

**ATOMIC STRUCTURE REVIEW WORKSHEET:** Name: \_\_\_\_\_

1. 1. What are cathode rays? Why are they called cathode rays? Do the cathode rays have a charge, if so what is the charge on each particle?
  
2. What are the differences in charge and mass among protons, neutrons, and electrons?
  
3. A particular atom of potassium contains 19 protons, 19 electrons, and 20 neutrons. What is the atomic number of this atom? What is the mass number? Write the symbol for this potassium nucleus (as we did in class.)
  
4. a. How many electrons, neutrons, and protons are in atoms of chlorine with a mass number of 35 (neutral state)?  
b. How many of each is in the atoms of thorium with a mass number of 232 (neutral state)?
  
5. Yttrium was discovered in 1794. It is one of the elements used in superconductors. How many electrons, protons, and neutrons are in an atom of yttrium-88 (neutral state)?
  
6. Compare the amount of energy involved in chemical changes to the amount of energy resulting from nuclear changes.
  
7. What are the differences among the three types of natural radiation?
  
8. How many neutrons and protons are in each of the following nuclides?
  - a. a. carbon-14
  - b. b. phosphorus-32
  - c. c. nickel-63
  - d. d. iridium-192
  - e. e. iron-54
  - f. f. neptunium-235
  
9. Find the average atomic mass of silver if 51.83% of the silver atoms occurring in nature have a mass of 106.905 amu and 48.17% of the atoms have a mass of 108.905 amu.

10. Find the average atomic mass of krypton if the relative amounts are as follows:

Isotopic Mass	Percentage
77.920 amu	0.350
79.916 amu	2.27
81.913 amu	11.56
82.914 amu	11.55
83.912 amu	56.90
85.911 amu	17.37

11. What is the energy of a quantum of light with a frequency of  $4.31 \times 10^{14}$  Hz?

12. A certain violet light has a wavelength of 413 nm. What is the frequency of the light? The velocity of light is equal to  $3.00 \times 10^8$  m/s

13. A certain green light has a frequency of  $6.26 \times 10^{14}$  Hz. What is the wavelength?

14. What is the energy content of one quantum of light in Problem 12?

15. What is the energy of light with a wavelength of 662 nm? First find the frequency in hertz of this wavelength of light.

16. Photoelectric devices rely on the ability of light to remove electrons from the surface of some substances. The energy required to release an electron from atoms on the surface of a certain substance is  $3.60 \times 10^{-19}$  J. What is the wavelength of light that would be necessary to cause electrons to leave the surface of the substance?