Chapter 6

Quiz

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

2) Of the following, _____radiation has the shortest wavelength.
A) X-ray
B) radio
C) microwave
D) ultraviolet
E) infrared

3) Of the following transitions in the Bohr hydrogen atom, the _____transition results in the emission of the lowest-energy photon.
A) n = 1 → n = 6
B) n = 6 → n = 1
C) n = 6 → n = 3
D) n = 3 → n = 6
E) n = 1 → n = 4

4) In the Bohr model of the atom, _____.
A) electrons travel in circular paths called orbitals
B) electrons can have any energy
C) electron energies are quantized
D) electron paths are controlled by probability
E) both A and C

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

6) All of the orbitals in a given electron shell have the same value as the _____quantum number.
A) principal
B) angular momentum

C) magnetic
D) spin
E) psi

7) Which one of the following is not a valid value for the magnetic quantum number of an electron in a 5d subshell?
A) 2
B) 3
C) 0
D) 1
E) -1

8) Which of the subshells below do not exist due to the constraints upon the angular momentum quantum number?
A) 2d
B) 2s
C) 2p
D) all of the above
E) none of the above

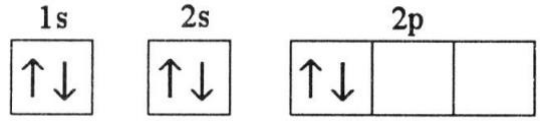
9) An electron cannot have the quantum numbers n = _____, l = _____, m_l = _____.
A) 2, 0, 0
B) 2, 1, -1
C) 3, 1, -1
D) 1, 1, 1
E) 3, 2, 1

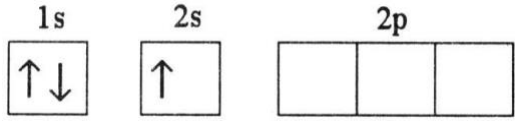
10) Which quantum number determines the energy of an electron in a hydrogen atom?
A) n
B) E
C) m_l
D) l
E) n and l

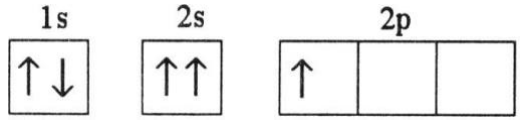
11) Which of the following is not a valid set of four quantum numbers? (n, l, m_l, m_S)
A) 2, 0, 0, +1/2
B) 2, 1, 0, -1/2
C) 3, 1, -1, -1/2
D) 1, 0, 0, +1/2
E) 1, 1, 0, +1/2

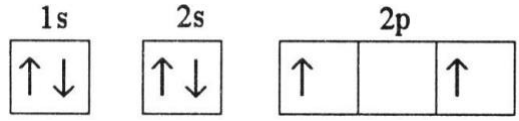
12) Which of the following is a valid set of four quantum numbers? (n, l, m_l, m_S)

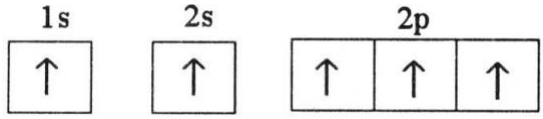
A) 2, 1, 0, +1/2
B) 2, 2, 1, -1/2
C) 1, 0, 1, +1/2
D) 2, 1, +2, +1/2
E) 1, 1, 0, -1/2

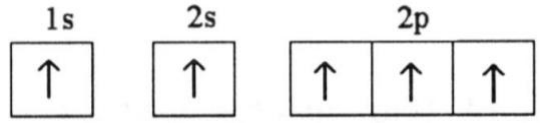
13) Which electron configuration represents a violation of the Pauli exclusion principle?
A)


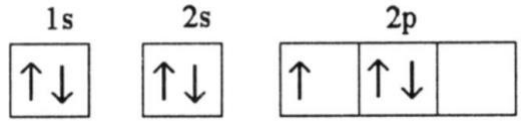
B)


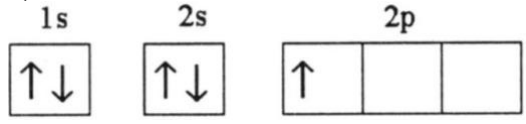
C)


D)


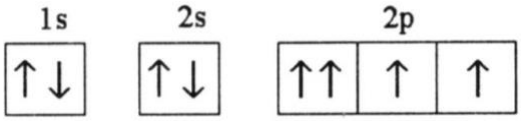
E)


14) Which electron orbital diagram represents a violation of the Aufbau principle?
A)


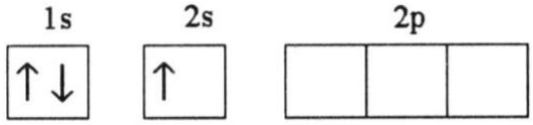
B)


C)


D)

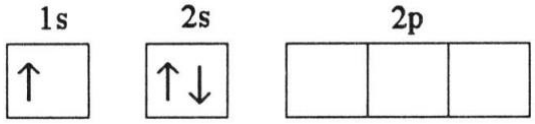


E)

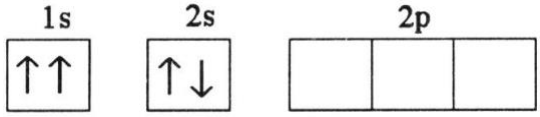


15) Which electron configuration represents a violation of Hund's rule for an atom in its ground state?

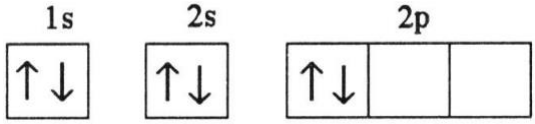
A)



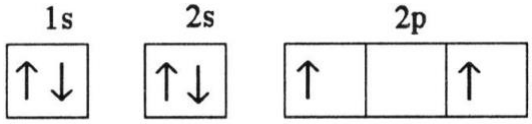
B)



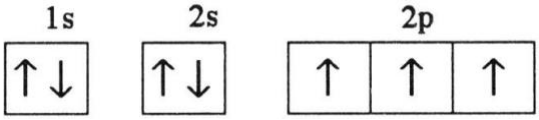
C)



D)

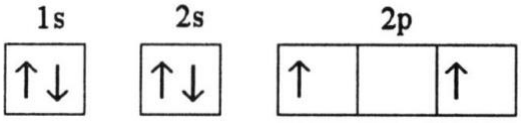


E)

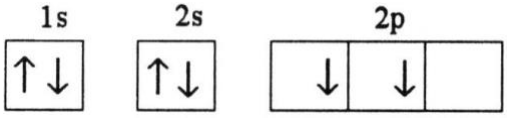


16) Which electron orbital diagram is written correctly for an atom without any violations?

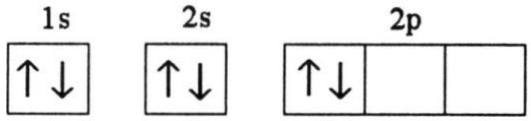
A)



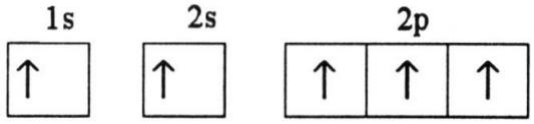
B)



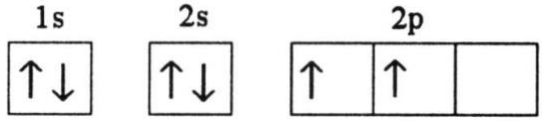
C)



D)



E)



17) The ground-state electron configuration of the element _____is $[Kr]5s^14d^5$.
A) Nb
B) Mo
C) Cr
D) Mn
E) Tc

18) The ground-state configuration of tungsten is _____.
A) $[Ar]4s^23d^3$
B) $[Xe]6s^24f^{14}5d^4$
C) $[Ne]3s^1$
D) $[Xe]6s^24f^7$
E) $[Kr]5s^24d^{10}5p^5$

19) Which two elements have the same ground-state electron configuration?
A) Pd and Pt
B) Cu and Ag
C) Fe and Cu
D) Cl and Ar
E) No two elements have the same ground-state electron configuration.

20) The wavelength of light that has a frequency of 1.20×10^{13} s^{-1} is _____m.
A) 25.0
B) 2.50×10^{-5}
C) 0.0400
D) 12.0
E) 2.5

21) Ham radio operators often broadcast on the 6-meter band. The frequency of this electromagnetic radiation is _____MHz.
A) 500
B) 200
C) 50
D) 20
E) 2.0

22) What is the wavelength of light (nm) that has a frequency of 3.22×10^{14} s^{-1}?
A) 932 nm
B) 649 nm
C) 9.66×10^{22} nm
D) 9.32×10^{-7} nm
E) 1.07×10^{6} nm

23) Visible light with a wavelength of 550 nm has a frequency of _____Hz.
A) 5.5×10^{5}
B) 1.7×10^{11}
C) 5.5×10^{14}
D) 1.7×10^{2}
E) 5.5×10^{17}

24) The wavelength of a photon that has an energy of 6.33×10^{-18} J is _____m.
A) 3.79×10^{-7}
B) 3.10×10^{-8}
C) 2.38×10^{23}
D) 4.21×10^{-24}
E) 9.55×10^{15}

25) What is the energy of a photon (J) that has a wavelength of 105 nm?
A) 1.89×10^{-13}
B) 1.89×10^{-32}
C) 1.89×10^{-18}
D) 1.89×10^{-36}
E) 1.89×10^{-27}

26) Using Bohr's equation for the energy levels of the electron in the hydrogen atom, determine the energy (J) of an electron in the n = 4 level.
A) -1.36×10^{-19}
B) -5.45×10^{-19}

C) -7.34×10^{18}
D) -1.84×10^{-29}
E) $+1.84 \times 10^{-29}$

27) The energy (J) required for an electronic transition in a Bohr hydrogen atom from n = 1 to n = 3 is _____J.
A) -8.90×10^{-1}
B) 3.00×10^{-19}
C) -3.00×10^{-19}
D) 1.94×10^{-18}
E) 8.90×10^{-1}

28) The frequency of electromagnetic radiation required to promote an electron from n = 2 to n = 4 in a Bohr hydrogen atom is _____Hz.
A) 4.13×10^{-19}
B) 6.17×10^{14}
C) 5.46×10^{-19}
D) 8.22×10^{14}
E) 4.13×10^{19}

29) When the electron in a hydrogen atom moves from n = 6 to n = 1, light with a wavelength of _____nm is emitted.
A) 487
B) 411
C) 434
D) 93.8
E) 657

30) Each d-subshell can accommodate a maximum of _____electrons.
A) 6
B) 2
C) 10
D) 3
E) 5

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