1.

The ground state electron configuration of $1s^2 2s^2 2p^6 3s^2 3p^3$ corresponds to an atom of which element?

1. Si
2. S
3. P
4. Al
5. Cl

2.

What is the wavelength of light emitted when the electron in a hydrogen atom undergoes a transition from level n = 6 to level n = 3?
$R_H = 2.179 \times 10^{-18}$ J

1. 182 nm
2. 1095 nm
3. 91 nm
4. 548 nm
5. 304 nm

3.

Which of the following electron configurations is *not* possible?

1. $1s^2\ 1p^3$
2. $1s^2\ 2s^2\ 2p^6\ 3s^1$
3. $1s^2\ 2s^2\ 2p^1$
4. $1s^2\ 2s^2\ 2p^5$
5. $1s^2\ 2s^2\ 2p^3$

4.

What is the wavelength of the photon required to cause the electron in a hydrogen atom to undergo a transition from the n = 4 state to the n = 10 state? ($c = 3.00 \times 10^8$ m/s, $h = 6.63 \times 10^{-34}$ J s)

1. 1.74×10^3 nm
2. 5.75×10^{-4} nm
3. 3.29×10^3 nm

4. 1.74×10^{-15} nm
5. 5.75×10^{14} nm

5.

What is the velocity of an electron whose de Broglie wavelength is 0.25 nm? mass of an electron = 9.11×10^{-31} kg

1. 3.4×10^{-7} m/s
2. 5.5×10^{12} m/s
3. 2.9×10^{6} m/s
4. 1.8×10^{-13} m/s
5. 3.4×10^{2} m/s

6.

Degenerate orbitals are those that

1. are closest to the nucleus.
2. are completely filled.
3. are the outermost orbitals.
4. have equivalent energies.
5. are incomplete.

7.

Which quantum number indicates the principal energy level of the orbital?

1. secondary quantum number
2. electron spin quantum number
3. principal quantum number
4. magnetic quantum number
5. angular momentum quantum number

8.

What is the maximum number of electrons in n = 2?

1. 8
2. 4
3. 1
4. 2
5. 6

9.

Which of the following best describes Hund's rule?

1. When orbitals of equal energy are available, the lowest energy configuration for an atom has the maximum number of unpaired electrons with parallel spins.
2. As protons are added to the nucleus increasing the atomic number of the atom, electrons are added successively to the next highest energy orbital.
3. There is an ultimate uncertainty in the position and the momentum of a particle.
4. A mathematical function that is used in the Schrödinger equation.
5. In a given atom, no two electrons can have the same set of the four quantum numbers.

10.

A possible value of the magnetic quantum number m_l for a 5d electron is

1. 3.
2. –6.
3. 2.
4. 4.
5. 5.

11.

From a consideration of electronic configurations, which of the elements indicated below would be classified as a *transition* element?

1. $1s^2\ 2s^2\ 2p^1$
2. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^5$
3. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8\ 4s^2$
4. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$
5. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$

12.

An angstrom is

1. a unit of time used primarily by physicists.
2. a unit of pressure.
3. a unit of force.
4. equal to 10^{10} m.
5. a unit of distance.

13.

What is the frequency of the photon required to cause the electron in a hydrogen atom to undergo a transition from the $n = 2$ state to the $n = 10$ state? ($c = 3.00 \times 10^8$ m/s, $h = 6.63 \times 10^{-34}$ J s)

1. 1.27×10^{-15} Hz
2. 7.89×10^{14} Hz
3. 5.23×10^{-19} Hz
4. 5.14×10^{13} Hz
5. 3.80×10^{-7} Hz

14.

What is the ground state electron configuration of a Cu^{2+} ion?

1. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^9$
2. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$
3. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^8$
4. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{11}$
5. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$

15.

The value of the quantum number, l, for a 5p electron is

1. 3.
2. 2.
3. 4.
4. 1.
5. 0.

16.

How many values are there for the magnetic quantum number when the value of the angular momentum quantum number is 2?

1. 17
2. 5
3. 1
4. 3
5. 13

17.

The maximum number of electrons in a 4p subshell is

1. 5.
2. 1.
3. 4.

4. 2.
5. 6.

18.

Which of the following ranges of electromagnetic radiation has the greatest energy?

1. gamma rays
2. visible
3. infrared
4. TV waves
5. ultraviolet

19.

Which of the following sets of the four quantum numbers (n, l, m_l, m_s) correctly describes an electron occupying a d orbital of an element in the second transition series?

1. 5 0 0 -½
2. 5 2 1 -½
3. 5 1 1 +½
4. 5 4 -1 -½
5. 5 3 2 +½

20.

Which of the following statements best describes the Heisenberg uncertainty principle?

1. The location and momentum of a particle can be determined accurately, but not the identity of the particle.
2. It is impossible to accurately know both the exact location and momentum of a particle.
3. The exact position of an electron is always uncertain.
4. The location and momentum of a macroscopic object are not known with certainty.
5. The velocity of a particle can only be estimated.