Chapter 7,8 Classwork

Electromagnetic Radiation, Quantum Mechanics

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| --- | --- | --- | --- | --- | --- |
| **E = -2.178 X 10-18J ( 1 - 1 )**    **(nfinal)2 (ninitial) 2** | c = υ | υ = |  = | E = hυ | E = |
| c = 3.0 x 108 m/s | | h = 6.626 x 10-34 J·s | | | |

1. Calculate the wavelength of electromagnetic radiation that has a frequency of 5.56 MHz.

2. Calculate the frequency of electromagnetic radiation that has a wavelength equal to 667 nm.

3. The longest wavelength of light with enough energy to break the Cl-Cl bond in Cl2(g) is 495 nm.

a. Calculate the frequency in s-1 of the light.

b. Calculate the energy, in J, of a photon of the light.

4. Calculate the change in energy of an electron in the n=2 energy level of hydrogen that moves to the n =3 energy level.

a. If a photon of light had this energy, what would its wavelength be?

Electron Configuration

5. The correct sequence in ascending energies of atomic sublevels is

a. 4d, 5s, 5p, 6s b. 5s, 4d, 5p, 6s c. 5s, 4d, 6s, 5 d. 5s, 5p, 4d, 6s

6. The statement that an electron occupies the lowest energy orbital that can receive it is

a. Hund’s Rule b. Bohr’s Law c. Aufbau Principle d. Pauli Exclusion Principle

7. The electron-configuration notation for scandium (Atomic Number 21) would show the three highest energy electrons to have the notation

a. 3d14s2 b. 4s2  c.3d3 d. 4s24p1

8. The element with the electron configuration notation 1s­­­22s22p63s23p2 is

a. Mg b. S c. P d. Si

9. “Orbitals of equal energy are each occupied by one electron before any one electron is occupied by a second electron and all electrons in singly occupied orbitals must have the same spin” is a statement of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. The electron configuration for carbon (C) is 1s22s22p2. The atomic number of carbon is \_\_\_\_\_\_\_\_\_

11. Suppose that a stable element with atomic number 119. Symbol Q, has been discovered.

a. Write the ground state electron configuration for Q showing ONLY valence electrons \_\_\_\_\_\_\_\_\_\_.

b. Would Q be a metal or a nonmetal? Explain in terms of electron configuration.

c. On the basis of periodic trends, would Q have the largest atomic radius in its group or the smallest. Explain.

d. What would the most likely charge of the Q ion in stable ionic compounds?

e. Write a balanced chemical equation that would represent the reaction of Q with water.

f. Assume that Q reacts to form a carbonate compound.

i. Write the formula for the compound formed between Q and the carbonate ion (CO3-2)

ii. Predict whether or not the compound would be soluble in water. Explain.

12. The number of electrons in the highest energy level of argon (Atomic Number 18) is \_\_\_\_\_\_\_\_\_\_\_

13. An element with eight electrons in its outermost main energy level is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_

14. Consider the two chemical species S and S2-

a. Write the electron configuration for both species.

b. Explain why (in terms of coulombic attractions – you know opposite charges attract and like charges repel) the S2- ion is larger than the S atom.

c. Which of the two species would be attracted into a magnetic field?

Periodicity

15. Which of the following elements has the largest atomic radius?

a) Li

b) Na

c) Rb

d) B

e) I

16. Which of the following describes the energy change associated with the process, Na(g) ==> Na+(g) + e-?

a) First Electron Affinity

b) Electronegativity

c) First Ionization Energy

d) Second Ionization Energy

e) None of the Above

17. Consider the elements of group I. All of the following properties increase down the group, EXCEPT;

a) Number of electron shells occupied

b) Number of electrons

c) Ionic Size

d) Atomic Size

e) First Ionization Energy