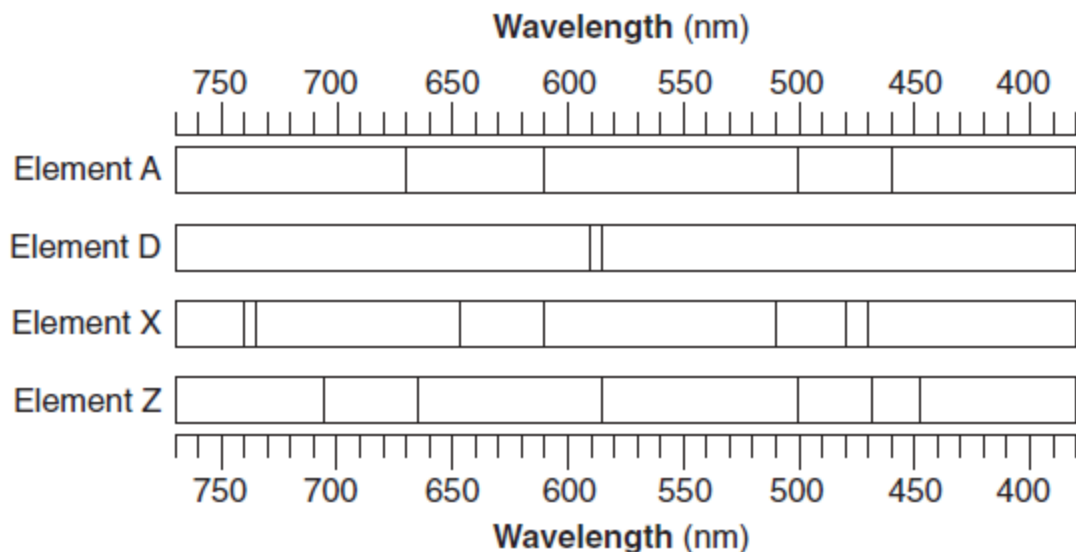


1. A specific amount of energy is emitted when excited electrons in an atom in a sample of an element return to the ground state. This emitted energy can be used to determine the

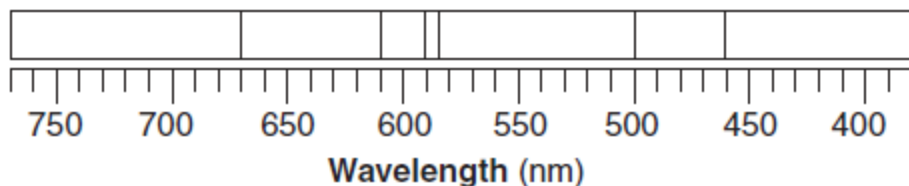
- A) mass of the sample
- B) volume of the sample
- C) identity of the element
- D) number of moles of the element

2. The bright-line spectra produced by four elements are represented in the diagram below.

Bright-Line Spectra of Four Elements



Given the bright-line spectrum of a mixture formed from two of these elements:



Which elements are present in this mixture?

- A) *A* and *D*
- B) *A* and *X*
- C) *Z* and *D*
- D) *Z* and *X*

3. The bright-line spectrum of an element in the gaseous phase is produced as
- A) protons move from lower energy states to higher energy states
 - B) protons move from higher energy states to lower energy states
 - C) electrons move from lower energy states to higher energy states
 - D) electrons move from higher energy states to lower energy states
4. The light emitted from a flame is produced when electrons in an excited state
- A) absorb energy as they move to lower energy states
 - B) absorb energy as they move to higher energy states
 - C) release energy as they move to lower energy states
 - D) release energy as they move to higher energy states
5. As an electron in an atom moves from the ground state to the excited state, the electron
- A) gains energy as it moves to a higher energy level
 - B) gains energy as it moves to a lower energy level
 - C) loses energy as it moves to a higher energy level
 - D) loses energy as it moves to a lower energy level
6. Which electron configuration represents an atom of chlorine in an excited state?
- A) 2-8-7
 - B) 2-8-8
 - C) 2-8-6-1
 - D) 2-8-7-1
7. During a flame test, ions of a specific metal are heated in the flame of a gas burner. A characteristic color of light is emitted by these ions in the flame when the electrons
- A) gain energy as they return to lower energy levels
 - B) gain energy as they move to higher energy levels
 - C) emit energy as they return to lower energy levels
 - D) emit energy as they move to higher energy levels
8. Compared to a sodium atom in the ground state, a sodium atom in the excited state must have
- A) a greater number of electrons
 - B) a smaller number of electrons
 - C) an electron with greater energy
 - D) an electron with less energy
9. Which is the electron configuration of a ${}^3_1\text{H}$ atom in the ground state?
- A) 1
 - B) 2
 - C) 2-1
 - D) 2-2
10. What causes the emission of radiant energy that produces characteristic spectral lines?
- A) neutron absorption by the nucleus
 - B) gamma ray emission from the nucleus
 - C) movement of electrons to higher energy levels
 - D) return of electrons to lower energy levels
11. The light produced by signs using neon gas results from electrons that are
- A) moving from a higher to a lower principal energy level
 - B) moving from a lower to a higher principal energy level
 - C) being lost by the Ne(g) atoms
 - D) being gained by the Ne(g) atoms
12. What must occur when an electron in an atom returns from a higher energy state to a lower energy state?
- A) A specific amount of energy is released.
 - B) A random amount of energy is released.
 - C) The atom undergoes transmutation.
 - D) The atom spontaneously decays.