Name KEY Date _____ Class 1st Qtr 1y

5 ELECTRONS IN ATOMS

Practice Problems

In your notebook, solve the following problems.

SECTION 5.1 MODELS OF THE ATOM

1. How many sublevels are in the following principal energy levels?
   - a. $n = 1$ 1
   - b. $n = 2$ 2
   - c. $n = 3$ 3
   - d. $n = 4$ 4
   - e. $n = 5$ 5
   - f. $n = 6$ 6
2. How many orbitals are in the following sublevels?
   - a. 1*s* sublevel 1
   - b. 5*s* sublevel 1
   - c. 4*d* sublevel 5
   - d. 4*f* sublevel 7
   - e. 7*s* sublevel 1
   - f. 3*p* sublevel 3
   - g. fifth principal energy level 16
   - h. 6*d* sublevel 5
3. What are the types of sublevels and number of orbitals in the following energy levels?
   - a. $n = 1$ s-1
   - b. $n = 2$ s-1 p-3
   - c. $n = 3$ s-1 p-3 d-5
   - d. $n = 4$ s-1 p-3 d-5 f-7
   - e. $n = 5$ s-1 p-3 d-5 f-7

SECTION 5.2 ELECTRON ARRANGEMENT IN ATOMS

1. Write a complete electron configuration of each atom.
   - a. hydrogen $1s^1$
   - b. vanadium $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$ $1s^2 2s^2 2p^6 3s^2$
   - c. magnesium
   - d. barium $[Xe]\,6s^2$
   - e. bromine $[Ar]\,4s^2 3d^{10} 4p^5$
   - f. sulfur $[Ne]\,3s^2 3p^4$
   - g. krypton $[Ar]\,4s^2 3d^{10} 4p^6$
   - h. arsenic $[Ar]\,4s^2 3d^{10} 4p^3$
   - i. radon $[Xe]\,6s^2 4f^{14} 5d^{10} 6p^6$

SECTION 5.3 PHYSICS AND THE QUANTUM MECHANICAL MODEL

$\lambda = c/\nu$ $E = h \times \nu$

1. What is the wavelength of the radiation whose frequency is $5.00 \times 10^{15}\ s^{-1}$? In what region of the electromagnetic spectrum is this radiation? 6.00×10^{-6} cm, UV
2. An inexpensive laser that is available to the public emits light that has a wavelength of 670 nm. What are the color and frequency of the radiation? $4.48 \times 10^{14}\ s^{-1}$ Red
3. What is the energy of a photon whose frequency is $2.22 \times 10^{14}\ s^{-1}$? 1.47×10^{-19} J
4. What is the frequency of a photon whose energy is 6.00×10^{-15} J? $9.05 \times 10^{18}\ s^{-1}$
5. Arrange the following types of electromagnetic radiation in order of increasing frequency.
   - a. infrared 3
   - b. gamma rays 6
   - c. visible light 4
   - d. radio waves 1
   - e. microwaves 2
   - f. ultraviolet 5
6. Suppose that your favorite AM radio station broadcasts at a frequency of 1600 kHz. What is the wavelength in meters of the radiation from the station? 1.88×10^{2} m

$c = 3.00 \times 10^{8}$ m/s

© Pearson Education, Inc., publishing as Pearson Prentice Hall. All rights reserved.