

Atomic Theory Problem Set

1. The fact that a sample of carbon monoxide will consist of carbon and oxygen in the weight ratio 3:4 illustrates which of the following principles?
 - a. conservation of matter and energy
 - b. the Bohr frequency rule
 - c. the law of simple multiple proportions
 - d. the law of partial pressures
 - e. none of the above
2. The emission spectrum of hydrogen is not a continuous spectrum but a line spectrum. This led Bohr to conclude that:
 - a. the hydrogen atom consists of an electron and a proton
 - b. electron energy states are quantized
 - c. light comes in discrete packages of energy called quanta
 - d. one cannot describe the exact position of an electron concurrently with its exact momentum
 - e. all of the above
3. The energy of a photon:
 - a. is directly proportional to its wavelength
 - b. is inversely proportional to its frequency
 - c. is directly proportional to its frequency
 - d. two of the above are correct
 - e. none of the above
4. For an electron in an atom, if the principle quantum number, n , the angular momentum quantum number, l , and the magnetic quantum number, m_l , all are known,
 - a. the electron shell is known
 - b. the subshell is known
 - c. the orbital is known
 - d. all of the above are known
 - e. none of the above
5. The fact that chemical changes could be caused by the passage of electricity through solutions of chemical compounds, led researchers to conclude that:
 - a. matter is electrical in nature
 - b. electricity is a fluid
 - c. the reactions in question were endothermic
 - d. the reactions in question were exothermic
 - e. none of the above

6. Cathode rays...

- a. are negatively charged
- b. can be bent by an electrical or magnetic field
- c. are composed of electrons
- d. have mass
- e. all of the above

7. An electron exists in a p orbital, therefore

- a. The principle quantum number, n , is at least 2
- b. The angular momentum quantum number, l , must be 1
- c. The magnetic quantum number, m_l , can be -1, 0, or 1
- d. all of the above are true
- e. only two of the above are true

8. Which of the following is the proper ground state orbital diagram for neutral carbon?



9. Which of the following electron configurations are forbidden?

- a. $1s^2 2s^2 2p^4 3s^1 3p^6$
- b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$
- c. $1s^2 2s^2 2p^6 3s^2 3p^6 4d^7$
- d. $2s^2$
- e. none of the above