Name: _____
Modern Physics Unit - Models of the Atom

1) Excited hydrogen atoms are all in the $n = 3$ state. How many different photon energies could possibly be emitted as these atoms return to the ground state?

2) An electron in a mercury atom drops from energy level *i* to the ground state by emitting a single photon. This photon has an energy of

A) 8.82 eV B) 1.56 eV C) 11.94 eV D) 10.38 eV

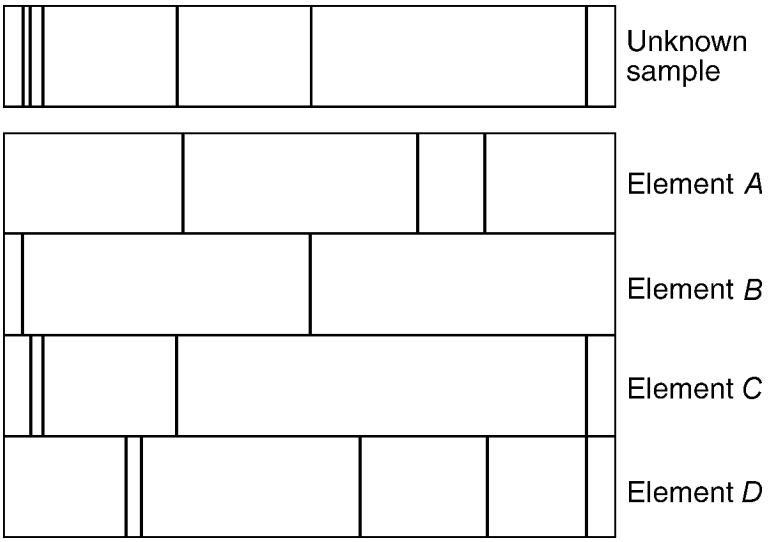
3) How much energy is required to move an electron in a mercury atom from the ground state to energy level *h*?

4) A hydrogen atom with an electron initially in the $n = 2$ level is excited further until the electron is in the $n = 4$ level. This energy level change occurs because the atom has

5) The electron in a hydrogen atom drops from energy level $n = 2$ to energy level $n = 1$ by emitting a photon having an energy of approximately

A) 7.4×10^{-18} J B) 2.2×10^{-18} J C) 1.6×10^{-18} J D) 5.4×10^{-19} J

6) The diagram below represents the bright-line spectra of four elements, *A*, *B*, *C*, and *D*, and the spectrum of an unknown gaseous sample.



Based on comparisons of these spectra, which two elements are found in the unknown sample?

A) *A* and *D* B) *C* and *D* C) *A* and *B* D) *B* and *C*

7) White light is passed through a cloud of cool hydrogen gas and then examined with a spectroscope. The dark lines observed on a bright background are caused by

A) constructive interference
B) the hydrogen emitting all frequencies in white light
C) the hydrogen absorbing certain frequencies of the white light
D) diffraction of the white light

8) In the currently accepted model of the atom, what does a fuzzy cloud around a hydrogen nucleus represent?

A) The presence of water vapor in the atom.
B) The general region where the atom's proton is most probably located.
C) The general region where the atom's electron is most probably located.
D) The electron's actual path, which is not a circular orbit.

9) An electron in a hydrogen atom drops from the $n = 3$ energy level to the $n = 2$ energy level. What is the energy of the emitted photon?

10) What is the minimum energy needed to ionize a hydrogen atom in the $n = 2$ energy state?

11) Experiments performed with light indicate that light exhibits

A) both particle and wave properties
B) particle properties, only
C) neither particle nor wave properties
D) wave properties, only

12) After electrons in hydrogen atoms are excited to the $n = 3$ energy state, how many different frequencies of radiation can be emitted as the electrons return to the ground state?

A) 1 B) 2 C) 3 D) 4

13) Alpha particles were directed at a thin metal foil. Some particles were deflected into hyperbolic paths due to

A) magnetic repulsion
B) gravitational attraction
C) electrostatic attraction
D) electrostatic repulsion