

## THE ELECTRON PRACTICE PROBLEM SET

Select the term from the notes given in class that best matches each description.

1. The lowest-energy arrangement of electrons in a subshell is obtained by putting electrons into separate orbitals of the subshell before pairing electrons was proposed by \_\_\_\_\_.
2. \_\_\_\_\_ said an atomic orbital can hold no more than two electrons.
3. The modern description of the location and energy of electrons in an atom is the \_\_\_\_\_.
4. \_\_\_\_\_ principle states that electrons enter orbitals of lowest energy first.
5. The distance between two adjacent crests of an electromagnetic wave is the \_\_\_\_\_.
6. \_\_\_\_\_ is produced by passing the light emitted by an element through a prism.
7. \_\_\_\_\_ is sometimes produced when light shines on metals
8. In the equation  $E = h\nu$ ,  $h$  is \_\_\_\_\_.
9. Einstein proposed that light is composed of particle-like quanta of energy; light quanta are known as \_\_\_\_\_.
10. Louis de Broglie developed the idea that matter in motion exhibits \_\_\_\_\_ properties.

Circle the letter of the best answer in the blank

11. The fourth principle energy level has:
  - a. Four orbitals
  - b. Sixteen orbitals
  - c. thirty-two orbitals
  - d. nine orbitals
12. If the electron configuration of an element is  $1s^2 2s^2 2p^6 3s^2 3p^5$ , the element is:
  - a. Iron.
  - b. Bromine.
  - c. chlorine
  - d. phosphorus
13. The quantum mechanical model of the atom:
  - a. is concerned with the probability of finding an electron in a certain position
  - b. was proposed by Neils Bohr
  - c. defines the exact path of an electron around the nucleus
  - d. has many analogies in the visible world
14. The electron configuration of Calcium is:
  - a.  $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2$
  - b.  $1s^2 2s^2 2p^6 3s^2 3p^4$
  - c.  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$
  - d.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
15. The maximum number of electrons that can occupy the third principal energy level is:
  - a. 18
  - b. 32
  - c. 2
  - d. 8

16. As the frequency of light increases, the wavelength:
- Increases
  - Remains the same
  - decreases
  - approaches the speed of light
17. In order to occupy the same orbital, two electrons must have:
- The same direction of spin
  - Low energy
  - opposite charge
  - opposite spin
18. According to Hund's rule, when electrons occupy orbitals of equal energy, one electron enters each orbit until:
- All the orbitals contain one electron, with spins parallel
  - All the orbitals contain one electron, with opposite spins
  - There are two electron in each orbital
  - Electron velocities become constant
19. Identify the elements that have the following electron configurations:
- $1s^2 2s^2 2p^6 3s^2 3p^1$
  - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$
  - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$
20. Consider the elements neon, bromine, and phosphorus. Which has:
- Three electrons in its 3p sublevel
  - Its highest energy level completely filled
  - The highest occupied energy level
21. Identify the elements described below:
- Contains a full second energy level
  - Contains the first d electron
  - Contains 7 electrons in its 4<sup>th</sup> energy level
  - Contains only 2 electrons in its fifth energy level
22. Given the electron configuration for phosphorus is  $1s^2 2s^2 2p^6 3s^2 3p^3$
- How many electrons are in each atom?
  - What is the atomic number of this element?
  - Write its orbital notation.
  - How many unpaired electrons does an atom of phosphorus have?
  - What is its highest occupied energy level?
  - How many inner-shell electrons does the atom contain?
  - In which orbitals are these inner-shell electrons located?
23. Write the electron configurations for the atoms: Ne, Al, Sr, Mo, Sn, and Xe