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## 4.3-110

For a particle in a 2D rectangular box, the number of lobes of electron density in the  $n_x=2$ ,  $n_y=5$  state is

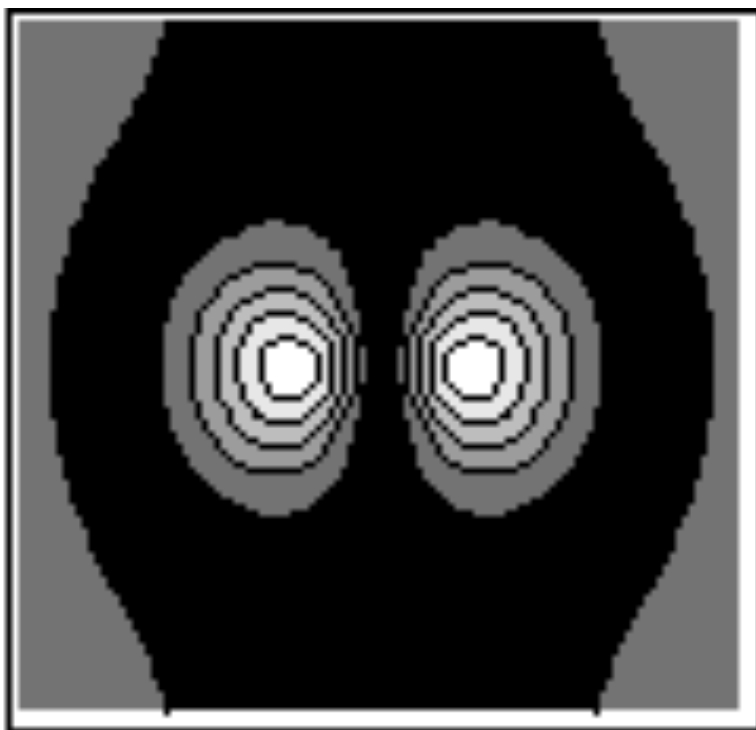
- |     |   |     |    |
|-----|---|-----|----|
| (a) | 2 | (b) | 3  |
| (c) | 5 | (d) | 10 |

The number of nodal lines is

- |     |   |     |   |
|-----|---|-----|---|
| (a) | 1 | (b) | 2 |
| (c) | 4 | (d) | 5 |

## 4.3-210

The electron density of a given state of a 2D H-atom is given by the contour map



This state has

- (a) 1 angular node only
- (b) 1 radial node only
- (c) 1 angular node and 1 radial node
- (d) 2 angular nodes

The quantum numbers for this state are

- (a)  $n = 2, \ell = 0$
- (b)  $n = 2, \ell = 1$
- (c)  $n = 3, \ell = 1$
- (d)  $n = 3, \ell = 2$

## 4.3-310

The number of angular nodes in a 3s atomic orbital is

- |       |       |
|-------|-------|
| (a) 0 | (b) 1 |
| (c) 2 | (d) 3 |

The number of radial nodes in a 3s atomic orbital is

- |       |       |
|-------|-------|
| (a) 0 | (b) 1 |
| (c) 2 | (d) 3 |

## 4.3-320

An atomic orbital has 2 angular nodes and 1 radial node. It is a

(a)  $2p$

(b)  $3p$

(c)  $3d$

(d)  $4d$

orbital.

## 4.3-330

Among the designations

I.  $n = 3, \ell = 2, m_\ell = -2$

II.  $n = 3, \ell = 1, m_\ell = 0$

III.  $n = 3, \ell = 0, m_\ell = -1$

IV.  $n = 3, \ell = 2, m_\ell = 0$

V.  $n = 3, \ell = 3, m_\ell = -2$

which does not describe an allowed state for an electron in an atom?

(a) II and IV

(b) I and III

(c) III and V

(d) IV and V

## 4.3-340

Which of the following is not an atomic orbital?

(a)  $2p$

(b)  $5s$

(c)  $3f$

(d)  $4d$

## 4.3-350

What is the full degeneracy of the  $n=3$  state of a H-atom (in the absence of a magnetic field)?

(a) 4

(b) 10

(c) 8

(d) 18

## 4.3-411

$(1s)^2(2s)^2(2p_x)^2$  represents a configuration of  
a

(a) beryllium

(b) boron

(c) carbon

(d) nitrogen

atom.

## 4.3-412

The  $(1s)^2(2s)^2(2p_x)^2$  state of a carbon atom is

- (a) the ground state
- (b) an excited state

## 4.3-420

Which of the following represents the ground state of a nitrogen atom?

- (a)  $(1s)^2(2s)^2(2p_x)$
- (b)  $(1s)^2(2s)^2(2p_x)^3$
- (c)  $(1s)^2(2s)^2(2p_x)^2(2p_y)$
- (d)  $(1s)^2(2s)^2(2p_x)(2p_y)(2p_z)$

Which represents an excited state of a nitrogen atom?

Which is not a state of any atom at all?

## 4.3-425

Which of the following is not an excited state of a silicon atom?

- (a)  $(\text{Ne})(3s)(3p_x)(3p_y)(3p_z)$
- (b)  $(\text{Ne})(3s)^2(3p_x)^2$
- (c)  $(\text{Ne})(3s)^2(3p_x)(3p_y)$
- (d)  $(\text{Ne})(3p_x)^2(3p_y)(3p_z)$

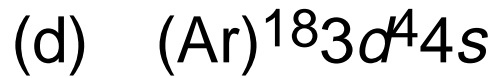
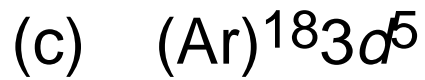
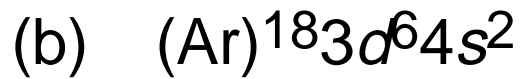
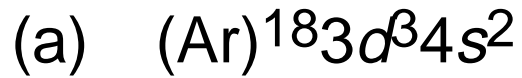
## 4.3-430

The electronic configuration of element X is  $(1s)^2(2s)^2(2p)^6(3s)^2(3p)^3$ . The formula of the most probable compound that X will form with Ca is



## 4.3-440

The ground state electronic configuration of  $\text{Fe}^{3+}$  is



## 4.3-450

Which of the following sets of quantum numbers,  $n$ ,  $\ell$ ,  $m_\ell$  and  $m_s$ , describes one of the outermost electrons in a ground state strontium atom?

- (a) 5,1,1,+1/2      (b) 5,0,1,+1/2  
(c) 5,0,0,-1/2      (d) 5,2,1,-1/2

## 4.3-460

Which of the following ions is paramagnetic?



## 4.3-470

Which of the following atoms has the largest number of unpaired electrons in its ground state?

(a) Sn

(b) Ag

(c) Rh

(d) Mo

## 4.3-480

Suppose that the electron spin quantum number could have three possible values. Which of the following atomic numbers would not correspond to a noble gas?

(a) 3

(b) 15

(c) 27

(d) 42

## 4.3-510

Of the following, the atom with the largest first ionization energy is the one with the ground state electronic configuration

- (a) (Ne)  $3s^23p^1$
- (b) (Ne)  $3s^23p^2$
- (c) (Ne)  $3s^23p^3$
- (d) (Ne)  $3s^23p^4$

## 4.3-520

Of the following, the atom with the smallest first ionization energy is the one with the ground state electronic configuration

- (a) (Ne)  $3s^2$
- (b) (Ne)  $3s^23p^1$
- (c) (Ne)  $3s^23p^2$
- (d) (Ne)  $3s^23p^3$

## 4.3-530

Of the following, the atom with the smallest first ionization energy is the one with the ground state electronic configuration

- (a)  $1s^2 2s^2 2p^3$
- (b)  $(\text{Ne}) 3s^2 3p^3$
- (c)  $(\text{Ar}) 3d^{10} 4s^2 4p^3$