

5. Shown below are excited states for some elements. Identify each element and write its ground state configuration:



6. Using only a periodic table, write the notations requested for each element below:

Sulfur (S): $1s^2 2s^2 2p^6 3s^2 3p^4$ (complete configuration)

Selenium (Se): $[\text{Ar}] 4s^2 3d^{10} 4p^4$ (abbreviated configuration)

Nickel (Ni): (orbital notation for valence electrons)



7. Give symbol and name the element in the fourth period of the periodic table with:

a) 5 valence electrons arsenic (As)

b) a total of four 4p electrons selenium (Se)

c) a total of three 3d electrons vanadium (V)

d) a complete outer shell krypton (Kr)

8. Write complete electron configuration for each of the following ions:



What do all the electron configurations above have in common?

They all have noble gas electron configurations

9. Using electron configurations, explain why oxygen tends to form a 2- ion while calcium forms a 2+ ion.

Oxygen has 8 electrons and forms a noble gas configuration by gaining 2 electrons to form O^{2-} ion:



Calcium has 20 electrons and forms a noble gas configuration by losing 2 electrons to form Ca^{2+} ion:



10. According to the quantum mechanical model for the hydrogen atom, which transition produces light with longer wavelength: 3p to 2s or 4p to 2s? Give clear explanation and reasoning.

The 3p to 2s transition has lower energy than 4p to 2s. Therefore it produces a light with lower frequency and longer wavelength.

11. Complete each statement below with a suitable word or phrase:

- A) Based on Bohr's model of atom, the electrons exist in energy levels around the nucleus.
- B) The arrangement of the electrons around the nucleus is called electron configuration.
- C) A particle of light is referred to as a(n) photon.
- D) The group number of representative elements represents the number of valence electrons.
- E) The number of waves per unit of time is called frequency.
- F) Electrons that exist in the same orbital must possess opposite spins.
- G) When electrons descend from higher energy levels to lower ones they emit light.