Review I: Quantum Numbers & Electron Configuration

IB_ 2011-2012

Fill in the blank

1. The distance between comparable points (i.e. peak to peak or trough to trough) of a wave is called the __________________.

2. The number of wave passing a stationary point in a specified time interval is called the _____________.

3. Plank suggested that all energy gained or lost by an atom must be some integer multiple of a minimum amount of energy called a (n) _______________.

4. A spectrum that contains light of all colors is called a (n) _______________ spectrum.

5. An atom with its electrons in the lowest possible energy levels in said to be to be in the ___________ _____________.

6. According to Bohr, atomic lines spectrum occur when electrons move between ______ _____.

7. According to Heisenberg's uncertainty principle, if one attempts to simultaneously measure the energy and position of an electron in an atom, the more exactly the energy is measured, the greater will be the __________________ in the position measurement.

8. The electron density is the _________________ of finding an electron within a given region of space.

9. Each quantum number has a different meaning. **The principal quantum number, n,** is a measure of the most probable ___________________ from the nucleus; **l, the angular momentum quantum number,** is related to the __________________ of the electron orbitals, and **m_l, the magnetic quantum number,** specifies in which ______________ within a subshell the electron is located.

10. a. When **n** = 5, which of the following values are possible for **l:**
l = -1, 0, 3, 5, or 6? ________

b. When **l** = 3, which of the following values are possible for **m_l:**
m_l = -2, 0, 3, or 4 ________

11. The size of an **s** orbital increases as the value of the quantum number __________ increases.

12. The Pauli's Exclusion Principle states that no two electrons in an atom can have the same set of four ____________ _________________.

13. Each atomic orbital can be occupied by no more than ___________ electrons and these electrons must have the opposite ____________.

14. For each pair, circle the atomic orbital that is **lower** in energy:
a. 4s or 3d b. 4p or 5s

15. According to Hund's Rule, when electrons are assigned to different orbitals in the same subshell, the most stable arrangement is that with the maximum number of _________ ___________.

16.Write the **complete electron configurations** for each of the following elements:

a. $_{15}P$ _____

b. $_{29}Cu$ _____

17.Write the **shorthand electronic configuration** for the following:

a. Mo^{+3} _____

b. Br^{-1} _____

c. Fe^{+2} _____

18. What is the maximum number of electrons that can be identified with each of the following sets of quantum numbers?

a. n = 3 _____

b. n = 3, l = 2, m_l = -2 _____

19. Name each of the following elements based on the information provided:

a. The electronic configuration is $[Ar]4s^2 3d^8$ _____

b. The element whose +3 ion has the configuration $[Ar]3d^2$ _____

c. The element in the third period with the greatest number of **d** electrons _____

20. The electronic configuration of **A** and **B**, two unknown elements, are:

A = . . . $3s^2 3p^5$ **B** = . . . $3s^2 3p^2$

a. Indicate whether each element is a (i) metal (ii) metalloid or (iii) nonmetal

A _____ **B** _____

b. Predict the formula of a likely compound formed only by these two elements:

_____

21. Use the Aufbau principle to write the electron configuration of an atom of germanium.

_____

22. Determine the full electron configuration of an atom of Si, an Fe^{3+} ion and a P^{3-} ion.

Si : _____

Fe^{3+} : _____

P^{3-} : _____