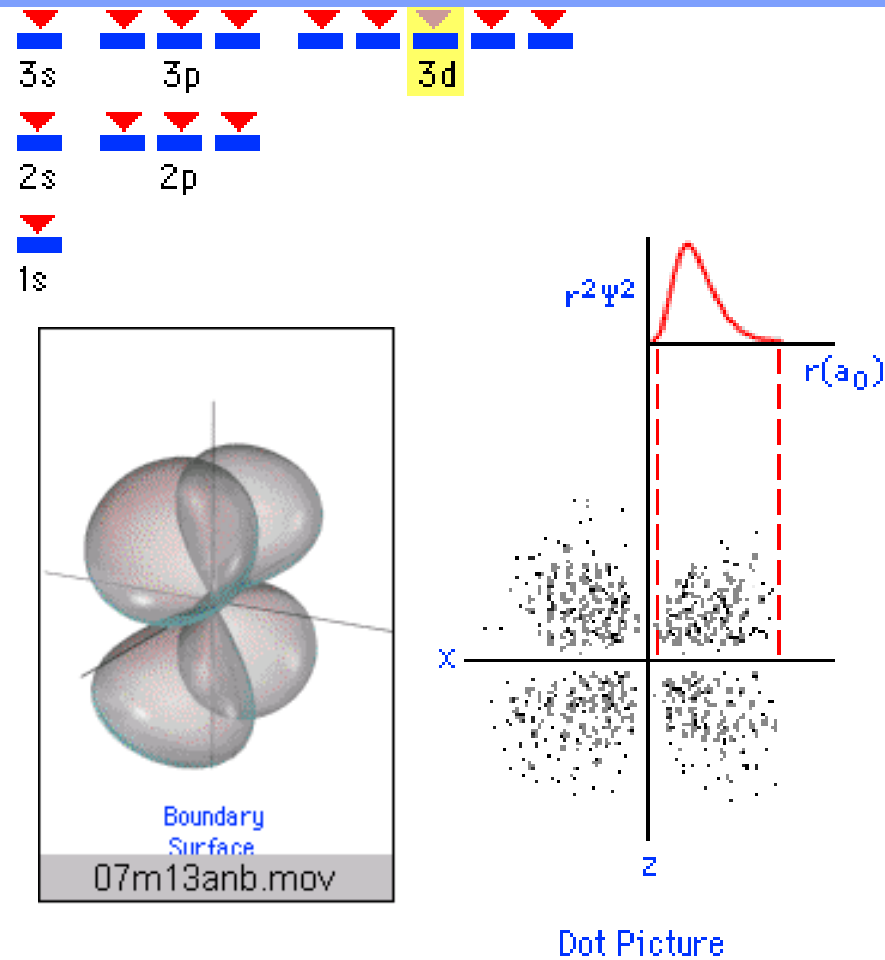
typical d orbital



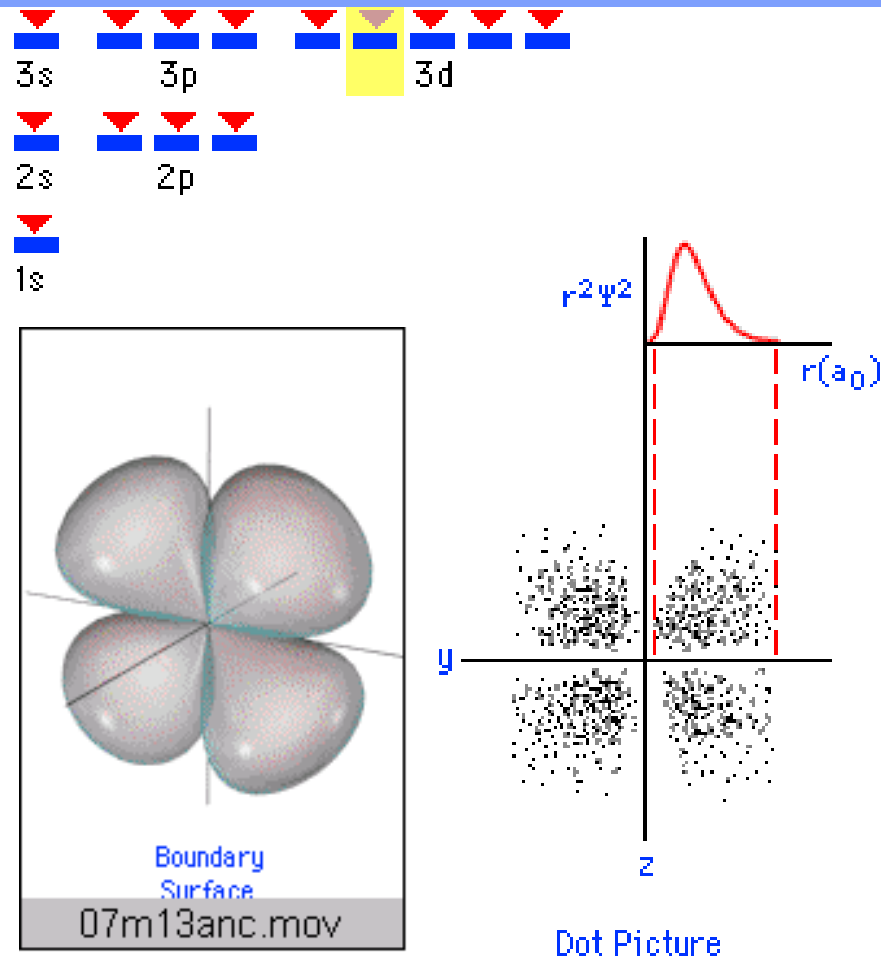
Orbital $3d_{xy}$



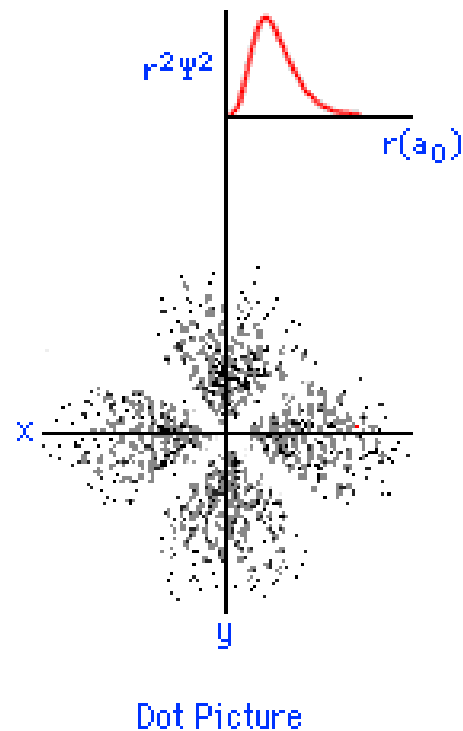
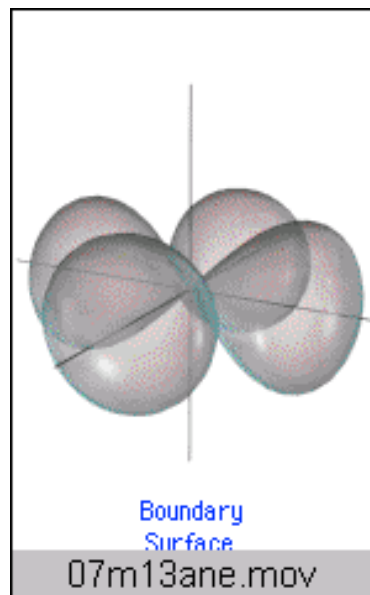
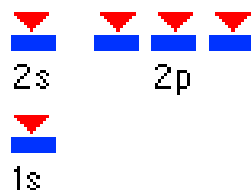
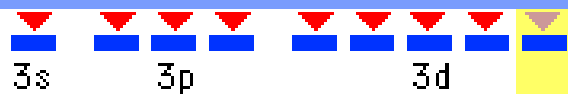
Orbital $3d_{xz}$



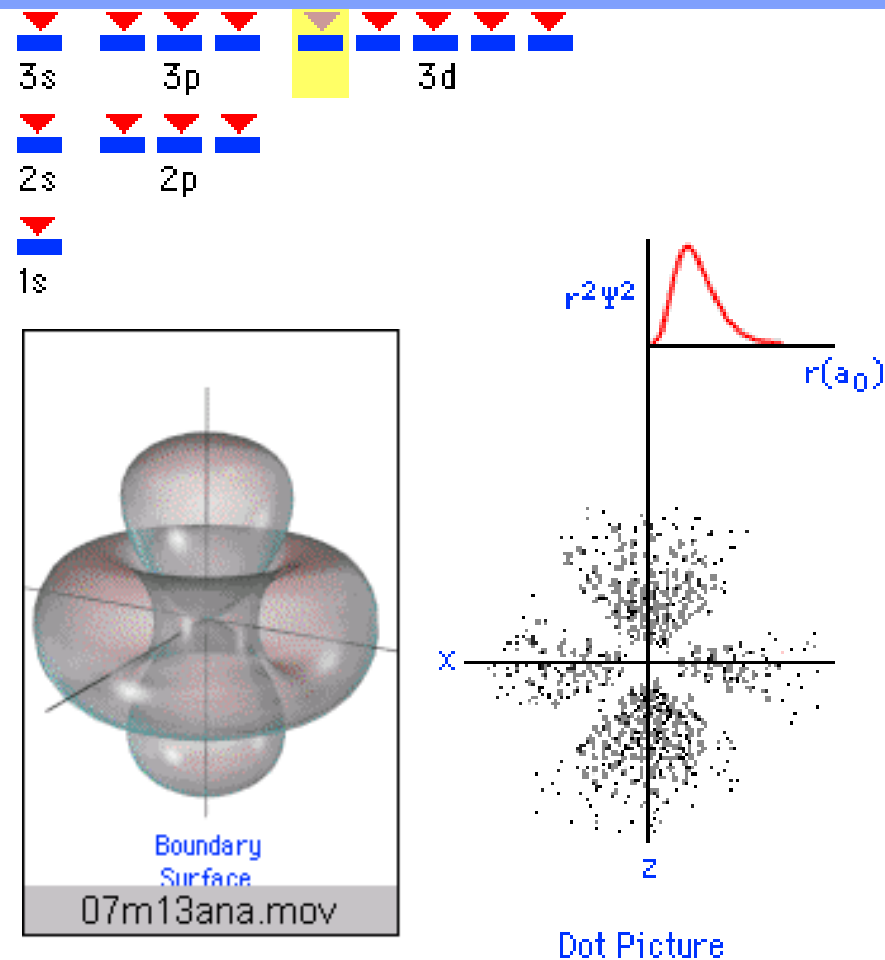
Orbital $3d_{yz}$



Orbital $3d_{x^2 - y^2}$



Orbital $3d_z^2$



Orbitais f

Para $n = 4$, $l = 0, 1, 2, 3 \rightarrow 4$ subcamadas.

Para $l = 0$, $m_l = 0$ – subcamada com 1 orbital s

Para $l = 1$, $m_l = -1, 0, +1$

subcamada com 3 orbitais p

Para $l = 2$, $m_l = -2, -1, 0, +1, +2$

subcamada com 5 orbitais d

Para $l = 3$, $m_l = -3, -2, -1, 0, +1, +2, +3$

subcamada com 7 orbitais f