AP Chemistry

Study Guide
Chapter 6

Name: _____

Date: _____ Per: _____

$c = \lambda\nu$	**λ = wavelength**	**c = speed of light (3.0×10^8 m/s)**
$E = h\nu$	**ν = frequency**	**h = Planck's constant (6.6262×10^{-34} J•s)**
	E = energy	

1. What is the wavelength of a wave having a frequency of $3.76 \times 10^{14}\ s^{-1}$?

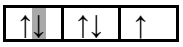
2. What is the frequency of a 6.9×10^{-13} m wave?

3. How does the increased size of the energy level drop for an electron relate to the energy emitted?

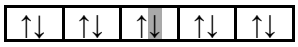
4. What is the wavelength of a 1.528×10^{-13} J wave?

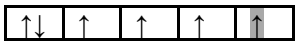
5. What is the energy of a 9330cm wave?

6. Write the quantum numbers for the **shaded** electron in the following diagrams:

   a. 3p orbitals  _____

   b. 5s orbital  _____

   c. 4d orbitals  _____

   d. 3d orbitals  _____

7. Fill in the following table regarding sublevels and orbitals.

Sublevel	Shape	Number of Orbitals	Maximum Number of Electrons
s			
p			
d			
f			

8. The distribution of electrons among orbitals is given by the atom's _____.
9. When electrons are located in the lowest energy orbitals possible the atom is said to be _____.
10. When electrons absorb energy, they are said to be _____.
11. As electrons lose energy, they give off that energy in the form of _____.
12. How many sub-levels are <u>completely</u> filled in:

    a. Sn ____ c. Ga ____ e. I^- ____

    b. V ____ d. Zn ____

13. How many orbitals are <u>partially</u> filled in:

    a. As ____ c. Ag ____ e. Se^{2-} ____

    b. Fe ____ d. Zr ____

Study Guide
Chapter 6

Name: _____

Date: _____ Per: _____

14. Write the complete electron configuration for the following elements:

a. Cl _____

b. Kr _____

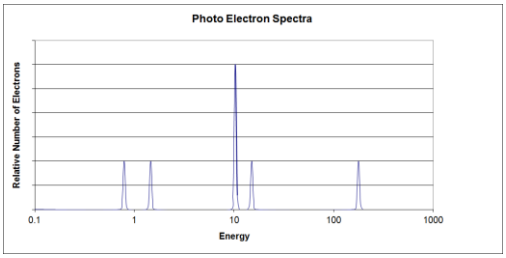
c. Sc _____

d. K _____

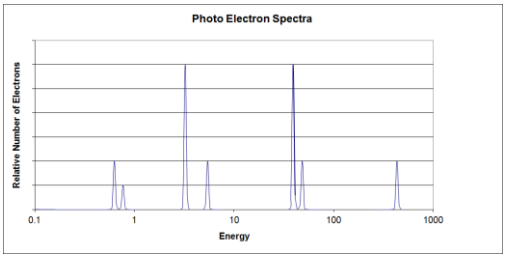
e. Li _____

f. Sn _____

15. Identify the following elements based on their PES data:

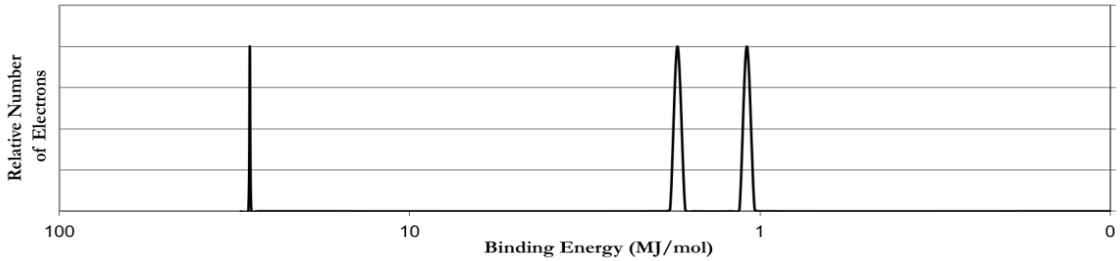


The element is _____.



The element is _____.

16. Refer to the PES spectrum below. Make note of the relative energies of each peak.

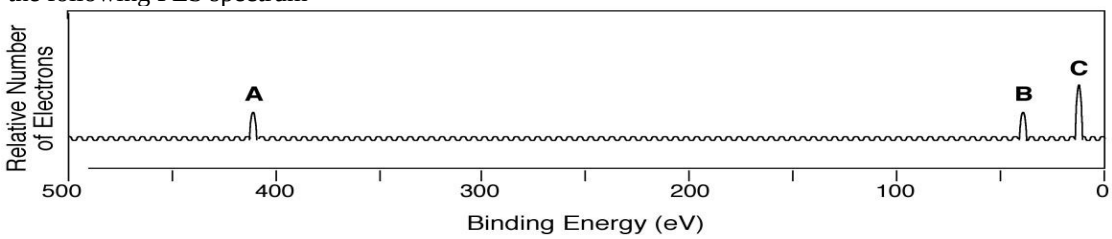


a. How do the peak heights compare? What does this tell us about the relative number of electrons represented by each? _____

b. If the peaks shown represent all electrons in this atom, identify the element. _____

c. Which peak represents the core (innermost) electrons? Explain. _____

17. Consider the following PES spectrum



a. Using the plot, write the electron configuration of the element, and identify it. _____

b. Label each peak with the appropriate shell and subshell.

c. Suggest a reason for the huge jump in energy between peak A and peak B. _____

d. This element has a very high first ionization energy *and* a very high electron affinity. Would you expect it to form a cation or anion? What would be the charge of the ion? Justify your answers. _____

e. Write the electron configuration for the ion. _____

f. How would the radius of the ion compare to the radius of the neutral atom. Use Coulomb's law to justify your response. _____