Name: _____ **Period:** _____ **Date:** _____ **ID: A**

Chapter 6 Electronic Structure of Atoms: Worksheet #2

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1) At what speed (m/s) must a 10.0 mg object be moving to have a de Broglie wavelength of 3.3×10^{-41} m?
   Ⓐ 4.1
   Ⓑ 1.9×10^{-11}
   Ⓒ 2.0×10^{12}
   Ⓓ 3.3×10^{-42}
   Ⓔ 1.9×10^{13}

2) The _____ quantum number defines the shape of an orbital.
   Ⓐ spin
   Ⓑ magnetic
   Ⓒ principal
   Ⓓ azimuthal
   Ⓔ psi

3) There are _____ orbitals in the third shell.
   Ⓐ 25
   Ⓑ 4
   Ⓒ 9
   Ⓓ 16
   Ⓔ 1

4) The _____ subshell contains only one orbital.
   Ⓐ 5d
   Ⓑ 6f
   Ⓒ 4s
   Ⓓ 3d
   Ⓔ 1p

5) The n = 1 shell contains _____ p orbitals. All the other shells contain _____ p orbitals.
   Ⓐ 3, 6
   Ⓑ 0, 3
   Ⓒ 6, 2
   Ⓓ 3, 3
   Ⓔ 0, 6

6) The lowest energy shell that contains f orbitals is the shell with n = _____.
   Ⓐ 3
   Ⓑ 2
   Ⓒ 4
   Ⓓ 1
   Ⓔ 5

7) The total number of orbitals in a shell is given by _____.
   Ⓐ I^2
   Ⓑ n^2
   Ⓒ $2n$
   Ⓓ $2n + 1$
   Ⓔ $2l + 1$

8) In a hydrogen atom, an electron in a _____ orbital can absorb a photon, but cannot emit a photon.
   Ⓐ 3s
   Ⓑ 2s
   Ⓒ 3p
   Ⓓ 1s
   Ⓔ 3f

9) How many quantum numbers are necessary to designate a particular electron in an atom?
   Ⓐ 3
   Ⓑ 4
   Ⓒ 2
   Ⓓ 1
   Ⓔ 5

10) A _____ orbital is degenerate with a $5d_{z^2}$ in a many-electron atom.
   Ⓐ $5p_z$
   Ⓑ $4d_{z^2}$
   Ⓒ 5s
   Ⓓ $5d_{xy}$
   Ⓔ $4d_{zz}$

11) The 3p subshell in the ground state of atomic xenon contains _____ electrons.
Ⓐ 2
Ⓑ 6
Ⓒ 8
Ⓓ 10
Ⓔ 36

12) There are _____ unpaired electrons in a ground state phosphorus atom.
Ⓐ 0
Ⓑ 1
Ⓒ 2
Ⓓ 3
Ⓔ 4

13) There are _____ unpaired electrons in a ground state fluorine atom.
Ⓐ 0
Ⓑ 1
Ⓒ 2
Ⓓ 3
Ⓔ 4

14) Which is the correct ground-state electron configuration for silver?
Ⓐ $[Kr]5s^24d^9$
Ⓑ $[Kr]5s^14d^{10}$
Ⓒ $[Kr]5s^24d^{10}$
Ⓓ $[Xe]5s^24d^9$
Ⓔ $[Xe]5s^14d^{10}$

15) All of the _____ have a valence shell electron configuration ns^1.
Ⓐ noble gases
Ⓑ halogens
Ⓒ chalcogens
Ⓓ alkali metals
Ⓔ alkaline earth metals

16) The elements in the _____ period of the periodic table have a core-electron configuration that is the same as the electron configuration of neon.
Ⓐ first
Ⓑ second
Ⓒ third
Ⓓ fourth
Ⓔ fifth

17) The largest principal quantum number in the ground state electron configuration of iodine is _____.
Ⓐ 1
Ⓑ 4
Ⓒ 5
Ⓓ 6
Ⓔ 7

18) Elements in group _____ have a np^6 electron configuration in the outer shell.
Ⓐ 4A
Ⓑ 6A
Ⓒ 7A
Ⓓ 8A
Ⓔ 5A

19) Which one of the following is correct?
Ⓐ $\nu + \lambda = c$
Ⓑ $\nu \div \lambda = c$
Ⓒ $\nu = c\nu$
Ⓓ $\lambda = c\nu$
Ⓔ $\nu\lambda = c$

20) The photoelectric effect is _____.
Ⓐ the total reflection of light by metals giving them their typical luster
Ⓑ the production of current by silicon solar cells when exposed to sunlight
Ⓒ the ejection of electrons by a metal when struck with light of sufficient energy
Ⓓ the darkening of photographic film when exposed to an electric field
Ⓔ a relativistic effect

21) A radio station broadcasts at 103.5 MHz. The wavelength of the signal is _____ m.
Ⓐ 3.10
Ⓑ 2.90
Ⓒ 4.71
Ⓓ 2.75
Ⓔ 3.84

22) According to the Heisenberg Uncertainty Principle, it is impossible to know precisely both the position and the _____ of an electron.
Ⓐ mass
Ⓑ color
Ⓒ momentum
Ⓓ shape
Ⓔ charge

23) The uncertainty principle states that _____.
Ⓐ matter and energy are really the same thing
Ⓑ it is impossible to know anything with certainty
Ⓒ it is impossible to know the exact position and momentum of an electron
Ⓓ there can only be one uncertain digit in a reported number
Ⓔ it is impossible to know how many electrons there are in an atom

24) All of the orbitals in a given electron shell have the same value of the _____ quantum number.
Ⓐ principal
Ⓑ azimuthal
Ⓒ magnetic
Ⓓ spin
Ⓔ psi

25) Which of the subshells below do <u>not</u> exist due to the constraints upon the azimuthal quantum number?
Ⓐ 2d
Ⓑ 2s
Ⓒ 2p
Ⓓ all of the above
Ⓔ none of the above

26) An electron cannot have the quantum numbers n = _____, l = _____, m_l = _____.
Ⓐ 2, 0, 0
Ⓑ 2, 1, -1
Ⓒ 3, 1, -1
Ⓓ 1, 1, 1
Ⓔ 3, 2, 1

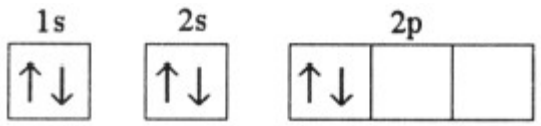
27) In a p_x orbital, the subscript x denotes the _____ of the electron.
Ⓐ energy
Ⓑ spin of the electrons
Ⓒ probability of the shell
Ⓓ size of the orbital
Ⓔ axis along which the orbital is aligned

28) The _____ orbital is degenerate with $5p_y$ in a many-electron atom.
Ⓐ 5s
Ⓑ $5p_x$
Ⓒ $4p_y$
Ⓓ $5d_{xy}$
Ⓔ $5d^2$

29) At maximum, an f-subshell can hold _____ electrons, a d-subshell can hold _____ electrons, and a p-subshell can hold _____ electrons.
Ⓐ 14, 10, 6
Ⓑ 2, 8, 18
Ⓒ 14, 8, 2
Ⓓ 2, 12, 21
Ⓔ 2, 6, 10

30) Which electron configuration represents a violation of the Pauli exclusion principle?

Ⓐ



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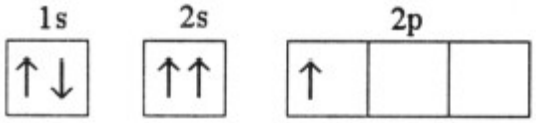

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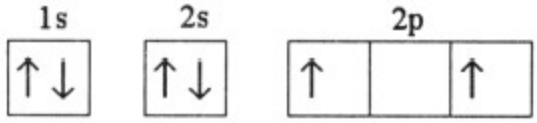

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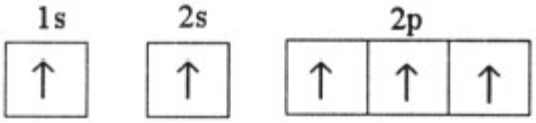
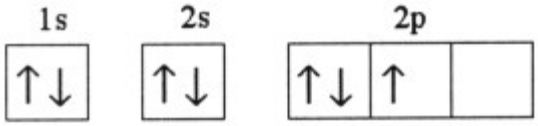


31) Which one of the following is the correct electron configuration for a ground-state nitrogen atom?

Ⓐ



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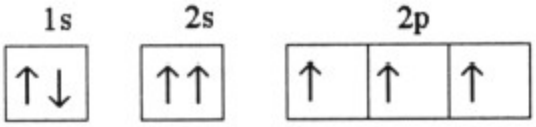

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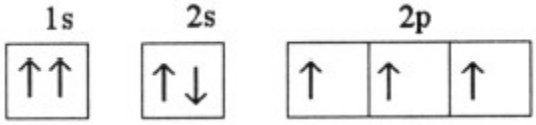

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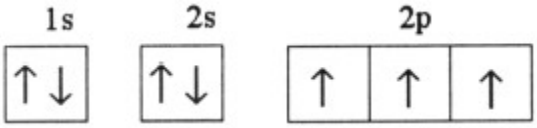
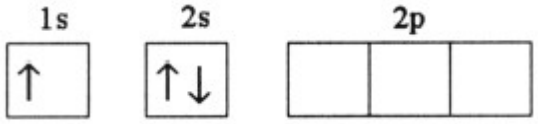


Ⓔ None of the above is correct.

32) Which electron configuration denotes an atom in its ground state?

Ⓐ



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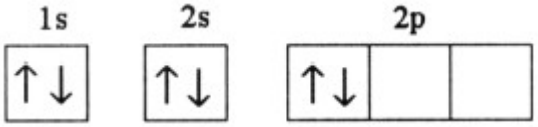

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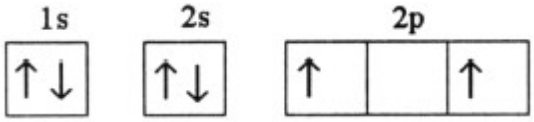

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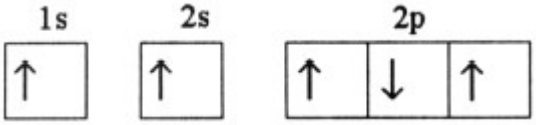


33) The ground state electron configuration of Fe is _____.

Ⓐ $1s^2 2s^2 3s^2 3p^6 3d^6$

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

Ⓒ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

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

Ⓔ $1s^2 2s^2 3s^2 3p^{10}$

34) The ground-state electron configuration of _____ is $[Ar]4s^1 3d^5$.

Ⓐ V

Ⓑ Mn

Ⓒ Fe

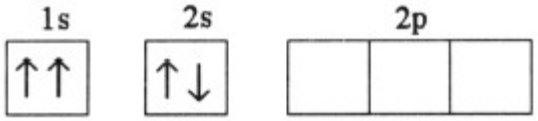
Ⓓ Cr

Ⓔ K

35) Which electron configuration represents a violation of Hund's rule for an atom in its ground state?

Ⓐ

Ⓑ



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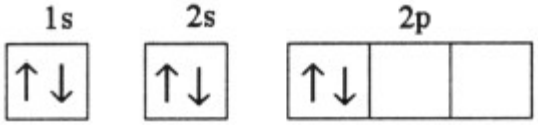

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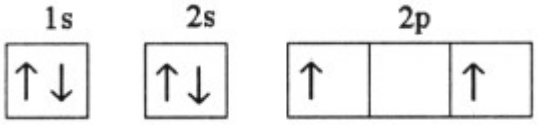

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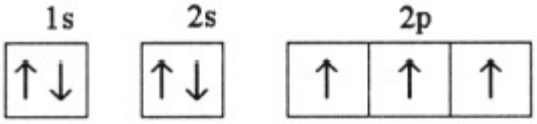

36) The lowest orbital energy is reached when the number of electrons with the same spin is maximized. This statement describes _____.

Ⓐ Pauli Exclusion Principle
Ⓑ Planck's constant
Ⓒ deBroglie hypothesis
Ⓓ Heisenberg Uncertainty Principle
Ⓔ Hund's rule

37) Which of the following elements has a ground-state electron configuration different from the predicted one?

Ⓐ Cu
Ⓑ Ca
Ⓒ Xe
Ⓓ Cl
Ⓔ Ti

38) The valence shell of the element X contains 2 electrons in a 5s subshell. Below that shell, element X has a partially filled 4d subshell. What type of element is X?

Ⓐ main group element
Ⓑ chalcogen
Ⓒ halogen
Ⓓ transition metal
Ⓔ alkali metal